РОЗДІЛ 9. МАТЕМАТИЧНІ МЕТОДИ, МОДЕЛІ ТА ІНФОРМАЦІЙНІ ТЕХНОЛОГІЇ В ЕКОНОМІЦІ

RISK MANAGEMENT IN THE IMPLEMENTATION OF INFORMATION TECHNOLOGY AT MODERN INDUSTRIAL ENTERPRISES

УПРАВЛІННЯ РИЗИКАМИ ПРИ ВПРОВАДЖЕННІ ІНФОРМАЦІЙНИХ ТЕХНОЛОГІЙ НА СУЧАСНИХ ПРОМИСЛОВИХ ПІДПРИЄМСТВАХ

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The article defines the main features of risks in the implementation of information technology. The main risks arising from the introduction of information technologies at modern enterprises are analysed. Proposed methodologies for managing and assessing risks at modern enterprises. The main advantages of introducing information technologies at domestic enterprises are considered. Developed recommendations on risk management and ways to reduce the likelihood of their occurrence.
Key words: *risk, information technology, modern enterprises, risk management, risk assessment.*

У статті визначені основні особливості ризиків при впровадженні інформаційних технологій. Проаналізовано основні ризики, що виникають при впровадженні інформаційних технологій на сучасних підприємствах. Запропоновані методології управління та оцінки ризиків на сучасних підприємствах. Розглянуті основні переваги впровадження інформаційних технологій на вітчизняних підприємствах. Розроблені рекомендації, щодо управління ризиками та шляхи зниження ймовірності їх виникнення.
Ключові слова: *ризик, інформаційні технології, сучасні підприємства, управління ризиками, оцінка ризиків.*

В статье определены основные особенности рисков при внедрении информационных технологий. Проанализированы основные риски, возникающие при внедрении информационных технологий на современных предприятиях. Предложенные методологии управления и оценки рисков на современных предприятиях. Рассмотрены основные преимущества внедрения информационных технологий на отечественных предприятиях. Разработанные рекомендации по управлению рисками и пути снижения вероятности их возникновения.
Ключевые слова: *риск, информационные технологии, современные предприятия, управление рисками, оценка рисков.*

Problem statement. To improve the quality and efficiency of management the Ukrainian enterprises are to follow the development of information technologies. Automation is a rather popular service in the direction of optimizing the business-processes of various types of enterprise activity. In particular, the range is wide enough: from complex systems (support of production-economic activity management, budget management, production design and technological preparation; systems of electronic document circulation) to simple software performing local tasks at a particular subdivision of the enterprise. Taking into account complicated economic conditions, such projects are rather expensive and risky for Ukrainian enterprises, but the results of their realization certify the significant reduction of the expenditure and improved efficiency of the use of the enterprise resources.

Analysis of recent researches and publications. A number of works by such native scientists as O. I. Volkov, M. P. Denisenko, Y. D. Krupka, S. M. Klymenko, O. S. Dubrova, N. M. Blazhenkova, S. G. Dzhura, O. V. Fisurenko and others, are devoted to research of the problem of assessment and risk management during the introduction of information technologies. In particular, U.V. Lityuga investigated the theoretical basis of the impact of risks and methods for their evaluation in his work. The significant contribution to the study of risks in the implementation of information technologies at domestic enterprises was done by T. L. Mostenska and N. S. Skopenko.

From foreign scholars Stonburner G., Goguen A. and Fering A., who developed the methodology for risk management of innovative projects and examined their impact on the national economy, should be hightlighted.

Setting objectives. However, a number of issues of assessment and risk management in the implementation of IT-technologies for domestic enterprises due to the peculiarities of their functioning remains. Precisely the in-depth study of the risks accompanying the introduction of information technology in modern enterprises, will help managers to use innovations in the enterprise in a quality and efficient manner.

That's why it is advisable to identify ways to improve the risk management process with the introduction of the latest information technology.

The purpose of the article is to form the main directions of risk management, which accompany the process of implementing information technology in modern enterprises, as well as the development of recommendations for effective risk management in order to reduce the likelihood of their occurrence.

Presentation of the main research material. Risks management in the process of project management is determined as a complex of measures including identification, risks analysis and taking decisions directed to reduction of the probability and degree of their influence on the process, results and products of these projects [1, p. 36].

It's possible to distinguish three main trends in the formation of factors that determine the implementation of information technology – they're, first of all, the needs of the enterprise, the needs of users and the availability of technical facilities. Implementation of the computer information system allows you to switch to new management methods, to a qualitatively new level of management and management.

Modern information technologies are able not only fully satisfy the requirements of production systems, but also act as an important prerequisite for their development. The world's experience in the development of computer technology and information technology suggests a significant increase in their development compared to the rate of development of the manufacturing sector in recent years. High pace of implementation of information technology contributes to the increase in the number of computer technology used in the production and economic activities of enterprises of all sectors.

As the practice today, most of the demand for automation of the company did not stop at the narrow application software solutions only for accounting or operations, and increasingly require integrated management systems. An effective tool in the IT market, which would be able to integrate virtually all the moments associated with the activities of one or another enterprise, are integrated systems of the ERP class.

The risks that arise during the introduction of information technology differ in specification and narrow focus on the risks arising from the implementation of other types of innovations, which is why they are unique.

Features of the risks, which are arising from the introduction of information technology at domestic enterprises: uncertainty; rapid rate of growth of likelihood of occurrence and reduction of losses; the complexity of the calculation, due to the narrow specification of individual risks.

With the introduction of information technology, the main aspect is the presentation of the latest software in the form of an investment project, that is, taking into account the key aspects, namely:

– consistency of the project, availability of interdependent activities;
– definition of the life cycle of the project;
– accounting of budget constraints;
– forming the goal of the project, and observing it at all stages of its life cycle [2, p. 128].

Equally important role in the risk management system is played by the right choice of measures to detect, prevent and minimize risk, which generally determine its effectiveness [3, p. 77].

The practice of foreign enterprises actively using information technologies in all fields of activities since 1980s demonstrates that introduction of up-to-date information systems enables optimization of the decision-taking process at all the levels of management, successful control of complex production processes. In this case the terms of orders fulfillment reduce on average by 20-30%, production rejects decrease by 35%, transport and purchase costs reduce by 60%, manual preparation of documents practically vanishes [4, p. 7].

During the introduction of information technologies the main approaches to risks management are based on:

– Cobit v.4.1 information technologies management and audit standard;
– NIST 800-30 directives in risks management in information technologies;
– ISO 3100 directives in risks management (are being prepared for adoption);
– ISO 27005 standard of information security management;
– AS/NZS 4360:2005 standard of risks management.

Practically any process of the project has its own (specific) set of risks and some general set of risks for all the processes of the project. According to ISO 10006:1996 standard risks management includes such activities as:

– *identification* – determination of the risks in the project;
– *assessmen*t – assessment of the probability of occurrence of risky events and their influence on the project;
– *reaction development* – working out plans of reaction to the risks;
– *risks control* – realization and renewal of the risks plans.

The analysis of scientific works and information sources has allowed to allocate the main methodologies of risk assessment in the implementation of information technologies:

– Methodology for Risk Assessment by the National Institute of Standards and Technology (NIST);
– Methodology for analyzing information technology risk factors (Factor Analysis of Information Risk – FAIR);
– Methodology of Proportional Analysis of Risks (MESARI);
– Method for evaluating operationally critical threats, assets and vulnerability assessment (OCTAVE);
– Methodological analysis of information risks of the International Information Security Risk Analysis Methodology (IRAM).

Potential impact of risk on a project is estimated as a product of probability of occurrence and degree of influence and on its basis formed a risk rating. Usually the rules of the rating system of risks are determined by the company in advance, before the start of the project, and are included in the assets of the processes of the company. Also, the rules of the rating system can be adapted to the needs of a particular project. An assessment of the importance of each risk and its priority, as a rule, is carried out using the probability matrix and influence [5, p. 589].

Table 1

Risks management during introduction of information technologies

Variants of risk management / types of risks		Risk description	Reduction of the risk types	Distribution of risk	Reduction of the probability of occurrence of risks
Risks related to the scale of the project	Failure of the executor and customer to schedule project terms	Increase of real terms of project performance by the time of delay of the work	Detailed analysis of every stage of the work, participants interaction, work organization	Separation of the project into several subprojects, allocation of a pilot project on subsystems (limited scale)	Quality program worked out in detail, well-tested management of project configuration, special procedures of participants interaction
	Change of project priority by the customer	Increase of real terms of the project realization or early completion of the project			
	Insufficient information on external systems, which provides for interaction within the project	Difficulties with integration realization that may cause changes in the terms and budget of the project			
Risks related to insufficient experience in the field of IT	Inability to participate in the planned work on the project required staff from the customer and the executor in connection with vacation, business trips, etc.	Increase of the project realization terms by the time of absence of employees or preparation of the competent substitution.	Provision of training for the users including administration, adhering to the operation technologies	Coordination with the customer of most project documents, harmonization of all changes in the functionality of the system	Development and approval of the project concepts at its earliest stage
Technical risks of the project	Недостовірна інформація про характеристики базового програмно-апаратного комплексу замовника, або його значуща зміна в ході реалізації проекту	Changes in the project terms and budget, complete or partial impossibility of the use of the project product by the customer	Strict choice of the project team by the qualification criteria. Project participants' training in the technology of the project work, instruments	The personal responsibility of project participants is documented, documenting all changes in the project process	Use of the enterprise standards in the project work, development of the project standards
Organizational risks of the project	Inconsistency of the system with business tasks, gross errors in process algorithms, critical failures of the system	Change of the project terms, customer's dissatisfaction with the project results, impossibility of system operation	Education of the project participants, team trainings, as complete activity formalization as possible	Inclusion of customer representatives in working groups	Inclusion of the project administrator into the team, detailed distribution of the roles in the project
Operational risks of the project	Extension of functional characteristics of software products that are already being used by the customer within the framework of the project objectives	Change of the project purposes or early termination of the project	Multiple testing of created products, careful expertize of the documents	The act of delivery to the customer of any document fixing the absence of customer claims for each stage of work	Strict observance of the quality program procedures

Putting into operation their logistic center made the International Confectionary Corporation ROSHEN introduce WMS Logistics Vision Suite system aiming at optimization of the storehouse processes management. The introduction of systems of this class is a rather expensive and risky solution, especially for domestic enterprises [6, p. 347].

For efficient management of all processes, the logistics center ROSHEN is provided by the Qguar WMS Pro system. Ant Technologies, a leading IT integrator for logistics management solutions. The advantages of this system are a combination of multifunctionality of supply chain management and warehouses, adaptation to the requirements of a single customer and an effective implementation methodology. Today, the WMS Logistics Vision Suite uses more than 300 companies around the world, including Shenker, Nestle, Renault, Citroen, Opel, Sopharma, Georgia-Pacific, Geodis, LogisticPlus, UniversalLogistic, Sniezka, Roshen and others.

Introduction of Qguar WMS Pro into the ROSHEN logistic complex made it possible to optimize all the logistic processes from the moment of acceptance of the goods to the moment of their loading – product loading lasts up to 35 minutes and the stay of the freight transport in the territory of the complex does not exceed one hour. The basic advantages of WMS LogisticsVisionSuite introduction consist in the high level of adaptation to changing business-processes; management of the storehouse in the real time with minimal number of employees; availability of all the necessary functions for performance of the current tasks and absence of restrictions in the increase of storehouse needs in the future.

Despite the risk and cost of implementing information technology in modern conditions, this project is profitable and increased the efficiency of the enterprise, which justified a number of risks.

In order to minimize or avoid losses, when implementing information technology domestic enterprises need to continuously optimize the process of risk management, which must take into account the features of a particular enterprise.

Table 1 contains basic risks that may occur during introduction of information technologies and ways of risks prevention. The following colors are used in the table: yellow – acceptable risk (low risks); orange – justified risk (middle, moderate risks); red – inacceptable risk (high, critical risks).

In order to avoid risks in implementing innovations in modern enterprises, managers need to develop a system of actions (base model) to provide necessary and operational information on the effective implementation of risk management measures.

Conclusion. Thus, the detailed analysis of the risks types and determination of their management directions will allow decrease of negative consequences or elimination of the probability of risks occurrence during IT implementation, providing profitability of the funds invested into automation of the production and managerial processes. All the project risks are to be subject to control, but realization of the strategy of their management depends on certain additional expenditure of time, resources and budget of the project.

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To improve the quality and efficiency of management, domestic enterprises are to follow the development of information technologies. Such projects are rather expensive and risky for Ukrainian enterprises but the results of their realization certify the significant reduction of the expenditure and improved efficiency of the use of the enterprise resources. In the paper analysed and estimated the main risks that arise during the introduction of information technologies at modern enterprises. Risks management arises during the introduction of information technologies is determined as a complex of measures including identification, risks analysis, and taking decisions directed to the reduction of the probability and degree of their influence on the process, results, and products of these projects. The main features of the risks are determined that arise during the introduction of information technologies. Also in the paper, there are determined the basic management risks approaches associated with the implementation of information technology. The basic types of activity, which include management risks related to IT-technologies, are considered. Analysis of scientific works and methodology of information sources allowed determining the main risk in the implementation of information technology. Established that the potential impact of risk on the project is estimated as the product of likelihood and degree of influence and, on its basis, the rating risk. For example, the International Confectionery Corporation ROSHEN proved a positive effect of the introduction of information technologies by optimizing logistics processes, despite a number of risks. Based on conducted research, qualitative risk analysis and their estimation are made. In the article, there are developed the main ways of reducing the potential risks associated with the introduction of information technologies and recommendations to reduce risk exposure. Proved that for the minimization of losses or avoidance of information technology at domestic enterprises, one must continually optimize the risk management process, which must take into account the peculiarities of a particular company. It is established that for the avoidance of risks in innovation in modern enterprises, managers need to develop a system of actions (base model), to provide them with the necessary and timely information for the effective implementation of risk management.