# Cognitive Model of Digitalization of Business Processes of a **Project-Oriented IT Company**

Isus Raichuk<sup>1</sup>, Iuliia Khlevna<sup>1</sup>, Oleksandr Timinskyi<sup>1</sup>, and Oleksandr Voitenko<sup>2</sup>

<sup>1</sup> Taras Shevchenko National University of Kyiv, 60 Volodymyrska St., Kyiv, 01033, Ukraine

<sup>2</sup> Kyiv National University of Construction and Architecture, 31 Povitroflotskyi Ave., Kyiv, 03037, Ukraine

#### Abstract

The task of developing a cognitive model of digitization of business processes of a projectoriented IT company is set. The relevance and practical significance of the development of such a model is justified. The latest studies on the digitization of business processes of enterprises are analyzed. A cognitive model of digitization of business processes of a projectoriented IT company is proposed in the development of existing approaches. This model is formalized. The elements of the model are characterized. A set of standards for use in the project of digitalization of business processes of a project-oriented IT company is proposed. A SWOT analysis of the offered model was carried out. The SWOT analysis proves the relevance, validity of the model and the practical significance of its use. The risks of implementing the proposed model in an IT company are analyzed. Appropriate anti-risk measures are proposed. Prospects for further research in the chosen direction are outlined.

#### **Keywords**

Cognitive model, digitalization, business processes, reengineering, project management, IT company

## 1. Introduction

The last decade a significant growth and development in the field of information technologies are observed, in particular areas related to the Internet. This fact enabled and encouraged most companies to transfer their activities to the online space. The Covid-19 pandemic is also a significant factor in the transition of business to the digital world. All of the above unknowns, as well as development in the field of project management (improvement of existing and invention of new project management methodologies, methods and standards) are a solid basis for effective and rapid cognitive digitization of business processes of project-oriented IT companies.

Therefore, the development of a cognitive model of digitization of business processes of projectoriented IT companies is quite relevant and timely. A logical first step would be to examine existing work in the direction of digitization, so let's look at some recent research to provide a basis for further developments.

#### 2. Literature review

In order to obtain an up-to-date basis on which the development of an own model of digitization of business processes of project-oriented IT companies is proposed, some of the achievements of

 $@\ 2022$  Copyright for this paper by its authors. Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0).



CEUR Workshop Proceedings (CEUR-WS.org)

Proceedings of the 7th International Conference on Digital Technologies in Education, Science and Industry (DTESI 2022), October 20-21, 2022, Almaty, Kazakhstan

EMAIL: neversaydie.jr@gmail.com. (Isus Raichuk); yuliya.khlevna@gmail.com (Iuliia Khlevna); timin@ukr.net (Oleksandr Timinskyi); boytehko@gmail.com (Oleksandr Voitenko)

ORCID: 0000-0002-0968-4811 (Isus Raichuk); 0000-0002-1874-1961 (Iuliia Khlevna) (i)\_(ii)

researchers in the field of digitization of business processes of IT companies were examined. A brief analysis of these works is shown below.

The article [1] discusses the application of the knowledge system for managing innovative projects and programs to stimulate and improve innovative activity in Ukraine by analyzing the causes of weak innovative development and finding ways to improve this state. The main areas of innovative activity of enterprises, the causes of failures in the introduction of new products to the market were determined and analyzed. The types of innovations used for innovative activities at IT enterprises are highlighted. The authors note that the project approach to innovation is almost completely absent in practice. At the same time, they point out that traditional project management methodologies, based on value systems, do not allow fully effective management of innovative projects due to their considerable complexity and riskiness. This leads to the need to find new approaches that would take into account the specifics of complex innovation projects and development programs, their elements, characteristics and parameters of connections. The issue of development and application of new management models of innovative projects based on a value approach was considered. For this purpose, it is proposed to use a model of scientific cooperation based on franchising from the point of view of maximizing the values of all interested parties of the project and the program using a complex system approach to determining the state of activity in the innovative project. A structural diagram of interaction with the external environment during the implementation of innovative projects is proposed, which is a conceptual model of research. On the basis of this model and scheme of innovative association, a mathematical model for determining the values of participants and stakeholders of the innovative project (program) at all stages of functional interaction within the framework of the initiated project activity is proposed.

Article [2] is devoted to the approach of creating a comprehensively competent project-oriented organization. The researchers analyzed the standards for assessing the competence of organizations and proposed a highly adaptive approach to creating an information system of a project-oriented organization; formulated an approach to creating complex competence.

In work [3], the authors, considering the diversification of the company in order to increase the efficiency of business processes, note that the diversification of construction companies is relevant due to the significant development of the construction industry over the last decade in Ukraine, China and the world. In the conditions of globalization, market consolidation, and economic instability, companies must look for new ways to strengthen their market positions, reduce business risks, and increase profits. The formation and implementation of the diversification strategy of enterprises allows to partially solve these problems. A difficult task for an enterprise is to choose a diversification strategy that would provide the maximum economic effect in the long term. Multi-objective optimization can be used to choose the optimal diversification strategy. The article describes some well-known decision-making methods for the problem of choosing diversification strategies. The article also describes the statement of the problem, the scheme of its solution and the mathematical model of decision-making regarding the choice of a rational diversification strategy taking into account IT systems of digitization of enterprise processes. The article defines the general requirements for the development of the choice of information technology strategy. Problems that need to be solved in future research were also identified.

In another study [4], the authors point out the following: over the past 50 years, human civilization has developed at an incredible pace. A special role is played by technical progress, which has made an incredible leap. Progress has led to the fact that along with the evolution of people, technology is also developing, while gradually outpacing the creators. It is quite natural to consider the fact that today technologies are taking root in all spheres of human activity, thereby qualitatively improving them. The process of introducing technologies into communication systems is called digitalization. It should be noted that although it is also aimed at improving and simplifying human activity in various areas, at the same time, the technological systems themselves are becoming more complex, despite high-quality transformations. Now there is a need for everyone to understand the complex principles of the latest technologies. This is facilitated by the fact that innovations are becoming more difficult and accessible every day. Digitization has become one of the main elements of the globalization process, which is confirmed, for example, by UN statistics, according to which, in 2019, about 4.1 billion people, which is more than 53% of the entire global population, are Internet users. In addition, various researchers predict that in the next 10 years, a large number of professions in various fields will disappear, and the work will be performed by intelligent mechanisms. However, the emergence of new professions in the

fields of science, creativity, management and other areas is predicted, in which a person will always be a necessary component. Against the background of such innovations, the fact of growing demand for education is logical and fully justified. Demands for the quality, accessibility and compliance of education with the modern needs of mankind are also growing. It is important that education today is mainly a matter of state competence, for example, Article 53 of the Constitution of Ukraine guarantees everyone the right to education. Taking into account this and the corresponding trends in the development of humanity, digitalization of education is a logical and natural vector of the development of this sphere, as evidenced by the experience of the leading countries of the world. Therefore, it is necessary to investigate what models and methods of digitization of education Ukraine needs, taking into account the analysis of the process of technical improvement and the experience of other countries that already have significant achievements in this field.

The article [5] analyzes the foreign experience of implementing innovative approaches and technologies in the management of business processes in various areas of activity. The use of machine learning in the field of health care, automation of processes in business, the fields of education, law and financial management is considered. The main business processes in production, which affect the financial and reputational component of the enterprise, are highlighted. The advantages of innovative solutions for enterprises have been identified, including: optimization of business production processes; increasing the efficiency of economic activity; increasing competitiveness; reduction of the expendable part. The payback of investments in technology was calculated using the example of a manufacturing enterprise, as a result of which the conclusion was obtained that the costs of robotics production pay off quickly due to the reduction of labor costs, improvement of quality and increase of production capabilities (launch of a new range, flexibility of processes). Development trends in the field of innovative technologies, namely in the issue of the spread and use of artificial intelligence, were also considered. It was determined that, contrary to stereotypes, in the next 5 years, the spread of artificial intelligence will cause the emergence of about 2 million new jobs, and not the reduction and replacement of human labor. Based on the practical experience of foreign enterprises that integrate laser scanners into the technological line for product quality control, so that the entire range of products can be checked in real time, the digitalization of a quality control with the help of artificial intelligence implementation is proposed. Improving business processes at manufacturing enterprises, in particular, control processes with the help of AI, will allow to significantly reduce the time for checking raw materials, finished products and packaging.

The study on digitalization as a tool for improving business processes [6] formulated the following conclusions: the basis of improving business processes is the establishment of effective, fast internal optimal communications between employees of the enterprise with the help of digitalization, which are aimed at achieving the main goal of the enterprise – speeding up operational capabilities and transparency of business processes in general, creating comfortable conditions for the consumer of services. The feasibility of the digital transformation of business processes is determined by the speed and understanding of consumers, the creation of a system of effective multidirectional communication flows. The changeability of the external environment requires the enterprise to establish a system of prognostic research and to form an adequate interpretation of information flows for the formation of an optimal managerial and organizational solution.

Another study on the digitalization of business processes of a modern enterprise [7] demonstrates a deep analysis of the problem of digitalization, and offers its own approach to its solution. At this stage of development, the question of the transition of enterprises to digital transformation (digitalization), which makes it possible to convert all information into digital, is becoming more and more common. The development of digitalization of the enterprise is one of the main factors of competitiveness in the conditions of the modern market. At present, an important indicator is the level of innovative development of an individual state. In 2020, the Bloomberg financial consulting agency, which is one of the largest on the planet, published a ranking of countries with the highest level of innovative development. This list includes 60 countries of the world. The first in the ranking were Germany, South Korea, Singapore, but Ukraine took only 56th place, ahead of Vietnam, Egypt and Kazakhstan.

Scientists distinguish two main directions of digitalization: increasing productivity and creating enterprises that work with information that has been translated into digital form. Since the latest technologies can significantly reduce overall costs, businesses are able to improve their products and services in a particular industry. In addition, the productivity of the company also increases, because this transformation makes it possible to move to a certain new level of management, requires less effort, etc. If we consider the second direction, the creation of such enterprises requires cloud environments that provide access to information from any corner of the world and any device. Currently, it is becoming more popular every day due to maximum convenience and quarantine restrictions to minimize the spread of COVID-19.

There are five main stages of developing measures for the digital transformation of business processes. At the first stage, certain processes or technologies that are considered relevant for digitalization are identified. Then the weakest points and shortcomings are determined in order to eliminate or improve them already during this transformation. At the second stage, they are engaged in improving the qualifications of employees and forming certain working groups. After that, new technologies are tested and verified. At the third stage, strategic directions of digitization for the organization as a whole and for individual processes begin to be formed. The work of the working groups created at the second stage is evaluated. In addition, they provide investments for the transformation of selected business processes. At the fourth stage, direct digital transformation strategies are developed taking into account all possible aspects, priority technologies are selected and approved taking into account the direction of activity of this enterprise. At the fifth stage, the goal of the need for constant and continuous development of the company in the field of the latest technologies is set.

In the article [8] a comprehensive approach to the management of complex projects, the creation of distributed information systems, which is based on the analysis of the interrelationship of project management processes, product creation, management of stakeholders and the external environment, is proposed. The authors analyzed the peculiarities of the implementation of projects for the development of distributed information systems, which are exposed to a significant number of complex effects of the turbulent external environment and reactions to these effects. A proactive approach was proposed to solve these problems. The work defines and formalizes the main structural elements of models of complex projects for the creation of distributed information systems. A conceptual model was built, which facilitated the study of the impact of the project's turbulent environment on all elements of the model. The key areas of knowledge affecting the model are identified. A structural model of the components of distributed information systems has been developed using cloud technologies and a design approach that takes into account the reaction to dynamic changes and turbulence of the external environment. A mathematical model of the process of creating a complex IT product was built, taking into account the impact of the turbulent external environment of the project, the main characteristics and parameters were determined. Modeling of the objective functions of the mathematical model of the process of creating a complex IT product was performed. A change management algorithm based on a proactive approach in projects to create distributed information systems is proposed, taking into account the monitoring of the project implementation environment and the definition of three types of possible events. Studies have confirmed the effectiveness of using a proactive approach in projects to create distributed information systems, which will allow using the proposed model for managing complex IT projects.

Source [9] describes digital project management technologies using the example of a platform for buying and selling currency. It is noted that risk management in the market economy is an integral part of the management system. At the same time, the identification of uncertainty does not allow avoiding danger. It is necessary to learn to predict risk, assess the magnitude of risks and uncertainties, their impact, plan preventive measures and not exceed acceptable limits. Project planning and implementation take place in conditions of uncertainty caused by changes in the internal and external environment. Risks arising in the process of project preparation and implementation require immediate response and decision-making to reduce them. Since decision-making is a choice of possible options for the development of events (scenarios), the risk analysis model for each scenario should be based on this. The main idea of the model is to choose the optimal plan according to the ratio "gain-risk", taking into account the actions that must be taken to reduce the risks associated with this scenario. Risk analysis requires, above all, fast and reliable information. Risk analysis is divided into two mutually intersecting stages: qualitative, the main task of which is to determine risk factors and circumstances that lead to risky situations, and quantitative, which allows you to calculate the value of individual risks and the risk of the project as a whole.

When implementing digitization projects, it is important to evaluate the effectiveness of the processes to be digitized. That is, to audit them. The article [10] considers various approaches, models and methods of IT audit. It is noted that the most popular of them are:

• COBIT 5 – a set of standards and recommendations developed by the Association for Auditing and Control of Information Systems (ISACA) in cooperation with the Institute for IT Management (ITGI);

• ITIL, which is the best description of international practice in the public and private sectors. It contains information about the company's IT services, documentation of IT service management (ITSM) processes, functions and roles;

• Prince 2 - a project management methodology that covers the quality of management, control and organization of the project consistently and according to the goals. Prince 2 is used for IT projects as well as many other types of projects;

• ASL is a description of best practices used to standardize application management processes and is the basis for creating and maintaining information systems and applications;

• ISO 27001 and 27002. The international security standard ISO 27001 contains requirements for information security management and information security management system. ISO 27002 provides information security management guidelines based on best practices.

At the same time, despite the importance and rapid growth of the IT industry in Ukraine, the problem of IT audit is still at an initial level, which may cause significant problems in the future. The most obvious problem is the vulnerability of the infrastructure to external attacks, as well as the insecurity of companies and enterprises. That is, the main problem now is the management's ignoring of the problem of IT security. Even considering some steps that have been taken after major attacks, these actions are rather local and do not solve the problem as a whole.

The article [11] notes that any time-tested planning solution can benefit a project-oriented company. In particular, such a decision can be used to plan the project of digitalization of business processes of IT enterprises. It is noted that Microsoft Project is not the only such a tool, but one of the most powerful. Scientific and practical research on the implementation of calendar and network solutions that carry out project planning and monitoring in the activities of project-oriented organizations may relate to: the development of models, methods and algorithms for the implementation of digitization in the activities of a specific project-oriented organization, taking into account its specifics; development of scientific foundations for the creation and development of corporate project management systems; creation of creative management of the project team; creating models based on digital project management tools. In another article [12], work on automation and digitization of business processes was analyzed. In

In another article [12], work on automation and digitization of business processes was analyzed. In general, a sufficiently large number of works on the automation of various types of business processes have been analyzed. In most of these works, the authors define digitization as the further development of automation using modern IT technologies. This makes it possible to define automation as a prerequisite and reason for digitalization of business processes. This analysis outlines the basic vectors of digitalization of business processes and their ultimate goal.

# 3. Purpose of the research

The purpose of the article is to develop a cognitive model of digitization of business processes of a project-oriented IT company.

The tasks of the article are the analysis of modern developments in the digitization of business processes of enterprises, the analysis of the suitability of such developments for the task of formalizing the cognitive model of the digitization of business processes of a project-oriented IT company, the development of the model, its characteristics and formalization, SWOT analysis of the model, the risk analysis of the model implementation, the determination of prospects for further research in the selected direction.

## 4. Cognitive model of digitalization

In general, the analyzed studies talk about the benefits of digitalization of business processes and its positive impact on the efficiency of business processes. Therefore, future research in this direction has a high scientific value. Considering the rapid pace of development of IT technologies in the modern world, research in this direction is relevant, but requires further continuous development and constant updating. For a deeper understanding of the digitization of business processes in general, developments related to the digitization of various project management and business sectors were considered. The foreign experience of digitalization of business processes of companies was also analyzed. After analyzing the models and methods of digitalization of business processes, their weaknesses and strengths were evaluated in order to highlight and apply already existing experience for further development in the field of digitalization of business processes, as well as outline possible further directions of research.

Based on the results of the analysis and the development of the analyzed research, we will propose a cognitive model of digitization of business processes of a project-oriented IT company (Fig. 1).

In general, the formalized model can be represented as:

$$D = \langle I, S, M, P, O \rangle \tag{1}$$

Let's define the constituent elements of the model:

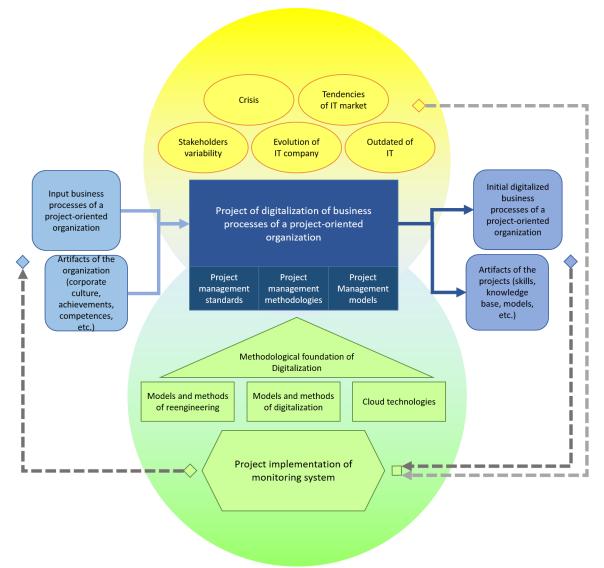
*I* – Input block (data of the current state), which can be represented as:  $I = <I_1$ ,  $I_2$ ,  $I_3$ ,  $I_4$ ,  $I_5$ ,  $I_6$ ,  $I_7 >$ , where:  $I_1$  is a subset of input business processes of a project-oriented organization;  $I_2 - I_7 -$  subsets of organization artifacts,  $I_2$  – values of a project-oriented organization,  $I_3$  – rules of corporate culture,  $I_4$  – personnel competency models,  $I_5$  – company competency model,  $I_6$  – knowledge base model,  $I_7$  – used innovation models;

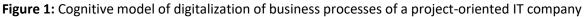
S – External factors that can be represented in the form:  $S=\langle S_1, S_2, S_3, S_4, S_5, S_6, S_7 \rangle$ , where:  $S_1$  – subset of stakeholders of a project-oriented organization,  $S_2$  – subset of stakeholder values,  $S_3$  – subset of stakeholder influences,  $S_4$  – models of IT market tools and technologies, including their trends towards obsolescence,  $S_5$  – models of crises and their impacts,  $S_6$  – subset of IT market trends,  $S_7$  – models of IT evolution of the company;

M – Methodological foundation of digitalization, which can be represented in the form:  $M = \langle M_1, M_2, M_3, M_4, M_5, M_6, M_7 \rangle$ , where:  $M_1$  – subset of project management models,  $M_2$  – subset of project management methods,  $M_3$  – subset of reengineering models,  $M_4$  – subset of reengineering methods,  $M_5$  – subset of digitalization models,  $M_6$  – subset of digitalization methods,  $M_7$  – subset of IT tools, in including those based on cloud technologies;

P – Project of digitalization of business processes of a project-oriented organization, which can be presented in the form:  $P = \langle P_1, P_2, P_3, P_4, P_5, P_6, P_7 \rangle$ , where:  $P_1$  – subset of project team roles,  $P_2$  – subset of project team competencies,  $P_3$  – project activity knowledge base,  $P_4$  – project activity process models,  $P_5$  – project activity risk model,  $P_6$  – subset of project management scenario models,  $P_7$  – subset of cognitive models and methods of project activity;

O – Block of output (resulting data), which can be represented in the form: O= $<O_1$ ,  $O_2$ ,  $O_3$ ,  $O_4$ ,  $O_5$ ,  $O_6$ ,  $O_7$ >, where:  $O_1$  – a subset of the original digitized business processes of a project-oriented organization,  $O_2$  – adjusted models and methods of project management,  $O_3$  – adjusted models and methods of reengineering,  $O_4$  – adjusted models and methods of digitalization,  $O_5$  – adjusted cognitive models and methods,  $O_6$  – subset of the risks that have occurred and anti-risk measures,  $O_7$  – knowledge base updated based on the results of the project.





The digitization algorithm assumed by the proposed model is cyclic. Cycles can be carried out in a certain number of steps and include the following stages:

- 1. Collection and analysis of current state data;
- 2. Digitization (management of a digitization project built on standards, methods and methods of project management):
- Implementation of project management using: models and methods of reengineering, models and methods of digitization, cloud technologies.
- Taking into account the impact of external factors: crises, IT market trends, disturbances from interested parties, evolution of the company's IT, aging of IT tools and technologies.
- 3. Obtaining the results of the current iteration. Analysis of results. If necessary, repeat the cycle. After the implementation of each cycle (stage) of digitization, quality control is mandatory. Namely, the application of a certain system of monitoring the implementation of the project of digitization of business processes of a project-oriented IT company is envisaged. This system should perform the following tasks:
  - particularly detection of problems related to the reengineering of business processes during digitalization;
  - display of performed operations, costs and used resources;
  - improvement of work performance processes within the project;
  - recognition of opportunities for further improvement of technologies;

- assessment of project management quality;
- cost savings;
- acceleration of the appearance of the necessary project results;
- identification of errors and analysis of their causes;
- providing stakeholders with information.

Project management of digitization of business processes of project-oriented IT companies is proposed to be based on one of the international project management standards (or a combination of such standards). Along the recommended standards for the described tasks, the use of the following three is suggested:

1. Project Management Body of Knowledge (PMBOK) of the American Project Management Institute (PMI). This standard is updated approximately once every four years. The basis of the standard is the generalized experience of project management practices and the use of modern IT technologies and methods [13].

2. IPMA Competence Baseline (ICB), which is an international normative document that defines the system of international requirements for the competence of project managers. This standard was developed by the international association IPMA (International Project Management Association). On its basis, national systems of requirements for the competence of specialists in countries that are members of IPMA are being developed [14].

3. ISO 21500 standard, which is the fundamental document from the series of standards of the considered profile. The main attention in the standard is given to the principle of efficiency of designing the optimal process of project management and control of this process [15].

We will conduct a SWOT analysis of the proposed cognitive model of digitization of business processes of a project-oriented IT company. Let's highlight the strengths and weaknesses of the model, the threats of its use and the opportunities that can open up when it is used.

*S* (*strengths*): system, comprehensiveness, availability of feedback.

W (weaknesses): insufficient formalization, failure to take into account the development of tools and models.

*O* (*possibilities*): the scaling of the model within its open nature, the possibility of its application to any IT enterprise, taking into account its specifics. Ensuring effective innovative development of the IT company thanks to the use of the proposed model.

T (*threats*): mismanagement of the model by implementation specialists, which can discredit the approach, use of outdated modeling and business process optimization technologies, distraction of a significant part of the company's IT specialists for development.

In general, the SWOT analysis confirms the promising application of the proposed model. Further research may concern the formalization of individual elements of the model, the development of a mechanism for its adaptation to a specific IT company taking into account its specifics, the description of recommendations for the implementation of the model within the implementation project at a separate IT enterprise.

At the same time, based on the results of the research, the main risks of implementing a cognitive model of digitization of business processes of a project-oriented IT company were identified from the set  $P_5=\{p_{51}, p_{52}, p_{53}, p_{54}, p_{55}\}$ :

 $p_{51}$  – resistance to the implementation of the model by the IT company's staff;

 $p_{52}$  – inconsistency of the model to the IT company in which the model is implemented;

 $p_{53}$  – failure to adapt the model to the IT company conditions in which the model is implemented;

 $p_{54}$  – increasing the load on the IT company's project office;

 $p_{55}$  – increased conflict between the IT company's project office and the IT company's staff.

For a detailed risk analysis of the proposed model implementation, it would be appropriate to use the Monte Carlo method and the approach described in study [16]. Corresponding anti-risk measures are also proposed from the set  $P_6=\{p_{61}, p_{62}, p_{63}, p_{64}, p_{65}\}$ :

 $p_{61}$  – conducting preliminary training on the basics of project management, the basics of reengineering and the basics of cognitive technologies;

 $p_{62}$  – conducting a preliminary study of the IT company's in the direction of clarifying the compliance of the proposed model with the company's conditions.

 $p_{63}$  – early preparation of the transition project from the "as is" state to the "to be" state, which will include an implemented cognitive model;

 $p_{64}$  – review of the role instructions of employees of the IT company's project office, based on the results of the review, it is possible to select additional personnel for the project office;

 $p_{65}$  – update of the role instructions of the IT company's HR specialists regarding conflict prevention (models and methods of conflict resolution), implementation of constant monitoring of conflict.

Through to the identification of risks and the development of anti-risk measures, the implementation of the proposed cognitive model of digitization of business processes of a project-oriented IT company should take place with the use of additional management tools. This increases the probability of successful implementation of the developed cognitive model in the practice of IT companies.

### 5. Conclusion

Modern IT companies, whose activities are aimed at fulfilling orders for digitization of customers (that is, other enterprises), must themselves be digitized. The processes of such IT companies must be described and automated. This task is relevant, scientifically and practically significant. Many works of Ukrainian and foreign researchers are devoted to this scientific task. Part of such developments is analyzed in this article. Based on the analysis of relevant developments, as well as their further development, a cognitive model of digitization of business processes of a project-oriented IT company was proposed. The elements of the model are disclosed, its general formalization is proposed, a SWOT analysis of the model is conducted, The risks of implementing the proposed model in an IT company are analyzed, appropriate anti-risk measures are proposed. Prospects for further research in the chosen direction are outlined.

### 6. References

- V. Morozov, A. Kolomiiets, Investigation of optimization models in decisions making on integration of innovative projects, Advances in Intelligent Systems and Computing, 1246 AISC (2021) 51–64.
- [2] O. Voitenko, A. Timinsky, Approach to the creation of a comprehensively competent projectoriented organization, in: Proceedings of the 2018 IEEE 13th International Scientific and Technical Conference on Computer Science and Information Technologies, (CSIT), International Workshop on Project Management, IWPM, September 11-14 2018, Lviv, Ukraine, 2018, pp.405-409.
- [3] Y. Li, A. Biloshchytskyi, S. Bronin, and T. Liashchenko, A Conceptual Model for Diversification Strategies Choice, in: Proceedings of the 2021 IEEE International Conference on Smart Information Systems and Technologies, SIST, 2021 pp.1-4.
- [4] V. V. Sukhonos, Y. V. Harust, Y. A. Shevtsov, Digitalization of education in Ukraine: foreign experience and domestic perspective of implementation, Legal horizons 19.32 (2019) 79–86.
- [5] Yu. P. Vorzhakova, K. G. Melnyk K. G., Foreign experience of implementing the latest systems and approaches to business process management in the production sphere, Actual problems of economy and management 14 (2020). URL: http://ape.fmm.kpi.ua/article/view/205475.
- [6] O. Yu. Guseva, S. V. Legominova, Digitization as a tool for improving business processes, their optimization, Economics. Management. Business 1 (2018) 33-39.
- [7] A. V. Lezina, A. A. Borei, Digitalization of business processes of a modern enterprise, Collection of theses: Kyiv National University of Economics named after Vadym Hetman, Kyiv, 2020, pp.95-96.
- [8] V. Morozov, O. Kalnichenko, S. Bronin, Development of the model of the proactive approach in creation of distributed information systems, Eastern-European Journal of Enterprise Technologies 4.2.94 (2018) 6-15.
- [9] Y. Dehtiarova, V. Morozov, Practical Implication of Digital Project Management Technologies, in: Proceedings of the Conference on Information Technology and Interactions (Satellite), December 04, 2020, Kyiv, Ukraine, Taras Shevchenko National University of Kyiv, Kyiv: Stylos, 2020, pp.191-194.

- [10] O. Suprun, N. Klimenkova, It Audit as a Key Component of Information Systems Effectiveness and Data Security, in: Proceedings of the Conference on Information Technology and Interactions (Satellite), December 04, 2020, Kyiv, Ukraine, Taras Shevchenko National University of Kyiv, Kyiv: Stylos, 2020, pp. 229-231.
- [11] A. Timinsky, N. Kerdun, MS Project as a digitalisation tool of project management system for project oriented companies, in: Proceedings of the Conference on Information Technology and Interactions (Satellite), December 04, 2020, Kyiv, Ukraine, Taras Shevchenko National University of Kyiv, Kyiv: Stylos, 2020, pp. 231-232.
- [12] A. Timinsky, O. Voitenko, I. Raichuk, Analysis of models and methods of business processes digitalization, Management of Development of Complex Systems 46 (2021) 38-47.
- [13] A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 7th edition PMI, 2021, USA, 274 p.
- [14] IPMA Individual Competence Baseline (ICB) Version 4.0 (2015) for Project, Programme & Portfolio Management, IPMA, 431 p. URL: http://products.ipma.world/ipma-product/icb/readicb/.
- [15] ISO 21500:2012 (2012). Guidance on project management Project Committee ISO/PC 236, 36 p.
- [16] A. Biloshchytskyi, S. Omirbayev, and A. Mukhatayev, Methods of project-vector management of educational environments, Scientific Journal of Astana IT University 7 (2021) 15-31.