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PROBLEMS OF RESEARCH DEVELOPMENT AND EDUCATION IN KAZAKHSTAN

Abstract

The accelerated development of economies is not possible without the introduction of innovation and the development of the country's scientific and research potential. The scientific and innovative system, represented by the subjects of the relationship, which directly affect the development of the scientific and innovative potential of the country. The end product of the system is the commercialization of research and development activities. The process of technology commercialization itself is a specific project, nevertheless, project management tools are applicable for it, but taking into account the specifics of innovation and with a high risk of failure. The article examines the main problems and barriers to the commercialization of technologies by conducting a sociological survey of participants in the innovation system of the Republic of Kazakhstan. The purpose of the survey was to obtain a holistic picture of the modern situations of the innovation system of Kazakhstan with an attempt to identify the main problems, both in the system as a whole, and in the process in particular. The respondents were direct participants in technology commercialization projects. Also, the article considered the problem of ensuring the educational approach of direct participants in innovative activities. The problem of the low level of education and the degradation of the education system is rising, which directly affects the country's innovation system. On the basis of the work done, recommendations were received on improving the innovation system and the corresponding project approach to the commercialization of technologies.

Keywords: research; innovation; education; development; commercialization.

Introduction. There are many initiatives by national governments to promote the commercialization of research and development. The main subjects of the development of research are education, science, production and the government. At the same time, at different stages of development, their role in the innovation process does not remain unchanged. There is some progress in Kazakhstan in the development and application of regulatory instruments in the scientific and innovation sphere [1].

Education is delivered to a society by educational institutions starting from kindergartens to universities and research institutes in order to achieve some level of goals and to develop human beings. Science starts at the master degree or doctoral level in the higher education system for understanding a particular subject which a student is majoring in. Any research projects have its own purposes and hypothesis to be developed for the society benefit or for the development of the country industry. So the interaction between education, science and industry is very essential while teaching and education the young generation.

One of the most important problems of research development is the problem of its organization, i.e. management. Since the implementation of a project for the commercialization of capital-intensive scientific developments is a rather complex process consisting of several stages, the need to develop a methodology for an effective

management decision is urgent. The quality of commercialization project management, which can be achieved by attracting highly qualified managers and training domestic personnel, comes to the fore. The social and economic growth of a country depends on the development of innovative research technologies and on their implementation in the practice, which means that each innovative devise of a scholar should be fairly awarded and should be given a chance to develop or realize his scientific idea until that idea achieves its own initial goal because a researcher sets several research purposes or sees several hypotheses while conducting his studies [2].

Despite all the initiatives and efforts on the part of the state, the indicator of the success of the programs for the commercialization of scientific research leaves much to be desired. One of the reasons for this state of affairs is an incomplete understanding of modern mechanisms of commercialization, the functioning of the intellectual property market and, among other things, the new rules of the game in the market of new technologies and innovations. The very understanding of the commercialization of scientists and personnel involved in the commercialization of scientific developments is limited to a judgment about the need to use funds intended for commercialization in favor of achieving the goals of deeper scientific research. Thus, many scientific developments remain not introduced to the market.

The problems of commercialization of Kazakhstani technologies are widely covered in the work of S.K. Mukhambetzhanov [3]. These problems arise at all stages of work, from the search for technologies and ending with their implementation and further support.

At this time, despite the public benefit, including the global scale of the open innovation model, the closed innovation model is still popular, including in developed countries. The closed innovation model assumes that the institute develops its technologies without the involvement of third-party scientific organizations, including any additional co-operation. University has internal resources and sufficient funding, which allows the development of technologies at the model stage with the development of a functioning pilot industrial prototype. Also, the university has in its arsenal the entire intellectual potential of the accumulated professors.

Research problems. Unfortunately, in the post-Soviet states the situation looks different. Currently, universities have a low level of support from the state, including direct or indirect support in the feed, funding, legal support and logistical support. The low level of financial support for scientific organizations will lead to the fact that scientific organizations in Kazakhstan have to postpone their direct responsibilities in the direction of scientific activity and move more to practical research, thereby fundamentally breakthrough research remains uncompetitive. At the same time, it is necessary to understand that the development of fundamental foundations is extremely important for innovations, and without these it cannot be possible to talk about innovations. As a result, this circumstance led to the fact that Kazakhstan has negative dynamics in the field of introducing domestic innovations. All these issues are related to the education system of the country.

In the 21st century, collaboration skills are becoming a must. There have been many studies showing the effectiveness of the collaborative learning approach in relation to students' ability to cooperate and interact. In Indonesia, through the introduction of the 2013 curriculum, group learning is being encouraged. The aim of the study was to describe the implementation of collaborative learning by describing teachers' understanding of collaboration skills and collaborative learning models, the strategies teachers use to teach collaborative skills, and the constraints that prevent teachers from using collaborative learning models. Hence, teachers need to deepen their understanding and open themselves to new learning patterns. It can be a challenge for principals and teacher education managers to provide intensive learning and training associated with a collaborative learning approach [4]. The collaborative learning approach has not been properly implemented in Kazakhstan yet. As a result, after graduation

from the university, most graduates lack working skills in solving problems collaboratively.

The widespread use of digital technologies in education has led to the need to study their impact on human cognition, as well as on the quality of learning and teaching [5]. Nowadays, all educational institutions have been teaching students online because of the global pandemic COVID-19. As a result, the quality of education decreased since Kazakhstan was not ready to transfer education from traditional to online. Students have been feeling stressed because they are locked down at home. Flexibility in the manifestation of human consciousness in matters related to the change in the information system has been tested more than once. Reformatting the educational approach in the information age is a new challenge for educational institutions. At the same time, the main tasks of finding the best solutions and revealing the truth remained unnamed – this is the human essence of a constant endless search interrupted by an existential crisis. Just like human being, consciousness, the role of the university in society has evolved and changed, in the information era, the university becomes a dialogue platform for people of different generations and worldviews [6].

The modern educational economy, the management of its development, science and the development of the industry as a whole, is one of the most actively developing aspects of community life, closely related to other (cultural-ideological, political-historical, psychological and legal transformations) spheres [7; 8]. For the successful implementation of research innovations and non-destructive interaction with the community, economic and related structures and educational organizations must build partnerships, responsible, individualized relationships [9; 10]. That means, that there should be interaction between education, science, government and industry because they must work together to achieve a successful result in the society, especially, after educational institutions have produced graduates.

In modern education, the idea of individual educational trajectories is actively used. The study of individual educational trajectories in modern pedagogy and psychology is a problem that should be based on numerous studies of education, accumulated by the science of Kazakhstan and Russia. It is also darkly associated with the comprehension of options and scenarios for the development of education in the future, the construction of foresight projects of education [11]. Pedagogical support for personal self-development in the context of the globalization of education is aimed at the global competence of a person. So education system should focus on the competency development of students [12; 13].

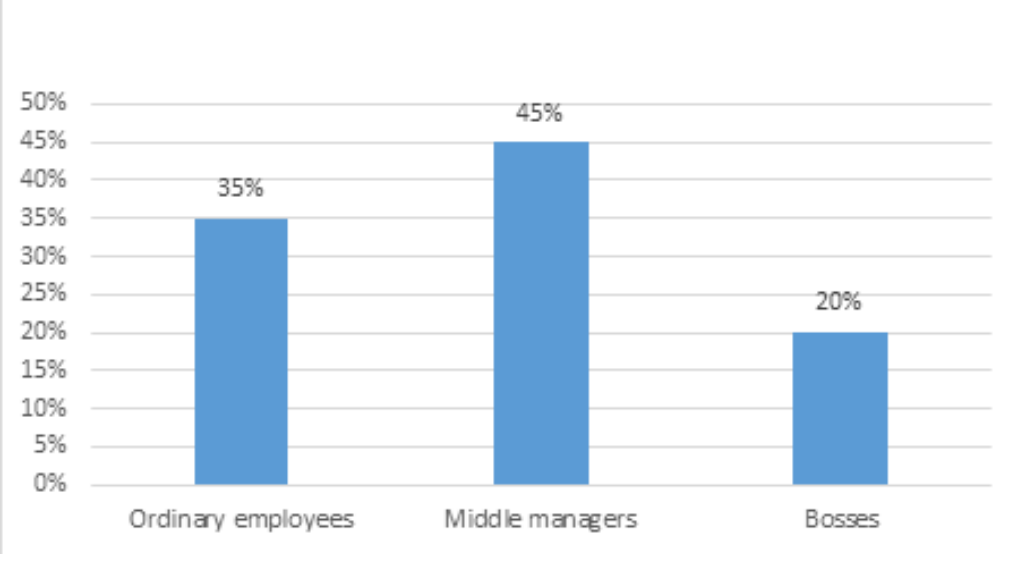
It is necessary to understand that the rapid scientific and technical development has given rise to a race of innovations in the world scientific environment. The processes of globalization have also influenced the speed of the spread of innovative solutions around the world, which also gave rise to the rapid obsolescence of new technological solutions. Not every country is able to maintain such a pace, while countries that successfully implement innovative projects receive a strategic advantage over other competing countries. All this suggests that the pace and speed of introducing new technologies to the market play an important role for successful implementations. The current practice of standardizing innovations in Kazakhstan does not meet the requirements of accelerated implementation, and even more so creates additional barriers to commercialization. Moreover, products are standardized after they have already been introduced into the market and managed to take their position. This phenomenon is due to the fact that it takes more than one calendar year to pass the standardization procedures, during this allotted time the innovation may lose its relevance. Thus, the existing mechanism is more a barrier to commercialization than a support measure.

In similar previous works, the authors came to the conclusion that the best solution would be to preserve the concepts of the innovation standard [14; 15; 16; 17]. The main message of this concept is that in parallel with the technical documentation for the product, a standard for an innovative product is also being developed with direct work on improving the product in

a cyclical manner. After that, the developed standard is submitted for state registration, in the end a full-fledged state standard will be received. This solution will allow the rapid advancement of innovation to the market.

Research results and discussions. In order to familiarize with the problems of commercialization on the ground, as well as to obtain additional information on the problem under study, a sociological study was conducted (Histogram 1). The survey was conducted by 27 respondents from the big cities of Kazakhstan such as Almaty, Nur-Sultan, South Kazakhstan region, Karaganda region. 35% are ordinary employees, 45% are middle managers and 20% are heads of organizations or departments. 68% of respondents have been working at enterprises for less than 5 years, 32% have more than 5 years of work experience. Most of the respondents 73% work in small enterprises, 50% of the respondents work in medium and large enterprises.

It should be noted that each of the stages of the study was accompanied by certain difficulties. The main problem was the reluctance of many companies to participate in sociological research. The reasons for refusing to take part in the survey were lack of time, lack



Histogram 1. **Sociological research**

of consent of the parent company, management, misunderstanding of commercialization activities, and so on.

Basically, about 70% of respondents think that the ongoing work on commercialization is insufficiently effective and brings little benefit to the progressive development of the domestic economy. In Almaty, 33% of survey participants believe that it does nothing, due to the low level of the country's most innovative development. In Nur-Sultan, they gave a critical assessment of the work being carried out, the respondents stated that the existing innovative activity in the country does not provide any benefit, and proposed to reform the system, there were more dissatisfied responses (53%). The reasons for the ineffectiveness of the work carried out may be the following:

– There are no clear criteria for the selection and support of promising scientific developments;

– Lack of interest of companies in scientific research, as well as weak government funding for commercialization;

– Each scientist considers his development to be unique and does not want to agree with the opinions of the commercialization specialist about the orientation of the research in accordance with the market.

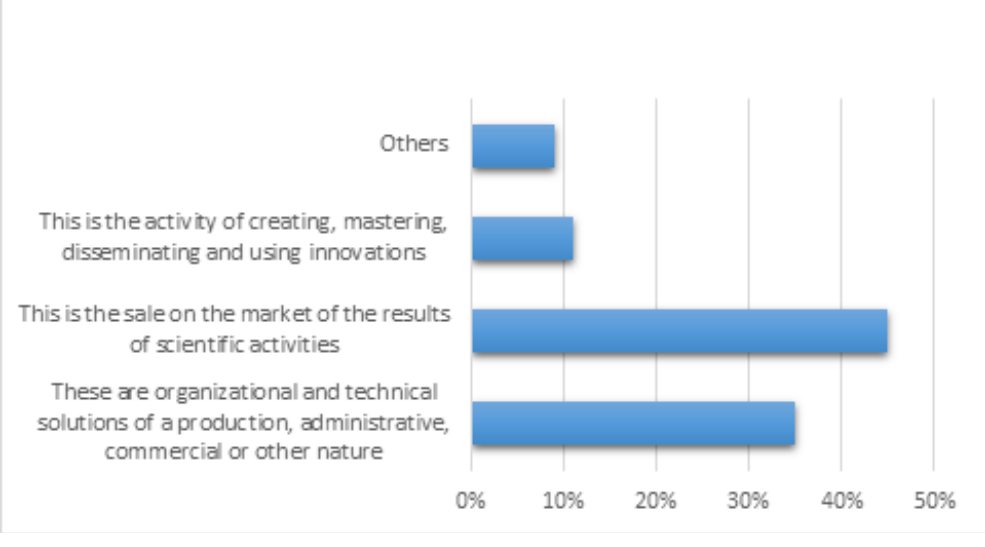
Basically, the majority of respondents

identified corruption as the main deterrent to the development of the system of commercialization and scientific research.

When asked what do you mean by commercialization, the respondents gave different answers (Histogram 2). Grouping them, mainly in Almaty and Nur-Sultan (35%) of respondents, the answer was commercialization – these are organizational and technical solutions of a production, administrative, commercial or other nature that contribute to the promotion of technologies, commodity products and services to the market, 45% decided, that this is the sale on the market of the results of scientific activity, 11% agreed that this is an activity for the creation, development, dissemination and use of innovations, 9% gave other responses.

When asked about the effectiveness of the commercialization system, most of the research participants in Almaty (more than 65%) believe that it is not effective and does not adequately reflect the results of scientific and technological progress; according to 18% of respondents, the system is effective, harmonized with the current situation on the country's market, the rest found it difficult to answer.

In Nur-Sultan, the opinion of the respondents for and against the effectiveness of the commercialization system was shared by almost exactly 42% and 44%, respectively. This division into two fronts shows that the system has not yet proven, but at the same time has not denied its effectiveness. One third of the



Histogram 2. **What do you mean by commercialization?**

respondents refused to answer this question, citing the lack of clarity of the situation at the moment.

Table 1 shows the main problems of the development of commercialization. As can be seen that the main issues of the research development include weak funding (74%) and incomplete scientific research (67%). According to respondents' responses that a poorly developed infrastructure (43%) and a lack of competence (46%) have got influences on the development of research projects.

Table 1

The main problems of the development of commercialization

Weak funding	Poorly developed infrastructure	Incomplete scientific research	Lack of competence
74 %	43 %	67 %	46 %

To the question of what measures are necessary to improve the current system of commercialization, the answers of the respondents in Almaty and Astana are shown in Table 2. It is notable that 70 % of respondents think of one of the most important measures to improve the current commercialization system is funding increase.

Table 2

Measures to improve the current commercialization system

Improving legal regulation	Increased funding	Forcing a company to use developments	Experimental test bases	Others
25%	70%	15%	45%	10 %

When applying the norms of the current legislation, 70-80% of respondents (Almaty & Nur-Sultan) had to face difficulties associated with imperfect legislation, in large part it is not the flexibility of laws, indirect and ambiguous interpreted norms, a lot of reference decisions, a low level of harmonization of national, interstate and international standards.

The Ministry of Education and Science (40%) should be involved in the implementation of innovations by the developers themselves and their organizations (22%), 27% of respondents suggest that all government bodies should equally participate in the process of introducing innovations. The rest of the participants think that the local city council of different levels should contribute to the introduction of innovation, linking business and government agencies in this matter.

Recommendations. The study participants gave the following recommendations for improving the commercialization system:

– Focus on the last consumer;

– Reforming the organizational and functional foundations of the system with the allocation of a national body to a non-governmental structure;

– Be guided by the most successfully implemented international experience;

– Transfer of part of powers by state bodies to public organizations.

The respondents indicate that there is a shortage of commercialization specialists with the required competencies. Many organizations shy away from recruiting young and inexperienced university graduates. Basically, employers give preference to specialists with experience in this field, or their own personnel who have received additional professional education. Since more attention is paid to practical experience, the name of the specialist university does not matter to employers.

Research limitations. Problems identified in the course of sociological research:

1) few special courses on commercialization in the Republic of Kazakhstan, mainly provide general (basic) information about commercialization. Special seminars on commercialization held in the countries of near and far abroad are costly;

2) lack of awareness of where to go for the necessary information to optimize activities in the field of commercialization. Note that even with the existence of a huge number of information publications, special sites, many managers have no idea about these publications, although they would like to use the information contained in them in their practice;

3) difficulties associated with the promotion of innovative products;

4) insufficient copyright protection, which prevents the promotion of information about new technical and technological innovations.

Conclusions. Project management of commercialization of scientific projects at the university has its own specifics, which consists in a huge number of unknown variables, which are also called “black swans” or unforeseen events. All this is superimposed on the high risk of project implementation, taking into account changes in market indicators. One of the solutions to the problems of risk management can be in the constant monitoring and examination

of the stages of commercialization with the prompt resolution of unforeseen excesses that have arisen, which also entails the attraction of a larger amount of human resources.

As a result, the project management methodology for the commercialization of scientific projects should read the specifics of human reverse management, as well as work on performance indicators, marketing risks, economic risks, decision tree and risk management at all stages of commercialization. With all this, it is also necessary to maintain flexibility in the management of technology commercialization projects. For these purposes, it is possible to use flexible Agile technologies, but taking into account the specifics of the task at hand. All together leads to the fact that the tasks of continuous training of personnel involved in solving such problems come to the fore. The problems of project management, professional development and education and the use of agile management technologies like Agile require even more experimental research.

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Қазақстандағы зерттеу жұмыстарының даму мен білім беру мәселелері

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Аңдатпа

Экономиканың жедел дамуы инновацияны енгізусіз және елдің ғылыми -зерттеу әлеуетін дамытусыз мүмкін емес. Елдің ғылыми-инновациялық әлеуетінің дамуына тікелей әсер ететін қарым -қатынас субъектілері ұсынатын ғылыми-инновациялық жүйе. Жүйенің соңғы өнімі – бұл ғылыми – зерттеу және тәжірибелік-конструкторлық жұмыстарды коммерцияландыру. Технологияны коммерцияландыру процесінің өзі – бұл нақты жоба, дегенмен оған жобаны басқару құралдары қолданылады, бірақ инновацияның ерекшеліктерін ескере отырып және сәтсіздік қаупі жоғары. Мақалада Қазақстан Республикасының инновациялық жүйесіне қатысушыларға әлеуметтік зерттеу жүргізу арқылы технологияларды коммерцияландырудың негізгі мәселелері мен кедергілері қарастырылады. Сауалнаманың мақсаты – тұтастай жүйеде де, оның ішінде процесте де негізгі проблемаларды анықтауға тырыса отырып, Қазақстанның инновациялық жүйесінің қазіргі жағдайларының тұтас бейнесін алу. Респонденттер технологияларды коммерцияландыру жобаларының тікелей қатысушылары болды. Сондай-ақ, мақалада инновациялық қызметке тікелей қатысушылардың тәрбиелік көзқарасын қамтамасыз ету мәселесі қарастырылды. Білім деңгейінің төмендігі мен білім беру жүйесінің деградациясы мәселесі көтерілуде, бұл елдің инновациялық жүйесіне тікелей әсер етеді. Жасалған жұмыс негізінде инновациялық жүйені жетілдіру бойынша ұсыныстар алынды және технологияларды коммерцияландыруға сәйкес жобалық тәсілдеме алынды.

Түйін сөздер: зерттеу; инновация; білім; даму; коммерцияландыру.

Проблемы развития исследований и образования в Казахстане

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Аннотация

Форсированное развитие экономики невозможно без внедрения инноваций и развития страны, которые напрямую влияют на научный потенциал, конечным продуктом научно-исследовательской деятельности является коммерциализация научных результатов. Сам по себе процесс коммерциализации технологий является специфическим проектом, тем не менее для него применимы инструменты проектного управления, но с учетом специфики инновационной деятельности и с высоким риском провалов. В статье рассматриваются основные проблемы и барьеры коммерциализации технологий, авторы провели исследование с помощью социологического опроса участников инновационной системы Республики Казахстан. Цель опроса – получение целостной картины современной ситуаций инновационной системы Казахстана и попыткой выявления

основных проблемам, как в рамках системы целом, так и процесса в частности. Респондентами выступили непосредственные участники проектов коммерциализации технологий. Также в статье были расмотривается проблема обеспечение образовательного процесса непосредственных участников инновационной деятельности, поднимается проблема недостаточного уровня образования. WWWНа основе проведенного исследования разработаны рекомендации по улучшению инновационной деятельности и соответствующего проектного подхода к коммерциализации образовательных технологий.

Ключевые слова: исследование; инновации; образование; разработка; коммерциализация.

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RESEARCH COMPONENT IN THE EDUCATIONAL PROGRAMS OF THE DIRECTION OF PRESCHOOL EDUCATION AND TRAINING

Abstract

A qualitatively new level of training of teachers of preschool education will ensure the implementation of educational programs based on a research approach. The purpose of this study is to study the current state of research training in Kazakh universities in the direction "6B012 – Pedagogy of preschool education and training" and to outline ways to modify the research component in educational programs. Within the framework of the study, a meaningful analysis of twelve educational programs of Kazakhstani universities was carried out for the representation and relevance of the research component. The results obtained showed that in the content of all educational programs, the research component is represented by an elective course, which is an alternative in a number of universities. There is also a problem of determining the content of research courses, in particular, the logical sequence of the presentation of the material is violated, the content that does not correspond to the name of the course is proposed, outdated literature is recommended, etc. The problem of correctness and updating of course names requires special attention. The lack of research practice is also a serious omission in terms of the integrity of research training. The conclusions resulting from the results obtained show the need to modify the research training of students of preschool education.

Keywords: research training; research competencies; research component; educational program; preschool education; future teachers.

Introduction. A quality pedagogical education is an investment in human capital that will increase the well-being of the nation in the future. In particular, according to research results, the level of professional training of preschool teachers directly affects the quality of upbringing and teaching children [1-6]. In this context, P.Kansanen's remark that quality pedagogical education should be of paramount importance, since any defects can lead to almost irreparable consequences [7].

The literature review indicates that the implementation of pedagogical educational programs based on the research activities of students [8-13]. The Finnish teacher education system [14; 15], which is of great interest to researchers from different countries, is a successful example, recognized at the international level, practicing this model. An additional argument in favor of organizing training based on a research approach is the research results describing scenarios for the