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Development of Innovative Management Competencies of Students in the Context of Digitization of Education

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ABSTRACT

This study critically examines and advances existing methodologies in project and program portfolio management, aiming to enhance competencies within enterprise project portfolio management. It explores the imperative need for competency development in project portfolio management specialists, underlining its significance for the efficacy of project activities and business operations. The research highlights that current global trends—such as digital transformation, network economy shifts, and transaction cost restructuring—necessitate a revised skill set for project portfolio managers. A significant gap is identified in higher education's role in equipping graduates with the requisite competencies for effective portfolio management. Current educational paradigms often conflate individual project management skills with portfolio management competencies, a misconception prevalent in most modern enterprises. This disconnect is evident when industry leaders advise new graduates to disregard their university training. The findings indicate a significant disparity between the competencies demanded by contemporary businesses for project portfolio and program management and those possessed by university graduates. The study identifies crucial competencies for project portfolio managers and emphasizes the necessity of aligning educational outcomes with business requirements.

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1. INTRODUCTION

The increasing complexity of projects, their multifunctionality, and territorial distribution have led to projects being grouped into programs and both programs and individual projects into the enterprise's project portfolio. The issue of project management quality has evolved into a problem of the quality of portfolio management of projects and programs (PMP). To assess the quality of PMP, systems for evaluating the quality and effectiveness of portfolio management have been developed (Shaturaev, 2023; Shaturaev & Khamitovna, 2023).

The Project Management Institute in the USA at the beginning of this century consolidated some experience in portfolio project management and defined PMP as an approach to coordinating the portfolio of projects and programs to achieve specific organizational goals (Shaturaev, 2023). This Institute defined that the typical goals of PMP include portfolio balance and strategic alignment of project management to achieve the enterprise's business objectives. The International Project Management Association (IPMA) defines portfolio management of projects and programs as the management of the totality of projects and programs "aimed at improving management efficiency and achieving the organization's strategic goals" (Cooper *et al*., 1999).

For enterprise management, the effectiveness of projects is expressed in terms of reducing the volume of resources and time required for project implementation, budget savings, and the attainment of high-quality project results. Maximum project activity efficiency at an enterprise is achieved through organizing and systematizing management based on the synergistic integration of project management into a project portfolio. In a well-organized portfolio, all projects are in harmony with each other, their execution does not contradict each other, and they do not compete for the limited resources of the enterprise.

In modern business, most enterprises have some form of matrix structure. Management is forced to minimize the fundamental negative aspects of matrix structures: dual subordination of personnel (to the functional unit manager and the project manager) and resource allocation for project activities on a residual basis. This fundamental problem, which is a bane of enterprise project activities, can be solved by organizing a project portfolio and harmoniously connecting it to the portfolio of business processes. The creation of effective project portfolio management systems minimizes the negative aspects of matrix structures and eliminates internal competition between projects and enterprise processes. It should be understood that the competencies for managing an individual project on an enterprise fundamentally differ from the competencies required for managing projects within a portfolio.

In the first case, projects compete for the limited resources of the enterprise, and in the absence of systematic portfolio project management and coordination between them, it can lead to managerial chaos, causing harm to both individual projects and the entire enterprise's business. The establishment of a project office responsible for the systematization of the enterprise's project activities, the creation of a project registry, the selection, and development of project management methods and technologies, and their complete transfer under the supervision of the project office, along with methodological and technical support for projects, not only eliminates managerial chaos but also significantly enhances the overall efficiency of enterprise operations.

The hierarchical organization of project execution within the portfolio, which is a fundamental function of the project office, greatly enhances the efficiency of individual projects and the entire portfolio. Clear differentiation of projects based on business functions, their alignment with the implementation of the enterprise's strategy (based on priority), the

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scale of problem-solving, and the formation of benchmarks form the basis for structuring the project and program portfolio. Evaluating the quality of hierarchical systems for project execution within the portfolio, portfolio structuring metrics, staff motivation (KPIs), methods, technologies, and management tools is an important task in assessing the effectiveness of such systems. The key challenge in effective portfolio project and program management is the development of competencies among managers in this field, which are required by practical business needs.

In the second case, projects compete for the limited resources of the enterprise, and in the absence of systematic portfolio project management and coordination between them, it can lead to managerial chaos, causing harm to both individual projects and the entire enterprise's business. The establishment of a project office responsible for the systematization of the enterprise's project activities, the creation of a project registry, the selection, and development of project management methods and technologies, and their complete transfer under the supervision of the project office, along with methodological and technical support for projects, not only eliminates managerial chaos but also significantly enhances the overall efficiency of enterprise operations.

2. LITERATURE REVIEW

The hierarchical organization of project execution within the portfolio, which is a fundamental function of the project office, greatly enhances the efficiency of individual projects and the entire portfolio. Clear differentiation of projects based on business functions, their alignment with the implementation of the enterprise's strategy (based on priority), the scale of problem-solving, and the formation of benchmarks form the basis for structuring the project and program portfolio. Evaluating the quality of hierarchical systems for project execution within the portfolio, portfolio structuring metrics, staff motivation (KPIs), methods, technologies, and management tools is an important task in assessing the effectiveness of such systems (Shaturaev, 2023).

The key challenge in effective portfolio project and program management is the development of competencies among managers in this field, which are required by practical business needs.

Issues at the Intersection of Educational Processes in the Training System for UPPP Specialists with Business Processes

(i) In the Russian education system, there are virtually no processes for developing competencies in UPPP (Portfolio, Program, and Project Management) specialists. Only competencies related to general project management are partially addressed in this direction. However, even in the few competencies that are formed in the training of project managers, significant gaps are observed:
(ii) A gap between the system of secondary and higher professional education.
(iii) A gap between the requirements of universities for graduates - project managers and the requirements of employers.
(iv) A gap between the comprehensive experience of previous professionals and its utilization by modern managers.

The challenge of preparing professionals to manage project portfolios is further complicated by the fact that the teaching staff in the education system lacks the competencies needed by practical businesses in this field. Herman Gref has repeatedly emphasized the mismatch between the competencies of university graduates and the requirements for competence from the business side. Regarding education in general, he notes: "What do we suffer from? It's an overload of knowledge and a lack of skills in

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education. As an employer, we primarily want people with skills because knowledge and the breadth of knowledge today are secondary." The Russian higher education system has not yet been able to bridge the gap between graduate competence and business requirements.

To address this situation, Sberbank believes that the development and organization of the educational process should be based on principles that maximally satisfy the competence requirements of employees for current and future business processes. The Corporate University of Sberbank was created for this purpose.

In addition to the external "front-office" necessity of creating a Corporate University, Sberbank has a deeper need for developing competencies among managers in the field of portfolio, program, and project management.

The relevance of the deficiency in the level of competence of UPPP specialists is demonstrated by work on the certification of project management maturity conducted by the International Project Management Association (IPMA). Let's briefly consider the results of the assessment of the effectiveness of portfolio project and program management in Sberbank's IT Block, conducted under the methodological guidance of S.I. Neizvestny in 2010 in collaboration with IPMA and the Russian Project Management Association SOVNET, using the international IPMA Delta system.

Overall competence in portfolio project and program management in the IT Block at the time of certification was at a low level. The existing education system in Europe is unable to provide businesses with professionally trained managers for large projects, even at the postgraduate level, let alone at the undergraduate level.

At the 22nd World Congress of the International Project Management Association in 2008, a pertinent question was raised: How long does it take to develop a project leader? Following extensive discussions, global experts concluded that the typical age at which a professional project leader matures is around 37 years old (see http:// sovnet.ru/organizations). The typical career cycle of such a specialist. This underscores the inefficiency of preparing project management professionals through the educational system, not only in Russia but also worldwide (see http://www.bologna.ntf.ru/DswMedia/ bolognadeclaration1999_rus.pdf.). Around the same time in 2008, research in the Russian business education segment noted: "Employers complain that the knowledge of even the best graduates from Moscow universities does not meet market requirements, and they are forced to establish their corporate universities. According to various data, businesses today spend 500 billion rubles on retraining yesterday's graduates, twice as much as all federal budget expenditures on higher education".

Sberbank's Corporate University shapes the learning process with a maximum focus on activating the creative potential of learners. The university's primary motto is "Leaders Educate Leaders" (LEL) (Bushuev *et al*., 2020). Education is less effective when a teacher positions themselves as more experienced, intelligent, or higher in the hierarchy of gurus than the students. At the Corporate University, it is emphasized that there is no hierarchy during the learning process – it is a collaborative effort where everyone is equal. The outcome of the educational process should yield graduates who are more "advanced," more creative, and more productive than the instructor [2]. Hence, the motto of the education system at Sberbank's Corporate University is "A leader teaches a leader."

3. METHODS

The research was conducted from 2019 to 2021 at the Financial University under the Government of the Russian Federation among 4th-year students in the field of Business Informatics, specializing in IT Management in Business. The methodological basis of the

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research consisted of theories of innovation management, portfolio, and project management. The typology of project portfolios is presented along with the main competencies required for project portfolio managers. The analysis of the existing education system shows that it is unable to provide businesses with professionally prepared managers for large projects, let alone at the undergraduate level. Some limitations in the application of known portfolio management competencies are noted due to their inconsistency with current business realities. The main research method was the analysis of modern requirements for the functionality of organization project portfolio management systems.

Briefly reiterate the research's objective, which is to explore how digitization in education influences the development of innovative management competencies in students. Define the boundaries of the research, such as the educational level (e.g., higher education), types of digital tools analyzed, and the specific management competencies under consideration.

1. Research Design is the following:

(i) Approach: Choose between qualitative, quantitative, or mixed methods based on the research questions. For instance, a mixed-methods approach might be suitable to capture both statistical trends and in-depth insights.
(ii) Rationale: Explain why the chosen approach is the most effective for investigating the research questions.

2. Participant Selection is the following:

(i) Population: Define the target population (e.g., students enrolled in management courses, educators).
(ii) Sampling Method: Describe the sampling technique (random, purposive, etc.) and justify its suitability.
(iii) Sample Size: Provide details about the number of participants and the rationale for this number.

3. Data Collection is the following:

(i) Instruments: Outline the tools and instruments for data collection. This could include surveys, interviews, focus groups, or analysis of digital learning platforms.
(ii) Procedure: Describe the step-by-step process of data collection, ensuring ethical standards are met (e.g., consent forms, confidentiality).
(iii) Timeline: Offer a timeline for the data collection process.

4. Data Analysis are the following:

(i) Qualitative Data: If applicable, describe the methods for coding and analyzing qualitative data, such as thematic analysis.
(ii) Quantitative Data: Explain the statistical techniques for analyzing quantitative data, like regression analysis or ANOVA.
(iii) Software Tools: Mention any software used for data analysis, such as SPSS, NVivo, or Python.

4. RESULTS AND DISCUSSION

This research aims to analyze existing approaches to portfolio management of projects and programs, further develop them, and summarize them, creating systems oriented towards the development of competencies in the field of enterprise project portfolio management. The rationale and main reasons for the necessity of developing competencies in project portfolio management specialists are discussed in terms of project activity effectiveness and enterprise business.

In today's conditions, the operation of any company is determined by several global trends: changes in business formats under the influence of digitization, the network economy, and

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changes in the structure of transaction costs, optimizing portfolio project management. This, in turn, leads to changes in the requirements for the competencies of project portfolio managers in enterprises.

The higher education system currently does not provide the necessary set of competencies to university graduates who are functionally supposed to be engaged in portfolio projects and program management. Competencies in portfolio project management are mistakenly replaced with competencies in managing individual projects, even though virtually all modern enterprises have project portfolios. This is one of the reasons why enterprise leaders, when hiring recent university graduates, often tell them, "Forget everything you were taught in university."

It is revealed that the main requirements of modern business for specialists possessing competencies in project portfolio and program management significantly exceed the competencies of university graduates. The main necessary competencies for project portfolio managers are identified. A gap is shown in the requirements of business and the competencies of university graduates in this management direction. The results obtained in the study can be used in the formation of competencies in project portfolio management demanded by the business education system.

Based on this study, this new leader will be more "advanced" than their mentor. In this perspective, Sberbank emphasizes once again that in today's business leadership, developing skills for fostering collaboration within a team and cultivating emotional intelligence (EQ), is significantly more important than nurturing IQ – the accumulation of knowledge. Currently, the educational system is geared in the opposite direction.

Key Competencies in Project Portfolio and Their Brief Characteristics Below are the key competencies required for managers in project portfolio and program management.

Value and Strategy Management, Mission Implementation Values encompass ethical, corporate, and business-oriented guidelines. Typically, values are described in an ethical code and other foundational documents of corporate culture. A project portfolio enables enterprise leadership to realize its mission primarily through strategic management tools such as project ranking, prioritization, and value management. The mission is carried out through the company's development strategy (Neizvestny *et al*., 2019). In cases where there is no value management process in place, where there is no systemic establishment of shared corporate values, local values begin to form within individual departments and groups, leading to corporate culture chaos that reduces business efficiency and destabilizes it.

Goal Setting Management is one of the most crucial competencies, which will be discussed in more detail in the following section of this work.

Phronesis (The "BA" Space) Phronesis involves comprehensive judgments aimed at identifying and revealing entities and phenomena in nature and society that are beneficial to the subject. It is the ontological identification of entities that enhance human life. Phronesis is closely related to value management, strategy, and the enterprise's mission. The "BA" mental space represents the transformation of traditional project management thinking into the thinking of a new culture of portfolio and program management, based on respect, mutual assistance, trust, and corporate values, systematically described in the Japanese R2M methodology (Guriev, 2008). Taxonomy Competence in the classification, ranking, and prioritization of projects and programs (see https://sberuniversity.ru/edutech-club/glossary/927.).

Holistic Management Management from a "bird's-eye view." From a contextual and technical management perspective, a manager should understand the intricacies and details of management. While immersed in project activities, a manager, who knows the parts, the

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"molecules" of this flow, should have the competence to rise above this "river," identify and see its sources, where it flows, and where its mouth is. Details of holistic management are described in the R2M methodology (Guriev, 2008).

Process and Resource Integration Management A project portfolio is an effective tool for integrating project activities within an organization. It enables the more efficient application of a unified project management system and the use of consistent methodologies and management tools. Integration management is the ability to plan integral resource loading and preempt "gaps" and overloads. Some aspects of this competency are described in the ICB IPMA (Cooper *et al*., 1999).

(i) ***Mediation.*** Conflict management competency (Neizvestnyy *et al*., 2019). Contextual competency in project and program management (UPPP). Competencies associated with management objects (which include enterprises, subdivisions, life cycles, projects, programs, and portfolios) (Cooper *et al*., 1999). Technical competency in UPPP (including IQ). Competencies related to management processes (Cooper *et al*., 1999). Behavioral competency (including EQ). Competencies related to management subjects (company staff, subdivision teams, program teams, project stakeholders, individual employees) (Cooper *et al*., 1999). Efficiency assessment competency in UPPP. Competency in methods and tools for assessing the efficiency of project and program portfolio management (see http//:www.pamj.or.jp and https://www.pmi. org/learning/library/effectiveness-project-portfolio-management-6394) (Romanova, 2016; Arsanjani & Ershadi, 2021). It's worth noting that the Financial University has begun to give significant attention to competency development in UPPP.

(ii) ***Goal-setting***. Competencies as an Example of Basic Competencies in Enterprise Project and Program Portfolio Management: Goal-setting in the management of a project and program portfolio represents an organizational ability to form and manage a portfolio in such a way that it aligns with the strategic direction of the organization, considers risks and opportunities, and is adaptive to internal and external changes. This ensures both short-term and long-term value or benefits for the organization and manages projects in the portfolio to ensure transparency, consistency of processes, visibility, and predictability of projects in the portfolio. It also promotes the cohesion, unity, and morale of the project management team. The structure and content of goal-setting in UPPP systems depend on the scale, orientation, and specifics of a business's conditions. For small businesses, the portfolio might consist of a few programs and individual projects, or sometimes even a single program or project. In this context, the term "portfolio" might not even be used. In this paper, we'll primarily focus on large, multifunctional enterprises with multiple programs and individual projects that form a portfolio. The main objective of project and program portfolio management systems is to realize the mission and core strategies for business development. A critical task of UPPP is coordinating the use of enterprise resources, ensuring their effective and balanced application in projects and program projects towards achieving the primary goal of UPPP. This is a crucial competency for specialists in managing project and program portfolios.

"Management competencies can be organized based on different management levels. The goal-setting level for program management can be classified as strategic and large-scale tactical. Meanwhile, project goal-setting, with some exceptions, falls under the tactical category. Thus, the foundational approach for managing a company's program and project portfolio is to consolidate based on the company's overall resource pool (Shaturaev, 2023). The portfolio management process then addresses the distribution and management of these resources among different programs and projects. Rapidly growing startups and companies

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with immature management practices often expend significant management resources addressing competition between programs and projects for these resources. One of the main objectives of portfolio management is to mitigate this competition and reallocate resources for balanced and efficient management.

An essential aspect of program goal-setting is to unify them based on a common project objective within that program. Individual project management is carried out based on its specific goal, under the systematic management of the program and overall portfolio. The goal-setting process in portfolio management largely depends on internal and external conditions of its implementation. Some characteristics of portfolio management in extremely turbulent working conditions of enterprises.

Creating a systematic registry of programs and projects is the starting point for employing the portfolio management system. Ranking and prioritizing projects in the portfolio form the foundation for resolving internal resource conflicts, systematic planning, and balanced distribution.

The following project ranking metrics were used. Detailed information is in the following paragraph.

The project importance metric is in the following:

(i) Priority – Projects aimed at achieving significant strategic business objectives, prioritized and allocated all required resources.
(ii) Important – Projects that have an indirect impact on achieving the company's business goals.
(iii) Routine – Projects carried out within the standard initiatives of a departmental scale, typically related to ongoing operations.

The level of organizational participation metric is in the following:

(i) Corporate – Projects involving employees from various company departments and interested departments of the holding or other organizations within the holding.
(ii) Large-scale – Projects involving employees from different departments within the company.
(iii) Integrated – Projects engaging employees from several departmental units.
(iv) Solo-project – Projects where only employees from a single departmental unit are involved."

The project execution experience metric is the following:

(i) Innovative - A project that has no precedent within the Company.
(ii) Modular - A project that, as a whole, hasn't been executed by the organization but consists of parts from previously conducted work.
(iii) Standard - A project that has been previously implemented by the Company and is archived.

Resource allocation among projects, based on their "importance" and "level of participation" criteria. Depending on a project's ranking in terms of "Importance" and "Participation Level", it is allocated human resources. From the table, it's evident that in some instances, resources engaged in priority, large-scale, and integrated projects are inherently unavailable for a significant portion of upcoming or ongoing projects. Access to resources in projects of equal priority is feasible only with consensus among project managers and the head of the resource-holding department. Access to resources for projects with a lower priority than the resource-seeking project always requires the approval of the resource-holding department head. If the head can't resolve the resource allocation issue, it is escalated to the project managers and, if needed, further to the project office head.

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Individual Project Management Competencies are aimed at quality control over project content, its execution, and outcome realization. These competencies are comprehensively detailed in methodological literature, educational texts, and project management standards.

Portfolio Management Competencies focus on quality goal-setting, holistic management, realizing an enterprise's strategic objectives, managing integration, resolving resource conflicts, and fostering the organizational potential across the enterprise scale. Such competencies are sporadically and unsystematically represented in educational and methodological literature. A significant portion of them remains unexamined (Hyvan, 2014; Neizvestnyy *et al*., 2019; Gnedykh, 2015)."

Project and program portfolio management is a significant factor in the development of enterprise business. The current conditions of business operation require companies to simultaneously implement several projects and programs, and these projects and programs are forced to be combined into portfolios. In portfolios, projects compete for the limited resources of the enterprise, and without systematic portfolio management and coordination, managerial chaos may arise, causing harm to both individual projects and the entire enterprise business. Thus, the consolidation of individual projects into programs and programs into portfolios significantly increases the efficiency of project activities and the enterprise business as a whole.

The article compares the list of competencies required by business functionality in the field of project portfolio and program management with an assessment of the competence of graduates in the field of Business Informatics. The results obtained in the study can be used in the transformation of personnel training systems and practical activities related to portfolio projects and program management in organizations of various types.

5. CONCLUSION

In the modern era, businesses are evolving to be multifaceted, diverse in nature, and geographically distributed, making their management increasingly intricate. Individual projects are often amalgamated into programs, and these programs are integrated into portfolios. Such a systematized approach greatly augments the efficacy of project activities and the overall business operations. The effective functioning of enterprises without the incorporation of methodologies, tools, and innovative technological solutions for process and project management is implausible. In this context, the development and evolution of project and program portfolio management systems hold pivotal importance.

The demands of contemporary business for professionals proficient in project and program portfolio management significantly surpass the existing competencies of university graduates from related disciplines. This paper illustrates, using Sberbank of Russia as a case study, the required competencies in project and program portfolio management and the expected level of proficiency in them, juxtaposed against the competency assessment of graduates from a Business Informatics discipline. The authors of this study share their experience in shaping competencies in enterprise program project portfolio management, which the business community expects from the education system.

6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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