

Development of graduates' training system with meta-subject competencies for Russian agro-industrial complex

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Abstract. The needs of enterprises, the state and personnel in case of introduction of digital technologies, as well as the emergence of new types of products are considered. There was established that the response to the acceleration of business processes and a radical change in their technological content was the emergence of project management. The essence of its key differences from traditional organization of labor is demonstrated. It is shown that the increase in the efficiency of new business models is associated with the use of the project approach, as well as cooperation with leading universities. It is noted that the joint project activities of the enterprises, employees of HEIs and students' project training allow to achieve a synergistic effect. Moscow State University of Technology and Management named after K.G. Razumovsky is given as an example of students project activities. Such an approach ensures implementation of effective developments for Russian agro-industrial complex to work in the new economic conditions. The competencies allow to take into account the emergence of demand in advance and to develop new products. Thus, the project activities at K.G. Razumovsky MSUTM contribute to the solution of Russian national projects.

1 Introduction

The period of radical changes in the economy began relatively recently - 80-90s of the XX century - with the intensive use of digital technologies. [1] When it became clear that the use of digital technologies brings tangible income, enterprises were forced to change organizational and managerial work models. That is how the project approach appeared and proved it's need for the time of digital technology. Its theoretical development was carried out by US Project Management Institute, PMI. [2] Since 2011 a number of state standards (National standard of the Russian Federation. Project management. Project management requirements) was developed in our country to regulate terminology and norms in this field of activity. Definitely, the implementation of the project approach in practice required a different organization of labor and availability of qualified personnel, ready to work with higher results. The education system faced a number of issues - the development of project

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activities, the implementation of its elements in the educational process, and then - project training. [3] Advanced HEIs, which have a permanent communication with employers, started this activity earlier than others did.

Difficulties are encountered in any new work, also in the process of implementing project training. However, going on systematic work in this direction and constant application of project training, there comes the experience and successful project solutions, demanded by enterprises. This process allows graduates to get competencies of a qualitatively different content and to master entrepreneurial skills in the learning process.

2 Problem Statement

Fundamental technological and economic changes have begun in countries, which were actively developing and using digital technologies. They affected, first of all, US, countries of Western Europe and a number of countries of the East. The penetration of digital technologies into life grew quite quickly and affected the work of enterprises in almost all countries of the world. As a result, the form and content of the companies' work process changed: to achieve success, they were forced to introduce new business models, to change technologies, to run the new types of products realization and to present new requirements for the employee qualifications.

Organizational and managerial models of companies have also felt under transformation. The increased pace of work and production volume, dynamic changes in markets, demand and products of competitors required the introduction of fundamentally different, more effective than traditional, model of labor organization and enterprise management. Therefore, the emergence of such a branch of knowledge as project management became a natural response to the changes - at the company level, and in our country - at the level of government [4]. It should be noted that the state manages to achieve complex effects, also called systemic, using project approach. The main effects are reduction of cost and timing of implementation of projects relevant in conditions of limited resources, as well as reduction of time for making decisions on all issues related to the implementation of the project.

In line with government structures at all levels, project management began to be implanted into large number of enterprises working practice. It has proven its effectiveness and relevance in the era of digital transformation, when the time of making decisions and their quality have become the determining factors in the companies' profitability.

The next step, which allows enterprises to use the principles of project activities effectively, is the presence of qualified employees, who are ready to apply it immediately, without any additional preparation. At this stage, it became obvious, that the system of higher professional education in total was built without taking into account the needs of training graduates with such set of competencies. Only few universities, which maintained close communication with employers and introduced new education methods, have begun to introduce elements of project-based learning into educational process. One of the first universities that began and successfully continues this work was Moscow State University named after K.G. Razumovsky (FCU), which trains specialists for the food industry and a number of other economic sectors.

3 Materials and Methods

K.G. Razumovsky MSUTM (PKU) – HEI with a 65-year history that trains personnel for the food industry and other sectors of the economy. It consists of five Institutes: Institute of System Automation, Information Technology and Entrepreneurship; Mega-faculty of food

production technology and technological management (Institute); Institute of Social and Humanitarian Technologies; Institute of Biotechnology and Fisheries; Institute of Economics, Management and Law.

Individual items of project management have been functioning at all of the University institutes for a long time. They are used in the university administration working process and in the process of employees' research activities of. Either project approach was also previously used in the educational process. [5] In accordance with the curricula at each course, students of the University master the discipline "Design". Besides, in the industry areas, where changing of production technologies, appropriate equipment and, as a result, work process at the enterprises is often, the specificity is quite important. Further, to justify the effectiveness of project implementation, it is also necessary to calculate economic indicators.

In 2016, the leadership of the University set a task, which should have been carried out by staff and students. It was decided that in addition to the project activities provided by the curriculum, it is advisable to implement this approach while defending students' graduate qualification works (GQW). The scheme provided the formation of integrated projects, which had to be prepared by students from various institutes of the University, by default. This approach, used to prepare comprehensive graduate qualification works, consists of fact, that several graduates of different profiles participate in the development of integrated projects, and each project becomes ready for implementation. This allows setting and solving tasks which student of one direction of training (profile) cannot deal with. At the same time, integrated projects began to be carried out on specific orders of the partner enterprises of the University. The customers of such projects became leading organizations and market leaders in various fields of industry, agriculture and research and production complex. Some of them – PJSC Cherkizovo Group, OJSC RotFront, PJSC Rosagroleasing, PJSC Gazprom, PJSC RusHydro, and also catering establishments and entrepreneurs.

During implementing integrated projects, the following goals can be achieved:

- to improve the qualification work quality of each student;
- to receive projects of new scale and fundamentally new content;
- to achieve unique results of each integrated project;
- wisely use limited resources, including time.

Thus, already at the initiation stage, each integrated project had all the signs of a project that needed competent management. [6]

As project activity provides, completing of this task was delegated to the project office, which included administrative and scientific-pedagogical staff of University. Performers, i.e teams of complex projects, became graduates of all five institutes of K.G. Razumovsky MSUTM.

It should be noted that in preparation process for project approach implementation, the necessary activities were carried out. Among them, firstly, there were regular methodological seminars for scientific and pedagogical workers, as well as students. However, through the first year there were identified individual sections, which made difficulties for timely and qualitative implementation of projects by all project teams.

To study the causes and liquidation of these defects, a causal relationship diagram (Ishikawa diagram) was compiled, which allowed to identify stoppers and make changes to further work. [7] This algorithm is shown at figure 1.

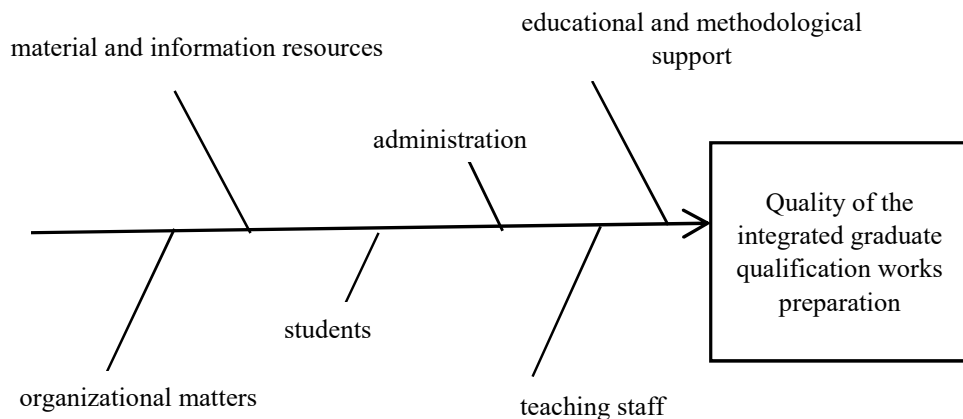


Fig. 1. Algorithm for identifying factors affecting the integrated projects preparation quality.

The most significant obstructing factor in transition to project working process was the lack of experience in the following issues:

- the need to develop cross-cutting teaching material for the implementation of an integrated project;
- administration level (interaction rules, communication level);
- the degree of using material and information resources;
- elaboration of the integrated projects subject;
- interaction between scientific-pedagogical workers with students;
- the motivation level of students.

These problems were successfully solved largely thanks to the administration of the University – methodological seminars and repeated study of the identified issues that caused difficulties were continued. Therefore, since 2017/18 academic year, the University has been engaged in project activities permanently and at a high level. It affects the implementation of the GQWs and interdisciplinary projects of third-year students.

4 Results

Gaining experience and continuous training in project activities allows the University to conduct this work permanently – in the last year of study students are preparing their GQW as part of integrated projects.

Project activity differs from ordinary functional labor, and the implementing process of integrated projects differs from the traditional GQWs implementation. In addition, obligations to customer enterprises determine the high responsibility for the results. Therefore, in preparation of integrated GQW participate project teams of graduates from all University institutes. Most developments are carried out for food industry enterprises. In addition, they are united by the fact that is innovative approach, practical orientation and high economic efficiency. [8]

Innovative developments for food industry companies are carried out in several stages, shown at the figure 2.

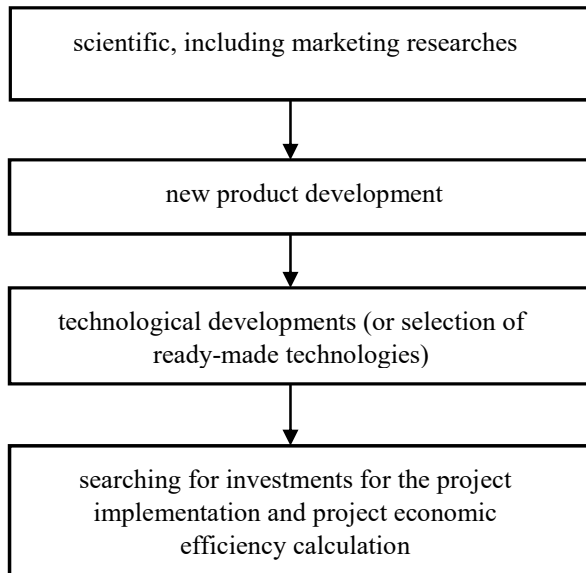


Fig. 2. Stages of an integrated project developing.

Thus, during the execution of each project, the following stages are carried out:

- scientific, including marketing research;
- new product development;
- technological developments (or selection of ready-made technologies),
- search for investments for the project implementation and calculation of the economic efficiency of the project. [9]

Each such innovation requires development of a set of issues, and every time the result is unique. It could be new types of products, improved products, new production technologies, organization of production, management and labor. In addition, an innovative approach could be applied to the sales of products, promotion and advertising. Certainly, the most important criteria for the effectiveness of each integrated project are economic effect, company's income and payback period of the invested funds.

During the implementation of each project, the next rules of project activity are observed:

- formation of project passports specifying the purpose of the project, its indicators, results, control points, budget and responsibility;
- focus on obtaining a unique result in case of limited resources;
- project planning, combined with flexibility, i.e the ability to change plans when moving towards a goal;
- the possibility of setting tasks by the executor directly – this is done by the project coordinator and managers;
- various project implementation scenarios are provided and task of risk management is set as its advanced prognosis;
- the project motivation system works: during the project preparation, each team can form its own startup for its implementation. [10]

In addition, quality of the integrated project implementation is evaluated on its defense and may affect the final certification results.

It should be noted that each project of students of K.G. Razumovsky MSUTM, as it is provided by any project activity, has limited implementation period and life cycle. [11] It is divided into the following stages:

- starting (initiation);
- development;
- implementation;
- completion. [12]

It is difficult to determine which of these stages is the most complicated – each of them is specific and can be divided into a number of phases. However, work of K.G. Razumovsky MSUTM shows, that the most critical stage, from the actions within which the projects' timing, quality and effectiveness depend, is the development phase. It is carried out by the administrative and scientific-pedagogical workers of the University together with students. The coherence of their actions, discipline and professionalism largely determine the effectiveness of integrated projects results. Each of them is aimed at creating a qualitatively new product, innovations which bring effect in the first year of implementation. The project team development of the University graduates' are highly appreciated by the customer enterprises and are successfully implemented. At the same time, it is especially valuable that project teams are focused on taking into account demand in advance and the willingness to develop new products taking into account market requirements.

5 Discussion

Whereas the University is an entrepreneurial HEI, the range of tasks that project executors solve is quite wide – from developing business ideas to finding sources of financing. Leading role in the preparation of integrated projects belongs to graduates who acquire competencies and aimed at working in the food industry, for which current development is being carried out. Furthermore, a graduate of the Institute of Economics, Management and Law is required to participate in each startup. His area of responsibility is marketing research, analysis of project perspective, calculation of its economic efficiency and payback period. They are brought to the logical conclusion and protection of integrated GQW. [13] As a result of this approach to the project work organization is the possibility of combining study and business.

During the integrated GQW implementation, start-up companies are formed, ready-made business ideas for creating new projects and types of products at specific enterprises are obtained. Some start-up companies begin to work, others stop, faced with the issue of financing. This question is mostly tangible today for many enterprises and for our students involved in project work, and for startup companies appearing at the University. However, cooperation with partner enterprises, among which should be highlighted Cherkizovo Group, interaction with financial institutions, for example, PJSC MInBank and many food industry enterprises, often allows finding forms of mutually beneficial cooperation.

Besides, the active support of entrepreneurship by the state in a number of directions also creates the conditions for the entrepreneurial initiatives implementation of the University and its students.

6 Conclusion

Despite the action of numerous external factors, Russian economy is getting stronger and gaining momentum. [14] Special role in this process belongs to the industries, which make up the basis of import substitution, especially the food industry. Under these conditions, the

state is doing everything possible to promote the innovative development of entrepreneurs that each of us needs. Measures of supporting small business by the state are various, and the leading banks of the country successfully cooperate with start-up companies, which are representing interesting projects for implementation. University students practicing in these organizations, enriching their academic study results with knowledge and real labor.

K.G. Razumovsky MSUTM contributes to this necessary for the country business – it prepares personnel for work at the enterprises of the industry. Additionally, during the integrated GQWs implementation graduates get the opportunity to create startups, which center become innovative business ideas.

For many developers of such interesting projects, it would be the first and very important step in the profession and entrepreneurship. Project activities in our country and around the world are gaining momentum, so everyone who wants to be in demand on the labor market needs to acquire competencies in this area. [15] These skills allow to realize abilities, and the motivation system, approved in the regulatory documents of our state, allows to strengthen the financial and social status of specialists in project work.

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