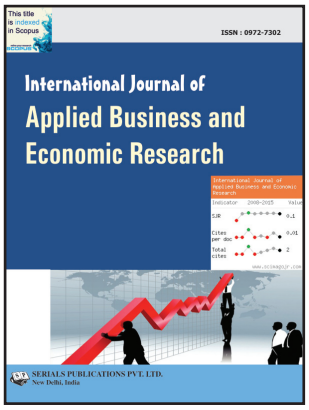

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Research Project Management as the Main Tool of Innovative Management

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ABSTRACT

The selection of priority areas of research and development plays an important role in the science and technology policies of the state. Priority areas for research and development are implemented in the form of large intersectorial projects aimed at creation, absorption and dissemination of technologies that contribute to drastic changes in the technological basis of the economy and to the development of basic research, scientific and technical provision of social programs, and international cooperation programs. The history of research project management can be traced back to the appearance of Homo sapiens, capable to deliberately and purposefully influence the surrounding world, and to transform it. Earlier, the concept of "project" was associated more with the technical side of human life, often with a construction area (the project of the building, plant, railway station, etc.). In our days, project is a methodology of organizing an activity, which helps to achieve tremendous results and to implement the most daring ideas. The project is a key concept of modern management science. Today, virtually any area of human activity – culture, science, education, social sphere, medicine and business – are marked by the presence of projects. That is why research project management is the most important tool of modern management that determines the relevance of the topic of the present work.

JEL Classifications: O14, O31, O32, O33.

Keywords: Innovation, innovation management, process management, new technology.

1. INTRODUCTION

The main impetus in the creation of a research innovation project is the willingness of enterprises to implement technological and managerial innovations. This is connected with the re-tooling of enterprises with modern equipment and expediency of state support of innovation in an industry or at a single enterprise.

Prior to its implementation, state expertise on the needs of the proposed foreign technology within the field, region or state should be carried out. Regarding this, it is interesting to note the experience of post-war Japan in the formation of policy of importing innovative foreign developments. Japanese economists offer two approaches for the acceleration of scientific and technological development. The first is the mastery of foreign innovative experiences on the basis of purchased licenses. The second is the intensive development of own research base. The state is expected to regulate the import of new technologies using the following strategic approaches:

- to exercise tight control over foreign exchange transactions during the purchase of foreign licenses;
- to force foreign companies to sell their licenses as a premium to access the country's market.

These activities should preferably take place within the framework of the implementation of research projects.

2. MATERIALS AND METHODS

Theoretical and methodological basis of our research are the conceptual provisions of fundamental and applied scientific works of leading domestic and foreign scientists in the field of innovative management and research project management.

The tools used to solve the research task are based on the dialectical approach to cognition, providing a systematic and comprehensive approach to the problem under study.

3. THE CONCEPT AND SUBJECT MATTER OF THE RESEARCH PROJECT

It is our understanding that the research project is the implementation of research and development aimed at solution of topical theoretical and practical issues having socio-cultural, economic or political significance. Research projects offer scientifically reasonable technical, economic or technological solutions.

There are the following types of projects: initiative scientific projects; projects for the development of material-technical base of scientific research; projects of creation of information systems and databases (IS, DB); publishing projects, organization of fieldworks etc.

Research projects can be executed involving various numbers of participants. They are one of the forms of the innovative project.

Initiative projects, as a rule, are carried out by small (to 10 persons) research groups or individuals.

The implementation period of an initiative project is usually one, two or three years.

The initiative project consists in the following: a fundamental scientific problem the project is aimed at; a specific fundamental task within the framework of the problem to be solved by the project; the proposed

methods and approaches (with an estimation of the degree of novelty), the general work schedule for the duration of the project; expected scientific results (a detailed description with assessment of the degree of originality); the current status of research in the field of science, comparison of the expected results with the world level; available scientific groundwork on the proposed project, the previously obtained results (with assessment of the degree of originality); developed methods (with estimation of the degree of novelty); the list of publications most closely related to the proposed project; the list and characteristics of existing equipment.

The project of development of material-technical base of scientific research includes: fundamental problems for the solution of which expensive equipment will be used; the scope of use of the equipment (department, organization, etc.); the overall work plan for acquisition and commissioning of the equipment; the existing groundwork for the proposed project; the list of available equipment and materials, and the rationale for the purchase of new equipment; a contract on acquisition (or manufacturing) of expensive equipment.

The project of development of information systems and databases reflects the following: the field of knowledge in which to apply the created IS or DB; fundamental scientific problems whose solution requires the creation of IS and DB, the users and their estimated number; a specific fundamental problem to be solved by the project; the proposed methods and approaches; the overall work plan for the duration of the project; expected results; state of the existing IP in the given field of science, benchmarking against the world level, domestic or foreign counterparts; available scientific groundwork for the proposed project (the experience of similar projects, description of the previously created IS, key publications); the licensed software available to the developers of IS; a list of expensive software and hardware that need to be further purchased for the successful implementation of the project; ways to deliver the created IS to the scientific community (removable media; the user is require to have specific licensed software; telecommunication access, other ways); standard features of the developed IS (required RAM - Kbytes); free memory required on hard disk (MB) for the program and separately for the database; the estimated hardware and operating platforms, software tools required for the operation of the IS); functional characteristics (IS type, number of output forms, the data source for IS, the number of fields and the number of records or objects; methods of submission of documents; organization and search mode); optional features (network, data transmission, communication channels, further IS development, ways of providing information from IS).

The publishing project includes: the fundamental scientific problem the results of which the project aims to analyze and generalize; a specific fundamental task in the context of that problem; the plan-prospectus (structure and the contents) of the edition, edition volume in copyright sheets (one author's sheet is equal to 40,000 characters) and the estimated circulation; state of the art publications in the field of science; the degree of originality of the offered edition (contents, structure, level of analysis and synthesis, methods of presentation); previous scientific results available from the author(s); previously obtained results and developed methods; list of publications of the author(s), most closely specific to this project.

The project of conducting fieldwork includes the following: the fundamental scientific problem it aims to solve; specific problems; overall work plan; the existing groundwork for the proposed project (prior results, justifying the need to conduct field work); a list of existing and needed equipment.

The project for the establishment of common use center shows: the field of knowledge in the solution of fundamental problems of which it is expected to use complex equipment; a list of available equipment,

its technical condition and main characteristics; the available expertise in scientific and methodological use of complex equipment for basic research; the main directions of scientific-methodological development of the center, a list of necessary equipment and materials to ensure stable operation of the complex.

The types of projects mentioned above are characteristic for carrying out scientific research in mathematics, information science, mechanics, physics, astronomy, chemistry, biology and medicine, earth sciences, humanities and social sciences.

A research project is characterized by the following:

- it is original;
- it has a clear aim;
- it has a definite beginning and end;
- it is limited in time and means;
- it is complex;
- it requires the involvement of specialists of different profiles;
- it has a high priority.

The project aims at achieving specific goals within the limited time while using limited resources. The goals are so novel that the project demands special approaches to its implementation:

- creation of a project group or creative team;
- management (how to ensure that the project meets the requirements for quality, costs and deadlines).

Many projects can be implemented alongside with the usual activities. However, project implementation often requires the organization of a working group (Sergeevich & Vladimirovich, 2015).

4. FEATURES OF LIFE CYCLE OF CONVENTIONAL AND UNCONVENTIONAL PROJECTS

The project life cycle is the time between the moment of conception, the birth of the project and the time of its termination, its completion. It is the conceptual notion for the problems of financing the project and making appropriate decisions (Konoplev, Kunelbayev, Mekebaeyev, Kabdoldina, Seidildayeva & Silnov, 2016). Project life cycle is divided into four major stages: pre-investment, investment, operating, and termination.

At the pre-investment stage, the following must be carried out: estimation of investment opportunities; pre-feasibility study; feasibility study; planning; report on investment opportunities; arrangement of financing.

At the investment stage: negotiation and conclusion of contracts; design; training; construction; marketing.

At the operation stage: acceptance and launch; production; equipment replacement; expansion, modernization, innovation.

At the stage of termination of the project, the completion of the project occurs as a one-off event.

Another kind of division of the project depends on its specificity. An example is the division of the project into the following phases:

- the conceptual phase consists of objectives setting, analysis of investment opportunities, justification of the feasibility (feasibility study) and project planning;
- the development phase of the project involves structuring the work and appointment of executors, scheduling work, project budget, development of design and budget documentation, negotiations and conclusion of contracts with contractors and suppliers;
- the execution phase of the project includes work on the implementation of the project, including construction, marketing, and training of staff;
- the completion phase of the project consists of acceptance tests, trial operation and putting the project into operation;
- operational phase includes acceptance, launch, replacement of equipment, expansion, modernization, innovation.

Construction, architectural and any similar projects are referred to as standard or traditional. Planning the above projects involves relying on familiar technology and the estimated results. In the implementation phase, traditional projects consume a considerable part of the allocated resources. Their use is necessary for the implementation of the strategy of senior management when project, industry and ultimate goals and expenses, and the management is practiced in the framework of the existing and unchangeable production and organizational structures and corporate culture. Management of traditional projects includes: planning (answering the questions "what, who, when, how"); organization and motivation; obtaining results as the outcome of the system of project management with the characteristics of the current state of the enterprise; determination of the measured results (control loop); comparison of measured results with the desired (planned) monitoring (control) methods; taking management decisions with coordination and regulation of work according to plan.

Non-traditional projects for organizational changes are marked by coinciding conceptual, planning and implementing phases while termination phase is virtually absent. Such projects are unique in their own way; therefore, goals and objectives are formed at all stages of their implementation. Global projects are also considered non-traditional during their first realization. For the implementation of non-traditional projects, unconventional methods are often used, while the implementation of traditional projects necessitates standard common approaches and practices. If any non-traditional project succeeds, it then acquires the status of traditional project. Cooperation between enterprises is one of the examples of non-traditional projects. In non-traditional projects, management strategy is predefined by circumstances beyond one's reasonable control. To manage the project a specialized project team is formed outside of the structure of the enterprise. Planning begins with the analysis of the data on similar cases. Objectives of the innovative projects identify the need to improve the management strategy of the enterprise in the area of statics of the system (the tree of goals, design decisions, structure of functions, matrix of distribution of rights and responsibilities), and the achievement of positive dynamics (management stages and procedure). The need to initiate innovative projects «from below» meets the requirements of modern market economy, when both

the management and the specialists of the company independently and thoroughly develop the conceptual and planning phase of the project.

Thus, it can be stated that the degree of novelty, the originality of ideas, and methods of implementation allow to divide projects into traditional and non-traditional.

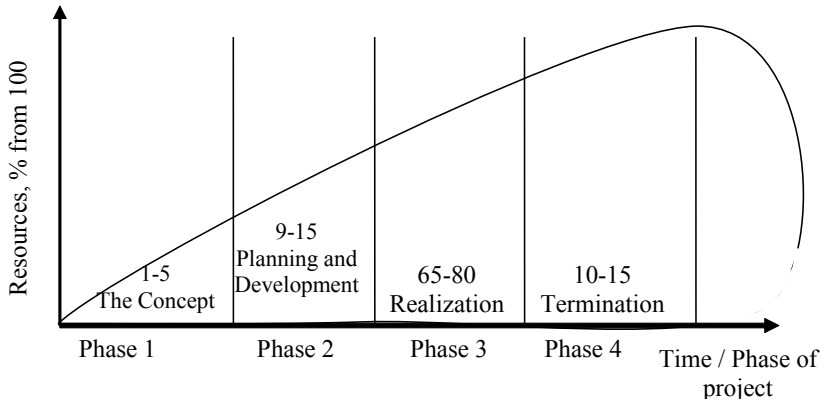

Figure 1: The structure of the life cycle of traditional project

The normative documents existing in the Russian Federation require that the organizational cycle of traditional project consist of four phases (Figure 1):

1. The Concept (1-5%);
2. Planning and Development (9-15%);
3. Realization (65-80%);
4. Termination (10-15%).

The output of each stage are the results, analyzing which further decisions can be made whether to move to the next phase of the project or to make corrections, to terminate the project. The positive results of the completion of each phase of the project mean progress toward the implementation of the general goal of the project, i.e. the creation of the final product (with the exception of the termination of the project because of inappropriateness of its continuation).

Unconventional approach is defined by the principle of reciprocating development, or iterative system expansion. This presumes that at each stage of the project functioning products are created, which are further developed by increasing functionality. Consequently, the development stages of the when at each individual iteration are incomplete, they are supplemented (expanded) in subsequent iterations. This principle virtually change the concept of life cycle: earlier the product was produced only at the end of the development period, whereas now relatively finished functional products appear at each iteration.

5. PRIORITY AREAS FOR RESEARCH AND DEVELOPMENT

The leading role in the state scientific and technical policy consists in the identification of priority areas for research and development. The implementation of the priority areas of research and development occurs as large-scale interdisciplinary projects for the creation, development, and dissemination of technologies. These technologies contribute to significant changes in the technological basis of the economy and to

the development of basic research, scientific-technical provision of social programs, and international cooperation.

The list of critical technologies includes specific priority directions of development of science and technology. These technologies, in fact, are intersectoral and their importance for further progress in various fields of science and technology is very high. Selection of critical technologies requires consideration of their impact on the competitiveness of products and services, quality of life, improvement of the ecology, etc. The Governmental Commission for science and technology policy drafts and approves priority directions of development of science and technology; it also draws up a list of critical technologies at the Federal level.

The Government of the Russian Federation approves acting state scientific and technical programs offered as: separate programs at the Federal level, subprograms as part of Federal scientific and technical programs (Gorbachenko, Kuznetsova & Silnov, 2016), based on several state scientific and technical programs and subprograms as part of Federal target programs.

The purpose of investing in programs is the development of research in the field of high-energy physics, nuclear physics, controlled thermonuclear fusion, high-temperature superconductivity, space, the World Ocean, and genetics. Programs in the field of technologies, machines and industries of the future, promising information technologies, and the development of the newest methods of bioengineering are also financed. In addition, there are state scientific and technical programs of development and creation of new medicines, programs of development of medicine and public health, and solution of some social problems.

6. NATIONAL SCIENCE-TECHNOLOGY CENTERS

A State Research Center is a special scientific complex at the Federal level. The status of a state research center can be obtained by a research company, organization, institution of higher education with unique experimental equipment and highly qualified personnel. This status is assigned by the Government of the Russian Federation. These organizations enjoy special support if the results of their research has received international recognition. The assignment of the status of a state research center does not change the organizational and legal form of the enterprise.

State research centers are exempt from value added tax when purchasing equipment, materials, third-party services, and purchased goods necessary for realization of the idea of programs funded from the Federal budget; the import customs duties, etc.

Already by the beginning of 1996, there were more than 60 state research centers in Russia. The government of the Russian Federation approved a number of programs, one type of which is the Federal scientific-technical program.

7. SCIENTIFIC AND TECHNICAL RESEARCH PROGRAMS

A Federal scientific-technical program contains a complex of scientific research and development projects linked by resources, performers and terms of implementation, as well as measures for their implementation.

The goals of Federal scientific and technical programs are: the production of new knowledge in the field of fundamental and applied science; solution of scientific and technical problems; creation of competitive equipment, technologies (Silnov, 2106), and materials providing the general increase in the level of knowledge and practical implementation of qualitatively new scientific ideas and technologies; development of scientific-technical and export potential of Russia.

This requires the following conditions to be met:

- a project must play an important role in major structural changes aimed at formation of a new techno-economic paradigm;
- a project must be a principal novelty and be interconnected with other projects necessary for the widespread dissemination of progressive scientific and technical achievements.

The state customer is the Committee for Science and Technologies of the Russian Federation.

A Federal scientific-technical program is guided by the Academic Board. The board is responsible for selecting the technical solutions, level of achievement, fullness and complexity of activities to achieve program goals. The Academic Board is organizing a competitive selection of executors and examination of the obtained results.

Today in Russia there are 41 Federal scientific-technical programs. They include the creation of environmentally friendly and resource-saving technologies in the energy sector, chemistry, metallurgy; new materials creation; efficient manufacturing processes for the agricultural sector; technologies and equipment for construction and transport. A number of major projects in high priority directions of development of science and technology are carried out by the assignment of the Committee on Science and Technologies of the Russian Federation and are funded from the Federal budget.

In the Russian Federation there are several high priority areas of development: information technology and electronics, industrial technologies (laser, robotics, flexible industrial systems, etc.); creation of new materials and chemical products; technology of living systems (e.g., biotechnology); transport, fuel and power; ecology and rational nature resource management. Within these areas, 77 critical technologies are singled out.

The above directions are an integral part of the implementation of the state scientific-technical programs and research programs of state research centers, major economic programs and projects, international and regional programs and projects.

Programs at the Federal level must meet the following requirements:

- the program and its constituent projects corresponds to the priority directions of development of science and technology and the list of critical technologies;
- the implementation of the program will have a positive impact on the development of the economy, exports, social services, science and technology;
- the need for support from the state is obvious, because to solve the problem in acceptable time through the existing market mechanism is not possible;
- the program must have mandatory novelty and technological progressiveness of the scientific and technical results;

- the program must produce a significant impact on structural relations in the economy and an increase in production efficiency;
- the program must have adequate (complete and interconnected) system of actions for the solution of the tasks;
- the existing groundwork, availability of personnel, material-technical base and other necessary resources must ensure achievement of the goal.

The selection of a program is largely determined by socio-economic priorities, forecasts, directions of the structural policy and commitments at the international level.

Most often, Federal scientific-technical program are planned for the medium term (five-year period) in accordance with the Federal law "On State Forecasting and Programs for Socio-Economic Development of the Russian Federation".

8. PROJECT MANAGEMENT: PECULIARITIES AND DIFFICULTIES

Project management has a number of peculiarities and difficulties. The working group established for the implementation of the project has to face challenges different from the ones the existing functional units usually face.

Between the working group and the whole organization there must be a stable relationship, because the project should be implemented in cooperation with existing units and the result should be integrated into the existing structure. For example, the introduction of distance education at the university should be done in collaboration with the deans, departments and other units.

Each member of the working group has, as a rule, two seniors (team leader and head of functional units). To manage the project a leader can be assigned. The structure of the project team depends on the complexity of the project. If it is, for example, modification of the product, a limited working group is created, composed of the departments of new product development, production, marketing and service. This group is accountable to the head of the relevant department.

If the project aims at major innovations, the composition of the groups can be the following: technical (work) leader, deciding what to do and when to do it; the scientific ("professional") leader, responsible for quality of work; the manager, ensuring the personal interests of employees are observed (salaries etc.).

The leaders form a coordinate group, whose tasks are:

- Definition of the goal of the project;
- Appointment of heads of working groups;
- Establishment of working groups;
- Setting objectives;
- Monitoring the implementation of the project (quality, time, costs);
- Decisions on the continuation of the project;
- Dissolution of the working groups.

Working groups carry out their part of the project. They are responsible for planning, control, reporting to the coordinating group and the entire organization.

The selection of candidates for the working group is guided by the following criteria:

- Competence and experience;
- Expertise in subject area;
- The opportunity to engage;
- Power and authority in the organization;
- The ability to resolve conflicts;
- Employee morale;
- Personal interest and motivation.

It should be noted that the project manager plays a crucial role in the organization of work. Therefore, his personal qualities, abilities and powers must ensure his/her authority among the leaders of the functional units.

In the practice of management, different techniques of working group management apply, for example, budget planning and expenses control; management of information flows, etc. However, these methods are not specific to the working group, they are used to control any processes. However, the procedures of holding meetings on the project, decision-making, etc. are universal.

The specific project management tools include:

1. Definition of the problem and goal setting.
2. The establishment of intermediate stages (division of the project into separate phases).

A clear formulation of the problem and setting of goals are important for:

- Understanding of the project and establishing milestones;
- Highlighting the most important problems;
- Creating a model of information exchange;
- The definition of expected results;
- Developing recommendations after the completion of work.

9. CONCLUSIONS

Research projects offer scientifically reasonable technical, economic or technological solutions.

Projects can be funded through the state scientific-technical programs, or through grants.

Each project is issued subject to certain requirements. It has a clear title, is accompanied by a brief annotation, the project statement specifies the number of participants, deadlines, the need for financing per year, information about the leaders and key performers.

Priority areas for research and development are implemented in the form of large intersectoral projects.

Priority directions of the development of science and technology in Russia are information technologies and electronics, manufacturing technology, new materials and chemical products, technology of live systems, transport, fuel and energy, ecology and rational natural resources management.

To manage the project and implement it the working group is created.

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