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USE OF INFORMATION TECHNOLOGIES IN FUTURE PROJECT MANAGERS' TRAINING

Abstract. The article clarifies the concepts of project and project management, substantiates the use of information systems and technologies in training specialists in project management (project manager and program manager), discusses the characteristics and functions of project management information systems as well as describes the materials and methods of project implementation and the advantages of using IT for project creation. The author outlines the contents of project managers' training at the University of Education Management Educational-Scientific Institute of Management and Psychology and claims that future project managers must know the main characteristics and functionalities of and be trained to use the MS Project, Oracle Primavera, etc. The project management students also have to be able to determine the purpose of and tools for a calendar network model development, to formulate requirements for project management software in solving specific problems as well as to use software for project planning, monitoring and analysis.

Keywords: project manager; higher educational institution; information systems and technologies; project management.

1. INTRODUCTION

Formulation of the problem. Globalization and accelerated information flow necessitate organizational changes and quick managerial decision-making. Practice shows that managerial decisions bring better results if they use a project approach rather than traditional methods. Project management based on information systems and technologies gives competitive advantages to the organization, which, in turn, forms the need for a new profession on the labor market – the profession of project manager (project and program manager) who can quickly adapt to socio-political transformations in the country.

To be efficient, project managers and project team members must be well-informed in management, information technology management, economics, social psychological disciplines, etc. A narrow profile specialist, most likely, will make a poor project manager, therefore project management in Ukraine is seen as an add-on to obligatory knowledge required by specific professional activities, which includes necessary knowledge and skills in project management.

The project-based organizational management is used in many countries of the world, and it has been found effective for significant improvement of managerial decisions.

As the Spanish philosopher José Ortega y Gasset notes: "I am I plus my surroundings; and if I do not preserve the latter, I do not preserve myself", that is, a person cannot be considered in isolation from the world. And the modern world is a world of projects where everyone's life is a unique project. [3]

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That is why the formation of the managers of a new generation, being the specialists trained with the use of advanced educational and managerial technologies, is a fundamental prerequisite for the positive development of today's Ukraine. Therefore, training of project managers capable of using new software including MS Project, Oracle Primavera, Clarizen, etc., is an important objective of a number of Ukrainian institutions of higher education.

Analysis of the latest relevant research and publications. The analysis of the relevant scientific literature shows that the priority management principles, the project managers' management functions, modern forms and methods of management and management styles have been studied by E. Berezniak, V. Berek, V. Maslova and others. The development of the theory of management has been analyzed in the works of L. Danilenko, G. Yelnikova, L. Kalinina, V. Pikelna and others.

The problems of education informatization [2], including future specialists' training using information technologies (hereinafter – IT) have been addressed in the works of V. Bykov, A. Guraliuk, M. Zhaldak, J. Zaporozhchenko, G. Kozlakova, S. Litvinova, O. Spirin, O. Torubari and others. The issues of IT development have been investigated by a number of Ukrainian and foreign scientists including S. Bushev, I. Kononenko, E. Kornoushenko, A. Kofman, T. Saati, L. Zade, M. Svami and K. Thulassiman.

Some aspects of IT development in project management have been disclosed in the writings of Yu. Tesla, B. Kosko, V. Prangishvili, V. Maksimov, O. Kulinich, R. Axelrod, V. Silov, N. Kunanets, T. Basyuk, O. Tyminsky and others.

Despite the large number of relevant studies, the IT-based project management and the corporate information system for management decision effectiveness assessment have not been fully covered in scientific works.

Therefore, the **objectives** of this article are to analyze the experience of project managers' (project and program managers') training in higher educational institutions, to prove the important role of IT in project management, as well as to analyze the best-known information systems used in project management.

2. METHODS

The research is carried out on a sample of project management students at the Educational and Research Institute of Management and Psychology of the State University of Education Management of the National Academy of Educational Sciences of Ukraine. The instruments used included analysis of the relevant theoretical and methodological sources, higher educational institution e-learning environment, software products (MS Project, Oracle Primavera, Clarizen), pedagogical observation, systematization of students' academic performance and projects, as well as the generalization of lecturers' experience of teaching "IT in Project Management" course to project management students.

3. RESULTS AND DISCUSSION

A number of higher educational institutions of Ukraine have Master programs in project management, which is necessitated by the following social and political factors:

- intensive change in industry with the priority given to flexible strategies and organizational structures that quickly respond to change;
- highly demanding market conditions and large-scale projects that require great professionalism of project managers as well as the increasing role of leadership, motivation, team building, conflict management, etc.;
- managers' project-related work, which requires special skills and possession of certain tools;

– the use of forms and methods in project management to cope with integration processes in education and production.

Management of organizations is carried out through various projects, because it increases the effectiveness of management decisions. Previously, the project meant a set of documents, drawings and calculations that people used to create a product or facility, therefore, projects included research, design and development. But now the concept of project has become wider to include different activities. The analysis of literary sources (Table 1), allows defining the project as a set of certain actions aimed at achieving the goals within a certain period of time with certain resources.

Table 1

Analysis of definitions of project found in scientific literature [5; 6]

Source	Definition
Dictionary on project management	a certain task with certain initial data and established results (goals), which determine the way of its carrying out.
Fundamentals of professional knowledge and the project managers' competence assessment system	time-limited system of operations (works) aimed at achieving a range of specified results and products (the plan needed to achieve project objectives) at the level of requirements and quality standards.
Essential project management knowledge	an enterprise with initially set goals, the achievement of which means the completion of the project
English Association of Project Managers	an individual enterprise with specific goals, which often include the requirements for the time, cost and quality of the results to achieve
S. Moskvin	a set of interrelated measures to achieve certain goals within a given time period with the established resource constraints
M. Robson, F. Ullah	a one-time set of interrelated measures aimed at satisfying a defined need by achieving specific results using the established material (resource) supply with clearly defined goals over a given period of time

According to G. Tarasyuk, project management is a process of managing the project team and resources using special methods through which the project ends successfully and achieves its goals [7]. Today, project management is popularly pictured as Harold Kerzner triangle (Fig. 1).

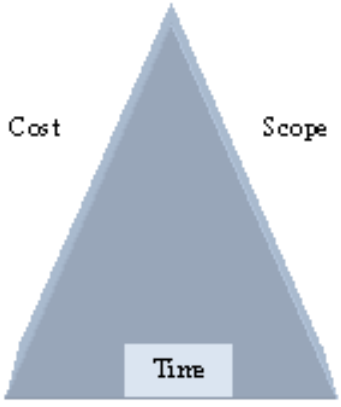

Fig. 1. Harold Kerzner triangle

I. Bashinska notes that project management is carried out by means of project planning, regulation and control [1].

Project planning plays an important role, as it determines the criteria to measure the project success, sets the project objectives and develops the methods and means to achieve the project objectives.

Project regulation is carried out as long as the project exists. During the project implementation all the relevant processes are regulated.

Project control determines the degree of goals achievement and the difficulties in project implementation with the following project implementation adjustments. When creating and managing projects, it must be remembered that projects have resource constraints, require constant monitoring and have time limits [1].

The role of IT in project management is ever increasing. The use of IT in project management (hereinafter referred to as ITPM) increases the effectiveness of project management and decreases the number of unfinished projects, it allows project managers to manage all the factors that have a significant impact on the projects. IT facilitates the communication between the project participants and monitoring of the deviations in the project implementation, saves time when logging all the project stages and makes control more functional. The benefits of using IT in project creation are shown in Figure 2.

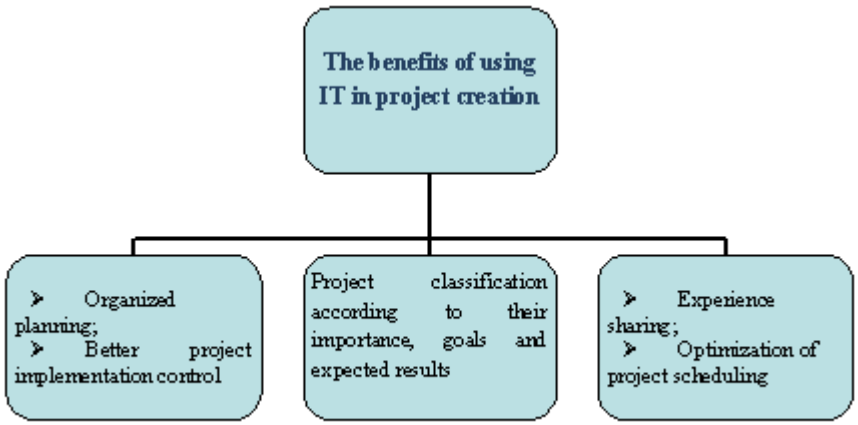

Fig. 2. The benefits of using IT in project creation

As is seen in Fig. 2, IT offers an opportunity to classify projects, giving priority to the projects that are strategically important in terms of the resources and funding. Optimization of project implementation allows distributing the resources of an organization or company, given the availability of resources, projects priority and funding constraints. The experience gained during project implementation makes it possible to avoid errors in future projects and to reduce the time for their planning.

Given this, project managers' training at higher educational institutions should provide general and specific knowledge.

General knowledge includes the theory of management, operational management, organizational behavior, etc. Specific knowledge covers the knowledge relevant to different project activities including educational, innovative, organizational, etc.

The project manager in any system of tangible and intangible production must have the appropriate knowledge and skills of management, i.e. be able to work in a team, have analytical and monitoring skills, know the methods of budgeting, business planning, project investment and project optimization model building, have time management skills as well as be an experienced software user.

The project management training program available at the University of Education Management of the National Academy of Educational Sciences of Ukraine includes the courses in project team building, project planning, project decision-making, project implementation, project social and environmental safety, theory of company, project-oriented organization marketing, investment management, methodology and organization of scientific research, macroeconomics-II, educational project management, organizational monitoring, business planning of project-oriented organizations, social project management, management of international projects and programs, political aspects of public administration, information technology in project management, methods of statistics, management psychology and time management.

Future project managers have the opportunity to do a qualifying internship under the "Case Management in Project Management" program at Jan Długosz University in Częstochowa (Poland). The majority of master's theses are done on the requests from a number of enterprises of Kyiv and are implemented as effective projects. Such scientific and practical training of project managers will provide positive changes in the practice of project management and a significant improvement in project designing and implementation.

As noted above, to be efficient, each project manager should be knowledgeable about the software used in project creation and implementation. Thus, project management uses a developed information business environment, which includes a large number of software tools for project development and management. This toolkit can become a powerful weapon for organizing comprehensive information security.

Below, we present the main software taught to project management students at the University of Education Management (Table 2).

Table 2

Software used in project management

Developer	Product
Microsoft	Microsoft Office Project, a program developed by Microsoft and used in project management of any complexity. It includes: – MS Office Project Standard, a one user entry-level package intended for small and simple projects; - MS Office Project Professional, a professional project management package designed for joint project management and project portfolios management with the help of Microsoft Project Server; this product can be used in projects of any complexity at any management level; - MS Office Project Server, a product that is used to manage distributed projects, that is those based on project managers' interactions; - MS Office Project Web Access, the MS Project web interface allowing all project participants to access information via Internet Explorer.
Primavera Inc	Primavera Inc offers several projects: – SureTrak Project Manager, a product used for lower level project management; - Primavera Project Planner (P3), a professional project management package used in complex multi-task projects or project groups; - Primavera Project Planner for the Enterprise (P3e), the main

	product of Primavera Enterprise, which is indispensable in project planning and project budgeting, project implementation analysis and coordination, monitoring one particular project or a group of projects, analyzing projects by different indicators, costs and works and tracking project results.
Welcome Software Technology (Deltek)	The Open Plan is used both at the low and high levels of project control and management. This product is helpful in creating project plans considering different restrictions, determining the priority of existing projects (which affects project resources), minimizing the possible risks in project implementation, making a detailed analysis of the work done, etc. There are professional and lite versions of the product that include the fully integrated Open Plan Professional and Open Plan Desktop.

In teaching the Information technology in project management course, the university lecturer teaches future project managers to choose the best IT to use in each stage of project management in order to assess the project effectiveness by calculating its costs and profits.

Thus, successful use of IT in project implementation determines organization's competitiveness.

Before using IT in project management, it is necessary to make a detailed plan for its use. It is also necessary to do resource and cost planning and controlling, which are done with the purpose of reducing the negative effects and the stress faced by employees because of the introduction of the new technology.

Most of the quality IT-based project management programs function as web applications, which means that a program uses a browser and an internal network. There is also a different type of project management software that works from an automated workplace (AWP). It can be used for multiple AWPs on condition that they are connected to the network to share information at any time [8]. The advantage of this type of software is the ease of on-line access and upgrading.

Each of the IT used in project management listed in Table 2 performs the following functions [4]:

- Tracking (recording the registered processes and problems);
- Scheduling (project planning);
- Project portfolio management (managing a set of projects, that is, connecting individual projects to the general information system, thus giving access to system resources);
- Resource management (tracking and distributing resources to be used in the project).
- Document management (input data-based analysis of the e-document turnover).

Thus, the functions of project management are carried out according to the scope of work, time, quality, costs, risks, integration management and IT management.

The Project Management Information System (PMIS) forms a single information space, which provides a single database of plans for all corporate projects, a single directory of the resources used in projects; uniform document forms, project and report templates. The PMIS consists of two groups of components: supporting and functional. The supporting components include organizational support, legal support, technical support, information support and software support for PMIS. The functional components include those elements (subsystems) that determine the objectives, management functions and information processing functions of PMIS.

The PMIS functions are carried out with the help of IT. The use of IT in project management envisages the creation of a wide range of functional capabilities of project activities. It includes the description of project parameters and establishment of logical connections between the activities, multilevel project presentation, listing of available resources, materials, expenses and works, calendar planning, resources and expenses planning, the project structure graphic representation (Gantt charts, PERT diagrams), the project implementation monitoring, reporting and documenting and communication organization (work in a network environment).

In turn, the implementation of the above-named means involves the use of the software described in Table 2. Therefore, future project managers should know the main characteristics of and be able to use MS Project, Oracle Primavera, etc. They should also know the similarities of and differences in the functional characteristics of modern professional software products used in project management, determine the objectives and means of calendar network model developing, meet the corporate requirements when using standard project software, formulate project management software requirements for solving specific problems, as well as use software tools for project planning, monitoring and analysis.

4. CONCLUSIONS AND FOLLOW-UP RESEARCH

The use of IT in project management is advisable and helpful in solving a number of project-relevant problems. It facilitates and improves project management, in particular simultaneous management of several projects and their monitoring. Currently, there is wide choice of information systems for project management to satisfy different tastes. The use of IT in project management requires prior research, planning of a complex of works and their implementation monitoring. All this is done in order to automate project management and monitoring, which can promote effective organizational management.

The author's own experience of teaching "Information technologies in project management" allows making a conclusion that the profession of project manager requires a complex and intense creative work to develop project management students' personality, team-work skills and information literacy. Among the large number of professionally relevant disciplines priority should be given to the use of IT in project management, since project management information systems increase the effectiveness and promptness of management decisions and automate all major project activities. Further research will focus on a model of future project managers' professional competence development during the research of IT in project management.

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ВИКОРИСТАННЯ ІНФОРМАЦІЙНИХ ТЕХНОЛОГІЙ У НАВЧАННІ МАЙБУТНІХ ПРОЕКТ-МЕНЕДЖЕРІВ

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Анотація. У статті уточнено поняття «проект» і управління ним, обґрунтовано застосування інформаційних систем і технологій у підготовці майбутніх фахівців нового профілю – проект-менеджер (керівник проектів і програм), розкрито особливості застосування інформаційних систем управління проектами, визначено функції інформаційних систем управління проектами, розглянуто матеріали і методи реалізації проекту, структуровано переваги застосування ІТ у створенні проекту. Окреслено зміст підготовки проект-менеджерів у Навчально-науковому інституті менеджменту та психології ДВНЗ «Університет менеджменту освіти». Встановлено, що майбутні проект-менеджери мають обов'язково знати основні характеристики, функціональні можливості та особливості практичного використання програмних засобів MS Project, Oracle Primavera та ін., визначати мету і засоби розробки календарно-сітьової моделі, використовувати вимоги корпоративного стандарту у використанні програмного забезпечення проекту, формулювати вимоги до програмних засобів управління проектами для вирішення конкретних завдань, використовувати програмні засоби для планування, моніторингу та аналізу виконання проекту.

Ключові слова: проект-менеджер; вищий навчальний заклад; інформаційні системи й технології; управління проектами.

ИСПОЛЬЗОВАНИЕ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ В ОБУЧЕНИИ БУДУЩИХ ПРОЕКТ-МЕНЕДЖЕРОВ

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Аннотация. В статье уточнено понятие «проект» и управления им, обосновано применение информационных систем и технологий в подготовке будущих специалистов нового профиля – проект-менеджер (руководитель проектов и программ), раскрыты особенности применения информационных систем управления проектами, определены функции информационных систем управления проектами, рассмотрены материалы и методы реализации проекта, структурировано преимущества применения ИТ в создании проекта. Определены содержание подготовки проект-менеджеров в Учебно-научном институте менеджмента и психологии ГВУЗ «Университет менеджмента образования». Установлено,

что будущие проект-менеджеры должны обязательно знать основные характеристики, функциональные возможности и особенности практического использования программных средств MS Project, Oracle Primavera и др., определять цель и средства разработки календарно-сетевой модели, использовать требования корпоративного стандарта при использовании программного обеспечения проекта, формулировать требования к программным средствам управления проектами с целью решения конкретных задач, использовать программные средства для планирования, мониторинга и анализа выполнения проекта.

Ключевые слова: проект-менеджер; высшее учебное заведение; информационные технологии; информационные системы; управление проектами.

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