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Development of innovative IT projects in the Republic of Kazakhstan within the context of human capital development

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Abstract

The article discusses various aspects of the concept of "innovative project", issues of information technology development in the country in the context of the state program "Digital Kazakhstan". For a full review of the level of development of innovative IT projects, the authors analyzed the level of human resources preparedness for IT competencies and the involvement of young people in IT specialties. As an example of innovative IT projects authors surveyed case f the development of the innovative company SMART SATU, which over the 3 years of development has gained recognition from the largest participants in the retail market and is developing in 7 countries of the world.

Keywords: Innovative project, innovation, IT project, information technology (IT), IT companies, IT education, SMART SATU

Introduction

Purpose of this article is to analyze the theoretical aspects of the "innovative project" concept within the context of its application to the Information Technology sector, consider the practical application of the theory of development of innovative projects using the example of a company in the Republic of Kazakhstan, analyze the level of development of IT resources in the country.

At the present time, digitalization and development of innovation projects using information technologies is a strategic development priority in many countries. According to the forecasts of the world's leading experts, by the year 2020 a quarter of the world economy will be digital, and the introduction of technologies for economy digitalization, which contribute to the effective coordination of the state, business and society, is becoming an increasingly large-scale and dynamic process. The most important issue in this context is the development of the innovation ecosystem and the project management of innovative companies in the field of IT (information technologies).

In the Republic of Kazakhstan, the course on digitalization of the economy was comprehensively developed and described in the State Program "Digital Kazakhstan", which was approved in December 2017 and effective until 2022.

The program is implemented in five key directions.

- Digitalization of the economy sectors - the transformation of the traditional economy sectors of Kazakhstan through the use and implementation of digital technologies and solutions;
- Transition to a digital state - a change in the approaches to the rendering of services and the interaction of the state with the population and business sector; the key principle is to anticipate needs;
- Implementation of the digital Silk Road - the development of high-speed and secure infrastructure for the transmission, storage and processing of data, both within the country and for the implementation of the transit potential;
- Development of human capital - changes involving the building of a creative society;

▪ Building an innovation ecosystem - creating conditions for the development of technology entrepreneurship, innovations, startup culture with sustainable relations between business sector, science and the state.

Issues of development of innovative entrepreneurship, information technology, IT startup culture are disclosed in the "Innovative Ecosystem" Program section. A support of innovative development platforms, creating conditions for the development of technology entrepreneurship and startup culture, attracting venture financing, development of unicorn projects, as well as creating demand for innovations are provided as a part of implementation of mentioned direction [State program "Digital Kazakhstan", 2017].

It is worth noting that a number of foreign scientific papers contain conducted researches aimed at establishing a direct correlation between the attraction of foreign direct investment and human capital. It is noted that increasing of the flow of foreign direct investment requires appropriate coordination on the part of the state, as well as injection of funds into education and trainings [Kheng V., 2017].

As it was noted by Ruslan Ensebayev, a Chairman of the Board of the National Information and Communication Holding "Zerde", the successful implementation of technological projects at the state level ensures high rates in development of economic and human capital. This requires the shaping of technology clusters for the active interaction of IT entrepreneurs, inventing engineers and concerned investors.

As noted by representatives of the "Zerde" holding, the creation of the Astana Hub was initiated for this purpose. Since the beginning of 2018, startups are selected, which will undergo acceleration (a period of accelerated development) at the base of Hub. This year it is also planned to bring 33 startups up to the level of ready-made companies, and about 300 companies by the year 2022. In the development plans there is also noted opening of research R&D laboratories with partners of "Zerde" holding and major international IT companies. They will allow performing a full cycle of research and preparatory operations to bring the new products and technologies into industrial production.

The goal of the "Digital Kazakhstan" Program is the presence of a greater number of domestic technology IT companies, a developed market of venture capital and investors, and the creation of "success stories" of Kazakhstan startups in the international arena.

In the longer term, the goals are to build a favorable environment for the emergence of "unicorns" and large companies with a high estimated capitalization, as well as building of a culture of technology entrepreneurship in Kazakhstan. For this purpose, according to the concept of the Program, both the necessary institutional conditions and incentive measures aimed at innovation activities, venture financing, creation and development of IT entrepreneurship will be created.

Issue of creating a high capitalization of the company is the subject of research of many scientists and experts of the world. So authors of the scientific article "Governance and Assessment Insights in Information Technology: the Val IT Model" state that investing in the development of information technology has a positive impact on increase of the company value in the long term [Lombardi R., 2016].

In this context, special focus should be made on the methodology of innovations and the analysis of the "innovative project" concept.

Innovative Project: Concept, Content, Methodology

In a general sense innovation represents all the changes that have been made and that make it possible to introduce significant new features in the process of thinking and acting. Innovation in business represents an invention or introduction that has been brought to the stage of a commercial or other pioneer product. It can significantly change the placement of forces in the market due to obvious

competitive advantages. An innovative concept follows the conception of invention and innovations in terms of other, previously unused ways, means, methods, products and technologies.

Innovation should have practical application. Next to the concept of "innovation" there are always accompanying concepts of "innovation process", "innovation projects" and "innovation activity". The notion of "innovation activity" was introduced in scientific and business practices by Academician L.I. Abalkin [Abalkin L.I., 2002].

It should be noted that the scientific theory, management system and knowledge system in the field of innovations are actively being formed nowadays. The meaning "innovation (innovative)" is increasingly applied to the words "management", "process", "program" and "project". An innovation project is a base element of the system for organization of innovations and innovation management. It refers to a project (in the traditional interpretation for the project management), aimed at solving the unique task of creating, implementing and mastering innovations, showing their results to consumers and obtaining benefits.

In addition to the above, the concept of "innovation project" is used in several aspects:

- **as an action, activity or event** held for the implementation of a package of any measures in order to achieve certain goals;
- **as a system** of organizational and legal documents, as well as accounting and financial documents necessary for the implementation of any actions;
- **as a process** of implementation of innovation activities.

These three aspects emphasize the importance of the innovation project as a form of organization and target management of innovation activity.

In general, an innovation project is a complex system of activities that are interdependent and interconnected in terms of resources, time limits and performers, and which are used to achieve specific goals and objectives in priority growth areas of science and technology.

In terms of the *scale of current tasks*, innovation projects are divided as follows:

Mono-projects are projects executed, as a rule, by one organization or even by one subdivision; they are distinguished by the setting of an unambiguous innovation goal; they are implemented in tight time and financial frameworks; a coordinator or a project manager is required;

Multi-projects are presented in the form of comprehensive programs that unite dozens of mono-projects in order to achieve a complex innovative goal (such as creation of a science and technology complex), solve a major technological problem or perform the conversion of a single enterprise or a group of enterprises of the military-industrial complex; coordination units are required;

Mega-projects are multi-purpose integrated programs, combining a number of multi-projects and hundreds of mono-projects, interconnected by one tree of objectives; they require central funding and guidance from a coordination center. Megaprojects can be used as a basis for achieving such innovative goals as technical upgrading of the industry, solving regional and federal conversion and ecology problems and improving competitiveness of domestic products and technologies.

In the context of the scope of coverage, the innovation process is becoming increasingly global nowadays. It is virtually impossible to narrow the entire breadth of events occurring within a framework of the process to the scope of a single firm. The following interrelated combinations can be noted as part of the main components of the innovation process:

- knowledge, scientific and marketing information;
- research and marketing studies;

- effective instruments of labor, which facilitate the work and make it more productive.

Thus, an innovation project is a complex system of processes interdependent and interconnected in terms of resources, time limits and stages. Innovation projects may be of a different nature and differ in a number of classification features [Lukov A., 2012].

The development of an innovation project is a long, expensive and very risky process. This aspect becomes sharp when innovation is related to the field of information technology.

Any project passes through a certain series of successive stages of its development, from the moment, when the idea arises, to the full completion of the project. A complete set of stages of development forms the *life cycle of the project*. The life cycle of the project can be divided into phases. Phases can be divided into stages and stages can be divided into steps. Stages of the project life cycle may vary depending on the scope of activities and the adopted system of work activity management. However, each project may have an initial (pre-investment) stage, a stage of project implementation and a stage of completion of the project (investment stage).

Innovative processes that apply to the field of IT have certain differences from the production processes and other basic and supporting processes of the operating cycle. The following moments are inherent to the activities on the creation and development of innovations in the field of IT or with the use of IT technologies.

1. There are significant risks and a state of uncertainty regarding the ways to achieve the intended result.
2. Detailed planning is not possible, and it is impossible to rely on forecasts.
3. There are permanent stonewalls not only to the persons involved in the innovation process, but also to the very environment of consumption of the process results in society or in the market.
4. This process itself depends on the market and society in which it is produced and developed.

Management of innovation projects is the art of leadership and coordination of labor, material and other resources throughout the life cycle of the project by applying a system of modern management methods and technologies in order to achieve the results defined in the project in terms of the composition and scope of work, cost, time and quality of the project [Gershman M.A., 2008].

It should be noted that the trend for application of Agile technologies and tools set of the Kanban methodology is developing in the context of managing an innovative IT project. The use of Agile smart management techniques allows you to maximally adapt projects to changes in the external environment and reorient your project stream.

Development of IT resources in the Republic of Kazakhstan: current state, problems of human capital development in the IT sector.

Considering the issue of developing innovative projects, it is necessary to analyze the development of human capital with competencies in IT sector.

Thus, within the framework of the task of developing human capital, the state "Digital Kazakhstan" Program provides for a number of measures to provide an IT personnel. So in the sector of secondary education the following activities are planned:

- implementation of the programming basics in primary education (2-4 forms) - 40.6% of schools by the year 2022;
- updating the content of the "Computer Science" subject through the actualization of programming languages (Java, C, Python, Rust, etc.) - 100% of schools by the year 2022.

With regard to professional, higher and postgraduate education:

- updating of curricula in line with best international practices;
- development of distance education through the building of a national open education platform;
- opening of Departments on Information and Communication Technologies (ICT) on basis of the production facilities in higher education institutions [State program "Digital Kazakhstan", 2017].

Let us consider the current situation in the education market and the aspect of training of technical field personnel.

At the beginning of the 2017-2018 academic year, 127 higher educational institutions with a total number of students of 496,209 were active in the Republic of Kazakhstan. The number of students acquiring education at the cost of state educational grants is 143,440 people (28.9%) and number students educated on a paid basis is 352,769 people (71.1%). It should be noted that the share of students of technical specialties is 35% of the total number of state grants.

However, if we look in detail at the structure of the specialties of the "Engineering sciences and technology" group, we can see that the share of students educated at IT specialties under government support is only 15%; this is only 7356 students at the specialties "Information systems", "Computer engineering and software", "Mathematical and computer modeling".

As noted by the Ministry of Education and Science, about 18 thousand of new personnel specializing in information technology are graduated from domestic colleges and universities annually, but in the era of globalization and digitalization of the country economy this is not enough. To change the situation for the better, the relevant department regularly increases the number of grants and opens up new specialties in educational institutions.

With the rapid development of technologies, curricula do not always have time to adapt to the realities of the sector, which ultimately affects graduates.
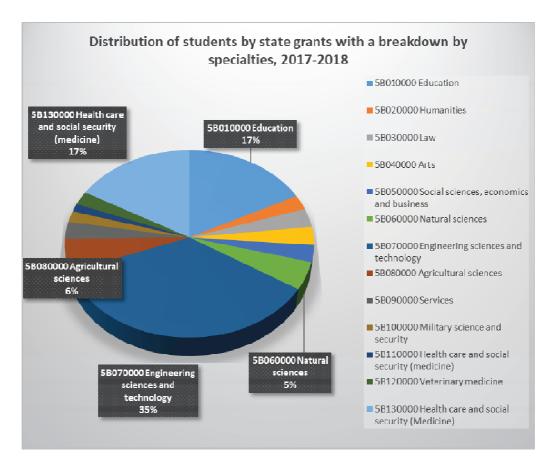
Fig. 1: Distribution of students by state grants with a breakdown by specialties, 2017

* Note - compiled by the author on the basis of source [Official Internet resource of the Committee on Statistics of the Ministry of the National Economy]

A research conducted by the Russian Public Opinion Research Center together with SAP showed that 87% of young IT specialists choose a profession not because they are interested in it. Applicants are usually influenced by the fact that the choice of a future profession falls on the period of preparation for admission and has little relation to career guidance. They refer more to the demand and role of the specialty than to their own capabilities and willing to work in this sector. The research sampling included 1,400 students from 5 Kazakhstan, 8 Belarusian and 25 Russian higher education institutions, 400 young IT specialists, 500 resumes from headhunter.ru database, 32 experts representing business sector, public sector and the education system, 8 discussion focus groups and global practices of interaction of higher education institutions, business sector and government [Database of sociological data of the Russian Public Opinion Research Center].

From the results of the study it may be concluded that in order to increase the interest of young people in IT specialties, schools need to update their computer science curricula and conduct the advanced training of the teachers. It should be noted that, at the moment, computer science begins to be studied only from the 5th grade in Kazakhstan schools, but from next year, students will study computer science from the 3rd grade. The question of introducing the study of computer science from 1st grade, as is done in many developed countries, is still only at the discussion stage.

Schools need to introduce a career guidance program so that an applicant, applying for a particular specialty, will rely more on his own willing and abilities, rather than on the amount of expected salary and role. Experience of countries with a high development level of IT sector shows that the involvement of high school students in field-specific educational programs at higher

educational institutions subsequently has a positive impact on the choice of profession. Thus, on the basis of higher education institutions, it is recommended to open programs of web and mobile development, courses on operation with Big Data, programs for studying the Artificial Intelligence and programming courses with the involvement of specialists from the world's largest IT companies, like Cisco, Oracle, Microsoft, Apple and others.

IT education itself also has major problems affecting the situation with personnel. Thus, on average, only 59% of the students of IT specialties attend classes in the countries covered by research (Kazakhstan, Russia, Belarus), although in Kazakhstan this figure is 76%, 16% of students speak in support of e-learning.

The most serious problem is that young people do not see any serious career prospects of profession in the IT sector. The reason is the underdeveloped ecosystem of IT companies in Kazakhstan and the almost complete absence of global cases of "success stories" with expansion to international markets. It is worth repeating that the goal of the "Digital Kazakhstan" Program is the presence of a greater number of domestic technology IT companies, a developed market of venture capital and investors, the creation of "success stories" of Kazakhstani startups in the international arena and providing the environment for the emergence of "unicorns" with a high estimated capitalization in the long run.

Innovative IT projects of Kazakhstan on the example of the SMART SATU Company

While applying the above aspects of the theory of innovation projects in the IT field to practical cases, we can note an example of the development of an innovative company with an IT product. This is the company SMART SATU.

SMART SATU is a SAAS ("Software As A Service") solution, a business-to-business platform that automates all business processes between sales outlets and manufacturers, distributors of FMCG products (fast-moving consumer goods). The platform allows for the optimization of the costs of distributors on 3 main components: orders, payments and logistics. All these processes are digitized in the system. The key propriety area of the SMART SATU platform is the big data analysis and processing. The system processes the collected data and displays detailed information on sales volumes, seasonality, time-schedule of sales, portfolio allocation by brand, turnover categorization by points, districts, cities and countries, ABC-analysis of the client base, BCG analysis of the partner network of participants and other analytical capabilities. Currently, the system is being developed in 7 countries: Kazakhstan, Russia, Belarus, Kyrgyzstan, Uzbekistan, Tajikistan and Saudi Arabia. Global manufacturers, such as P&G, Mars and Unilever, showed a confirmed interest in the platform capabilities.

The SMART SATU product system also includes decision on warehouse accounting for sales outlets. This company's solution also provides sales outlets (apart from the traditional automation solution for inventory accounting) with support for the service of Automatic Delivery Rewards: built-in artificial intelligence predicts residues and turnovers of the outlet (based on order history, weekends, holidays, seasonality and other factors) and forms Automatic Delivery Rewards. Another innovative solution of the company is the ability to display information on residual stocks in sales outlets for manufacturing companies. This means that suppliers (manufacturers and distributors of FMCG products) have the opportunity to solve an acute problem with cluelessness about their residual stocks in sales outlets (regardless of their location). The SMART SATU provides this solution to its partners.

It should be noted that the international forum "The Digital Agenda in the Era of Globalization" with the participation of the heads of the EAEU member states and international experts in the field of digital technologies was held in February 2018. The Forum vividly confirmed the need to implement digitalization in national economies within the Common Market and accelerated development of competitive performance on a global scale. In the summer of 2018, the EAEU member countries held a local design competition across the EAEU countries in order to determine the best solutions in

digital platforms. The project "SMART SATU" won the competition in Kazakhstan as the best digital platform. In November 2018, the project represented the country in the final of the competition, were received preferences for the development these countries.

Among other distinctive awards of the project SMART SATU should be noted the victory in the nomination "Innovative Start-up" of the international program Entrepreneur Of The Year® Award, held by Ernst & Yuong in more than 60 countries. World Entrepreneur Of The Year began in 1986, when Ernst & Yuong first organized a competition in one of the states of the USA. Today, this competition covers 145 cities in 60 countries of the world, which together represent more than 90% of the global economy.

In the context of the target of the "Digital Kazakhstan" program on the emergence of IT projects-unicorns should be noted that capitalization of the innovative company SMART SATU has grown from 300 thousand dollars at the seed stage to 50 million dollars in just 3 years of development [The official site of LLP SMART SATU].

Conclusions and Recommendations

In accordance with the conducted review and analysis of the IT market in Kazakhstan, the progressive development of the IT market in Kazakhstan requires the building of an IT sector ecosystem. By "ecosystem" we mean the competitive environment of IT companies and IT specialists. At the moment, in accordance with the state program "Digital Kazakhstan", the key focus in the development of the IT sector is on the development of institutional aspects with the involvement of international resources: building of a technology park and ensuring "soft" conditions for attracting foreign specialists and foundations. However, in the republic there is a lack of sufficient human resources potential represented by IT specialists. We believe that at the moment the movement towards the development of the IT market should be started from supporting the development of IT education, in particular, it is necessary to open IT laboratories and coworking centers at the base of universities to invite domestic and foreign speakers from the IT sector to promote the information technology sector. An illustrative example is the experience of Belarus and Israel, the idea of prospectivity and relevance of IT specialties is actively promoted in these countries. For example, in Belarus, 75 thousand students (24% of the total number of students of higher education institutions) study on STEM (Science, Technology, Engineering, Math) specialties, including about 70 IT specialties. Currently, over 85 thousand people are employed in the information and communication technology sector in Belarus, about 34 thousand of which work in the segment of IT products and services. IT sector acquiring strategic importance for Belarus. ICT accounts for 10.5% of gross domestic product (GDP) in the services sector and 5.1% of total GDP. IT services account for 3.2% of total exports volume.

Thus, taking into account that the development of information and communication technologies in Kazakhstan is proceeding along a positive trend, in order to achieve the goals set and effectively develop the IT market, it is primarily necessary to take measures to train relevant IT personnel and improve the IT sector positioning. In the long term, the state, which already needs to take the necessary measures to adapt to the growing needs of the industry and also improve the quality of education itself, influences the availability of the required number of qualified personnel for the IT sector. Thus, as part of the state program of education and science, it is necessary to focus on supporting STEM (Science, Technology, Engineering, Math) education, graduates of which are demanded by IT companies, to encourage IT companies to cooperate with higher educational institutions and schools to promote IT competencies.

Summarizing we note, that innovations in the field of IT technologies are highly risky activities, but given the market realities and the rapid prevalence of the globalization trend, innovations will go deeper into easily scalable and high-tech areas.

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