INTEGRATION OF PROJECT MANAGEMENT INTO THE RESEARCH ACTIVITIES OF UNIVERSITIES IN KAZAKHSTAN PRACTICE INNOVATIONS AND PROSPECTS

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Abstract - Scientific activity in Kazakhstan faces a number of systemic challenges, including centralized management, lack of management, and dependence on state funding. At the same time, Kazakhstan has successfully integrated project management into the public sector, which has been recognized at the international level. Based on this, there is a need to adapt and apply project management to optimize research activities in the country's universities. The report presents the experience of a team of scientists from KazNRTU named after K.I. Satbayev, demonstrating positive results of the application of project management in science. The artifacts and management techniques are presented, as well as conclusions emphasizing the effectiveness of this approach for improving scientific research in the region.

Keywords - Project Management, Scientific Research, Universities of Kazakhstan, Efficiency, Innovations

I. INTRODUCTION

Science and technology are developing at an incredible speed in the modern world, which leads to the need for more large-scale and complex scientific research. It is necessary to use effective methods and tools formanaging scientific activities for the successful implementation of scientific research. One of the main aspects of scientific research management is the planning, execution and control of project implementation. The issues of defining the goals and objectives of the project, rational allocation of resources, monitoring compliance with deadlines, as well as analysis of the results obtained are touched upon. The idea of promoting project management in Kazakhstan was announced back in 1993 at the First Congress of Engineers of Kazakhstan. Since then, this concept has been developed in the training of qualified, certified project managers, as well as the widespread application of project management methodology in all spheres of life. Kazakhstan has already made some progress in this area. A number of state projects have been initiated in various sectors at the government level, such as: high-quality and affordable healthcare, quality education, digitalization, entrepreneurship development, regional development, agro-industrial complex and national security.

In his speech on April 12, 2023, the president Kassym-Jomart Tokayev noted: "The overly centralized system of planning and management, lack of quality management, critical dependence on government funding, low demand from business for R&D, outflow and shortage of personnel, especially young ones, are characteristic problems of Kazakh science."

At the same time, there are certain problems in Kazakh science, such as excessive centralization of the planning and management system, lack of quality management, strong dependence on government funding and low demand for research work from business. All this leads to an outflow of qualified specialists and a shortage of young personnel in the scientific field. It is necessary to continue developing project management skills, attract more investments and solve existing problems in Kazakh science.

II. LITERATURE REVIEW

The Union of Project Managers of Kazakhstan together with the Kazakh National Research Technical University named after K. I. Satbayev have been actively engaged in research in the field of project management since 2003. They develop knowledge-oriented organization management models, study the factors influencing the development of companies in various industries, and also monitor the dissemination of managerial knowledge in public administration.

The issues of development of educational programs and certification in the field of project management are being actively addressed in Kazakh universities. For example, seven universities in the country are already training masters in this specialty, and three - PhD doctors, there are 270 masters and 26 PhD doctors in the field of project management. Therearethree dissertation councils at Satbayev University, Kazakh National University named after Al-Farabi and Astana IT Universityat the moment.

Certification issues are also being successfully resolved. A domestic CPM certification system was

created, according to which 187 project managers, 243 assistant project managers and 2600 certified project managers have already been certified according to the national standard of the Republic of Kazakhstan ISO 21500.

Kazakhstan conducts a lot of scientific research in various fields, some of them are devoted to energy, ecology, medicine, information technology and other areas. The effectiveness of project management in these studies may vary depending on the field of science and the specific organization. In some cases, it can be very useful, providing control over the project and reducing the risk of failure. In other situations, traditional methods of project management may be less suitable due to the peculiarities of scientific activity and the need for flexibility and innovation.

Various tools and methods of project management are used in scientific research, but they are not always fully applied. For example, programs such as Microsoft Project and Asana are used for project planning, error tracking systems such as Jira and Trello are used for task control, analysis methods such as SWOT and PESTLE are used for risk management, budgeting tools such as Excel and Google Sheets are used for resource allocation.

III. DATA AND METHODOLOGY

In the modern world, scientific research and technological developments are developing at a high speed and this requires effective management of scientific projects, which will allow rational use of resources, control the performance of tasks, and quickly respond to risks and problems. We consider methods and tools for managing research projects in this paper. The relevance of the topic is associated with the importance of project management in the conditions of rapid development of science and technology, without which it is impossible to achieve success in scientific research. We will consider the main methods and tools for managing research projects, their features and advantages in this paper.

The Ministry of Science and Higher Education mainly deals with the issues of scientific research and their introduction into production in Kazakhstan. It holds an annual contestfor funding for scientific projects of various formats, including projects for young scientists and the "Zhas Galym" program. Applications for participation in the contest are subject to formal and expert evaluation at the National Center for State Scientific and Technical Expertise. The most relevant projects are selected according to the results of the contest, the process is open, and its results are published on social networks and on the Ministry's website. In 2022, for example, funding was allocated for 16 scientific projects in the field of ecology, medicine, information technology, energy and others. Scientists from Kazakhstan and other countries participated in the contest. The results of the contest are also published on the website of the Ministry and on the websites of partners.

IV. RESULTS

All the main issues of the project are described in the application for participation in the contest. The application can be considered as a detailed order of the project from the point of view of project management. The project team develops a calendar plan, staffschedule, rental, operation and other costs based on the application, which are approved by the project manager, a representative of the university and the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan.

However, during the implementation of projects under state grants, difficulties arise related to the fulfillment of the tasks specified in the application. Project execution often takes place according to outdated methods that do not use project management tools and methods. This leads to the fact that the final product of the project does not fully correspond to the expected result, and the reports of the performers differ from the expected scientific results of the project, highlighted in the bids.

Such situation has been developed due to the non-use of project management capabilities by research groups to the full extent and often these groups are not familiar with the tools and methods of project management.

Another problem is that researchers are often busy with their current tasks, working at the university as instructors, which makes it difficult to interact and exchange information on the project, because the key problem in our case (which, as it seems to us, is typical for other universities) is the workload of the project staff with the educational process. The solution to this problem is possible if there is a full-time coordinator (operator) who performs operational interaction with team members and monitors the progress of the project tasks in a 24/7 format.

An issue is arisen by the fact that project managers often do not possess modern tools and methods offered by modern project management. The people who have submitted applications for the contest are appointed/become the heads of research projects, who are experts in their subject areas. Such a problem can be solved by conducting advanced training courses for potential managers of scientific

projects on project management with subsequent certification.

We have created a set of documents for the organization and control of the tasks of research projects as part of the implementation of project No. AR 14871548 "Development of productive models for managing portfolios of development of small and medium-sized businesses in Kazakhstan based on the ideas and principles of Agile technologies". We propose to use the templates developed by us for the management of scientific projects: the decomposition of the tasks of the research project, the design of the study, the outputs (output) by tasks, the main final products and results (output) of the project (form 1), the content of the final report (form 2) and the journal of current work with the literature used.

The main purpose and objectives of the project are known at the start in research projects. We offer a decomposition template that allows to designate the names of tasks and activities within the project, appoint a responsible person, highlight the delivered results, identify participants in this task from among the research group, track the dynamics of execution and the deadline for the successful implementation of projects. This template for the decomposition of project tasks is shown in Figure 1.

Decomposition of the tasks of the research project "Development of productive models for managing the development portfolio of small and medium-sized businesses for the conditions of Kazakhstan based on the ideas and principles of Agile technologies" into the delivered results

As of 11/15/22

	Name, tasks and measures for their implementation	Responsible Performer for the Task	Deliverable results (PW) for tasks. *CIP - Calendar Plan Task*	Performers for PW	Performance dynamics			Completion date according to PW		Note
					12/11/22	15/11/22	D	Plan (start-finish)	Fact (start-finish)	
1	2	3	6	7	8	9	10	11	12	13
	Task:									
1	**Development of a Methodological Guide for Assessing the Degree of Technological Maturity of Small Business Project Management**	Kuatov R.K.	1.1. Contents of the Methodological Guide	Kuatov R.K., Nekrasova N.A., Tsekhovoy A.F., Stepanov A.V.	70%	70%	0%	01.09.22-31.12.22		The result of one Brainstorm
			1.2. CIP - Literature review of scientific literature	Kuatov R.K.	70%	70%	0%	01.09.22-15.11.22		
			1.3. Development of a questionnaire for conducting a survey	Kuatov R.K.	5%	5%	0%	01.10.22-15.11.22		
			1.4 Formation of a group of experts (from the UPM RK database)							
			1.5. CIP - Report on a survey of SMB managers							
			1.6. Section in the Annual Report 2022 (in the form of information, an abstract of work performed for each section)	Kuatov R.K., Nekrasova N.A., Tsekhovoy A.F., Stepanov A.V.	100%	100%	0%			Uploaded electronically into the reporting form on the portal
			1.7. CIP - Matrix of target characteristics of successful development of the company	Kuatov R.K.	5%	5%	0%	01.01.23-01.03.23		Determine the location of the
			1.8. CIP - Classification in the table of existing models for assessing the maturity of project management	Kuatov R.K.	5%	5%	0%	01.01.23-01.03.23		
			1.9 Article "Model for forming requirements for a system for assessing the technological maturity of project management in a company"	Kuatov R.K., Nekrasova N.A., Tsekhovoy A.F., Stepanov A.V.	15%	15%	0%			Published online (CQASES, conferences..)
			1.10. CIP - Criteria for assessing the technological maturity of project management of SMEs	Kuatov R.K.	5%	5%	0%	01.04.23-01.06.23		
				Kuatov R.K.,						Published in

Figure 1 – Decomposition of project tasks

When the decomposition of the project tasks into individual tasks has been carried out and the owners of the tasks have been identified, the research team can begin to develop the design of the study, which is shown in Figure 2.

In this process, tasks that need to be solved are identified from the proposed project product, and then methods of research and data collection are described for each task. At the same time, the methods of research and data collection are divided into the following blocks:

- analysis of sources (foreign, domestic),
- qualitative analysis (grounded theory, observation/interview, collection of documents/artifacts, narrative research, case study),

Quantitative analysis: experiment, quasi-experiment, surveys, statistical data mixed analysis: sequential mixing from qualitative to quantitative, sequential mixing from quantitative to qualitative.

№	Research output	Research objectives	Research and data collection methods															
			Exploration research	Source analysis		Qualitative analysis					Quantitative Analysis				Mixed analysis			Other methods
				Foreign	Domestic	Grounded theory	Observation/interview	Collection of documents/artifacts	Narrative research	Case study	Experiment	Quasi-experiment	Polls	Statistical data	Sequential mixing from qualitative to quantitative	Sequential mixing from quantitative to qualitative	Parallel application of quantitative and qualitative approaches	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	Model of managing the development of an organization through UPM RK projects *(basic model of the entire study, "parent")*	1. Justify: 1.1. Conditions for capacity building; 1.2. Characteristics of trigger events; 1.3. Factors ensuring the dynamics of development.																

Figure 2 –Design of research in scientific projects

The Subsequent results of our research in this direction are reflected in the so–called Forms 1 and 2, Form 1 – The main final products and results (Output) of the AP14871548 project and Form 2 - The content of the final report on the project. These forms are also shown in Figures 3 and 4.

Main final products and results (Output) of the AP14871548 Project

Form 01 – RW 22

№	Results(Output)	Performers	Date of approval, signature	Completion dates	Requirements for the presentation form	Note
1	2	3	4	5	6	7
1	The text of the Final Report, edited for external review, meets the requirements of the NCSSTE	***Sultanbekova Zh.Zh.*.**		1.05.2024	100-250 pages	
2	Guidelines for managing the development portfolio of an SMB organization, describing the content of the developed productive models	***Zholtaeva A.S.*** *Sarkambaeva Sh.G. Akzambekkyzy A.*	18.04.23	1.03. 2024	Book 100 copies	To the library and to NCSSTE
3	Methodological guidance for assessing the degree of technological maturity of small business project management	***Kuatov R.K.***		1.06.2023	Brochure 90 page in 100 copies	To the library and to NCSSTE
4	Model of manager competencies and criteria for assessing his managerial maturity	***Zykova N.M.***	20.04.23	1.06.2023	Brochure 70 pages in 100 copies	
5	Advanced training program for managers of SMBs. A set of rules, algorithms, templates	***Zykova N.M.,*** *Sultanbekova Zh.Zh.*	20.04.23	1.05.2024	10-15 pages – In the appendix to the report	
6	Materials for state registration of rights to a copyright object entitled "Productive models for managing the development portfolio of an SMB organization" I Model of managing the development of an organization through projects (based on a flywheel); II Model of interaction between members of the development management team in the process of weekly compilation, monitoring and analysis of the WDS (weekly - daily schedules) of events, activities and contacts; III Model for managing commercial opportunities in the process of converting contacts into contracts;	Tsekhova A.F. Zholtaeva A.S. Tsekhova A.F. **Tsekhova A.F.** Stepanova A.V.		1.06.2024 1.07.2023 1.08.2023 1.09.2023	Reg. in MRIO Model description	

Figure 3 – Main final products and results of the project

CONTENT
of the final report

Form 02 - RW 22

№	Name	Due date	Performer	Note
1	2	3	4	5
	Introduction *(7-9 pages with subsections) (Relevance, Construction of research problems, Purpose, Objectives, Hypotheses, Scientific novelty, Products)*	*May 13, 2023*	*Tsekhovoy A.F.,* ***Stepanov A.V.***	
1	**Rationale for the research methodology**		*Tsekhovoy A.F., Stepanov A.V.*	
1.1	Theoretical basis of the study and literature review	*1.06.2023г.*	***Kuatov R.K., Zykova N.M., Sarkambaeva Sh.G., Sultanbekova Zh.Zh., Zholtaeva A.S.***	
1.2	Research base *(how we are going to obtain primary data: enterprises, Spider, Polytechnic, IAI, etc.).*	*1.07.2023г.*	*Tsekhova A.F., Nekrasova N.A., Kuatov R.K., Sultanbekova Zh.Zh.*	
1.3	Justification and selection of a tool for managing the execution of a grant application (as a project).	*1.07.2023г.*	*Tsekhovoy A.F., Kuatov R.K., Sultanbekova Zh.Zh.*	
1.4	Decomposition of research tasks, schedule and delivery management *(Publication Register, Project Product and other documents).*	*10.05.2023г.*	*Tsekhovoy A.F.,* ***Kuatov R.K.***	
1.5	Research methodology for project objectives:		*Sultanbekova Zh.Zh.*	*Prepares summary*
	1.5.1 Formation of a portrait *(personal characteristics and professional skills, competencies)* of an entrepreneur capable of realizing the "explosive" growth of his organization in the conditions of Kazakhstan.	*1.09.2023г.*	*Zykova N.M.*	
	Conclusion	*1.01.2024г.*	*Tsekhovoy A.F., Stepanov A.V.*	
	Recommendations	*1.03.2023г.*	*Stepanov A.V.*	

Figure 4 – Content of final report

V. CONCLUSIONS

1. PM is being actively introduced into the public administration system, thereby creating a favorable ground for its use in scientific research in Kazakhstan.
2. Wecreated a set of documents for the control of research projects, including decomposition, forms 1 and 2, publication plan, research design and a journal of literature accounting during the implementation of the project.
3. We recommend using portfolio management tools and skills to control projects in social sciences.
4. Lessons learned from the practice of applying project management of research. We were convinced in the following:

✓ of the universality of the first value of Agile: people and interaction are more important than processes and tools;

✓ the feasibility of creating special tools for organizing the interaction of team members;

- ✓ the need for a full-time operator who performs operational interaction with members of the project team in the 24/7 format;
- ✓ the project manager must be certified in the field of project management

5. Our vision for the implementation of PM in KazNRTU projects: Training and certification of project managers, expanded use of PM templates and tools.

The implementation of our proposals will help to improve the process of scientific research management in Kazakhstan.

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