

DOI:10.37943/IXYM7063

Bushuyev Sergey

Dr Sc, Professor, Head of the Department of Project Management
SBushuyev@ukr.net orcid.org/0000-0002-7815-8129
Kyiv National University of Civil Engineering and Architecture, Ukraine

Hiroshi Tanaka

Dr, Professor
hirojpmf@gmail.com, orcid.org/0000-0003-2631-721X
Tokyo University of Science and Innovation, Japan

Elmas Chetin

Dr, Professor, Head of the Department of artificial intelligence
cetinelmas@hotmail.com, orcid.org/0000-0001-9472-2327
Gazi University, Turkey

Babayev Igbal

Dr Sc, Professor, President of Azerbaijan project management
association
igbalbabayev@gmail.com, orcid.org/0000-0002-1787-7859
Azerbaijan, Baku

INSPIRATIONAL INTUITION AND INNOVATION IN IT PROJECT MANAGEMENT

Abstract. The role and place of inspiring intuition and creativity in the management of IT projects and development programs of organizations are considered. A conceptual model of the interaction of inspiring intuition and creativity in the processes of IT project management is presented. The influence of inspiring intuition and creativity on the life cycle of innovative projects for the development of knowledge and management technologies is determined. With the help of intuition, IT project managers can anticipate new products, management processes, business areas and development. Such promising actions usually cannot be planned purely rationally, but require an “intuitive feeling.” Vision and imagination open up opportunities for action beyond the paths. This is “inspiring intuition”. This inspiring dimension of intuition has a long-lasting, holistic and gradual effect. The key competencies and strategic priorities of the organization for the implementation of the strategy of sustainable development are considered. In the process of research, two models of sustainable development based on the use of innovative projects and programs were selected. The first model, the Strategic Sustainable Development Framework (FSSD), defines three levels of creative competencies - linear, literal, and holistic. Within the framework of this model, the qualitative influences of individual competencies on the formation of inspiring intuition are determined by example. The second model is related to the application of the system of knowledge and competencies for the management of IT projects and P2M programs. Within this model, priority competencies have been identified that shape the inspiring intuition of project managers. Within the framework of the evaluations, a matrix of qualitative influences on inspiring competence in the processes of implementation of innovative projects and programs was built.

Keywords: inspiring intuition, creativity, innovative projects, vision, competence, IT projects management

Introduction

Today, inspiring intuition is of great importance in project and program management as a holistic tool for evaluating and implementing innovation. This area of competence in project management is still insufficiently researched. Intuitive competence plays an important role in preparing and making decisions when the necessary data are ambiguous or missing. In this case, project managers have to deal with difficult management situations [1].

Through intuitive analysis and pattern recognition, project managers need to quickly understand and evaluate complex functional and structural decisions rationally and emotionally. Intuitive competencies help in creative mental processes, planning, and forecasting in dynamic conditions [2].

With intuition, managers can anticipate new ideas and areas of knowledge in decision-making processes [3]. Such predictions cannot be planned purely rationally, they require an intuitive sense. Vision and imagination open up opportunities for actions that go beyond conventional ways of preparing and making decisions [4]. Rational thinking remains in the old traditional paradigm of project managers' competencies. For evolutionists or revolutionaries, ideas remained unrealized on paper.

The article aims to explore inspiring intuition and creative potential in the success of innovative projects and programs.

1. Inspirational intuition and creativity in managing IT projects and programs

Consider inspiring intuition as the driving force of innovation. In the process of education, managers must acquire existing knowledge and competencies. At the same time, inspiring intuition should ensure the creation of new knowledge. Due to the rational interaction of existing knowledge and knowledge generation, constant change and innovation can be achieved [4, 5].

The stage of innovative development is based on creativity. This is the stage from the beginning of the organization to its first organizational crisis – the crisis of leadership [6]. The organization appears as a result of the entrepreneurial efforts of managers and develops due, as a rule, exclusively to the realization of the creative potential of its founders. The main focus during this period is on product development and marketing. The organizational structure of the organization often remains informal. However, as the organization grows, its founders need to monitor and direct its development in specific areas, which requires new specialized knowledge, which they do not yet have.

Creativity helps to expand existing knowledge and constantly feeds the process of acquiring certain competencies. In the creative process, new knowledge is developed from existing knowledge about the products of innovation projects and management processes to adapt to existing innovations and challenges [7, 8]. Thus, the development of teams of innovation project managers is understood as a creative generation of knowledge in which new knowledge is applied and explored.

With intuition, and innovation project managers can anticipate new products, management processes, business and development. Such promising actions usually cannot be planned purely rationally, but it requires “intuitive feeling.” Vision and imagination open up opportunities for action beyond the paths. This is “inspiring intuition”. This inspiring dimension of intuition has a long-lasting, holistic and gradual effect. Possible manifestations of inspired intuition are inclusive team dialogue, raising stakeholder awareness, processing emotions, developing concentration, clarifying feelings, and cultivating ethics [9, 10].

Inspirational intuition includes creativity that is an evolutionary force and drives adaptive change. These are endless processes of generation of heuristics, their testing, and learning, which repeatedly produce innovative knowledge and actions on a multidimensional basis of intelligence, creativity and competence [11].

Techniques of creativity are used both based on own or collective creative potential. Models and methods based on linear structures of thinking are used in the simplest form. They generate linear creativity based on our existing knowledge. Such thinking is unacceptable for innovation management. Innovative products cannot arise in this way. Further expand the boundaries, possibly through the use of creative techniques that are based on lateral and heuristic thinking, taking into account peripheral vision [12]. New knowledge is generated primarily through certain associations within benchmarking. Combination of concepts, visions and new ideas where there is a place for different conceptual systems. At the same time, the horizon of observation becomes wider and covers a larger perspective in time. This paves the way for new ideas based on inspiring intuition. Holistic structures of thinking eventually develop gradually. They require a long process of learning and acquiring creative competencies. Such competencies include an improved perception of the system, a positive basic attitude toward innovation, a strong mind, focus, and a high level of problem identification and feeling [13,14].

In the theory of creative thinking, the acquisition of knowledge and the preparatory stage of innovative problem-solving is the key to understanding the processes of creating new products [15]. In the preparatory stage, the first step is to launch a creative process to initiate innovative knowledge. Previous work is the basis for generating ideas based on heuristics and concretization of innovations in the further course of the innovation process [16]. This process is carried out mainly with the help of inspired intuition. Transparent and strategic actions of leaders of innovative projects and programs are always associated with dynamism and agility in generating ideas and heuristics in search of innovative solutions [17]. On the one hand, the vision and strategic direction can be planned and adhered to. On the other hand, there must be openness and adaptability to be able to generate opportunities and values. Creative leaders balance strategic planning and the spontaneous generation of innovative ideas [18].

2. Framework model of strategic sustainable development based on innovations

Consider the model “Framework for Strategic Sustainable Development (FSSD)” [19]. The general method of FSSD development allows for the development of rational framework models (frameworks) for the formation of competencies of sustainable strategic development.

The model includes five levels of application. It focuses on the system, goals, strategies, actions and tools and indicators.

The model helps organizations to deeply understand and place themselves in the context of the global challenge of sustainability, as well as strategically move towards sustainable development, ie gradually reduce their negative impact on environmental and social systems as a whole, while strengthening their organization through innovative opportunities, including new business models, exploring new markets and gaining new market shares, and by reducing risks and operating costs. In particular, FSSD helps to better manage system boundaries and trade-offs, enables the modelling and evaluation of sustainable capacity for different materials and practices before investments are made, and offers the possibility of more effective cooperation between disciplines and sectors. The FSSD model helps to prevent losses, even from unknown problems, and last but not least, to manage the selection, development and combination of additional methods, tools and other forms of support, which allows increasing their usefulness for strategic sustainable development.

The model is based on the «pyramid of creativity» built based on intuition, which is shown in Fig. 1. In this case, the model from the top of the pyramid forms decisions based on «ratio», and at the holistic level, decisions are mainly formed based on «emotion». The driver of the model is intuition built on creativity [19]. At the same time, the authors [19] built a process model that connects personal competencies, intelligence and creativity. There are four groups of competencies in the model - social, analytical, intellectual and variable (Fig. 2).

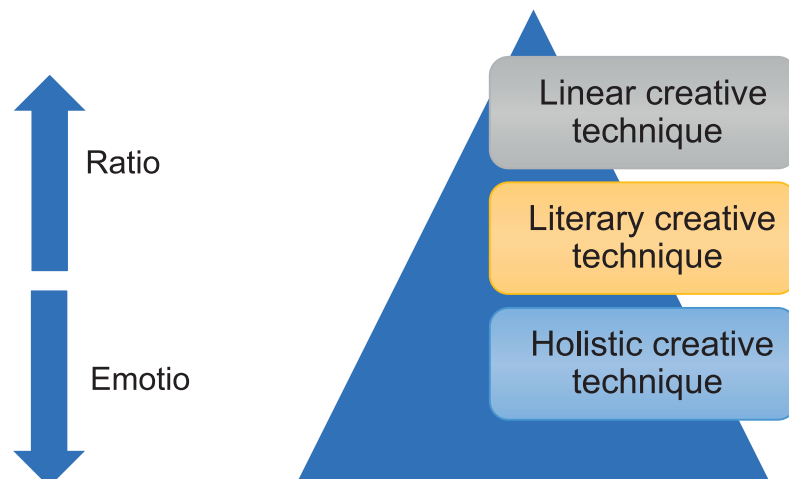


Fig. 1. Pyramid of creativity built on intuition

The top-level model assumes a “linear creative technique” based on vision and rational decision-making and choice.

At the intermediate level, the model assumes “literal creativity”, including lateral vision. Thereby expanding the scope of vision for the formation of balanced results in terms of ratio and emotion.

At the lower level, the technique of holistic vision is used – a bird’s eye view. At the same time, the coverage of the system and its surroundings sharply increases and the emotional component increases during the preparation and decision-making.

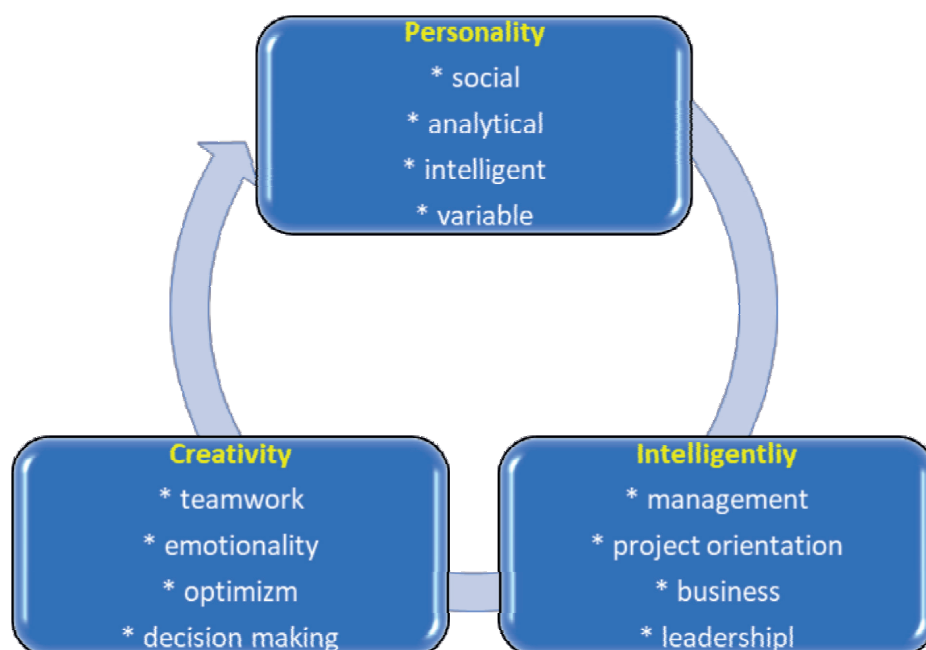


Fig. 2. Model of competence groups of strategic sustainable development

Consider the model of key competencies for building inspiring intuition within the framework of the Strategic Framework for Strategic Sustainable Development (FSSD).

The model is given in the table 1.

Table 1. Model of key competencies for inspiring intuition within the framework of the Strategic Framework for Strategic Sustainable Development (FSSD)

Nº	Group/competence	The level of influence on inspiring intuition
1	Linear creative technique	Moderate
2	Personality	Moderate
3	Creativity	High
4	Intelligently	Moderate
5	Literary creative technique	High
6	Personality	High
7	Creativity	Very high
8	Intelligently	High
9	Holistic creative technique	Very high
10	Personality	Very high
11	Creativity	Very high
12	Intelligently	Very high

To qualitatively assess the level of influence of competence on inspiring intuition, the assessment of a group of selected experts was averaged. In the process of determining the fuzzy value of the level of influence after averaging, a consensus rally was used to identify the final value of the level of influence within the competence groups.

A comparative analysis of the proposed approaches to determining the impact on the strategic stability of the system based on the competence model shows the greatest effectiveness of the holistic approach. This approach forms the broadest view of the manager on development projects, a very high level of creativity and intelligence in decisions. This approach is applied with the P2M knowledge system [7] and ensures the maximization of value in the process of implementing projects and programs.

Qualitative assessments of the impact of competencies on the formation of inspiring intuition were determined by a group of ten experts in the project for the development of master's training in the educational program «Management. Project Management» at Kyiv National University of Construction and Architecture.

3. Model of innovative development of the P2M knowledge system

Consider the model of competencies for IT project management. The structure of the model is defined in the table 2. The model has four components that shape the value of the product, the value of the process, the value of the business and the value of the development [20, 21]. Drivers of innovative development are identified within each component. Each driver is tied to a set of specific competencies, defined in the table 3 [7].

Table 2. Model of strategic sustainable development based on the P2M knowledge system

Type of Value Added	Objective of Value Delivery	Drivers of Innovation	Means	Type of Programs by P2M
Value DESIGN	Product Value	New technology New material Novel design	Research management R&D Product development	Creative
Value CREATION	Process Value	New design method New production process New business process	Product design Production design System design	Operational
Value CAPTURE	Business Value	New market New business model	New business	Creative
Value RE-CREATION	Re-positioned Business Value	Strategy reform Problem solution	Business transformation	Transformation

The model of strategic development based on inspiring intuition defines three types of values – creative, operational and transformational.

Table 3. P2M project management competency assessment system

Criteria of taxonomy competencies	Description of criteria and abilities that meet the competencies of P2M
I	Criteria for holistic thinking: focus on holistic mission
	Ability to identify problems, and their sources and develop solutions to overcome them
II	Criteria for strategic thinking: strategic perception
	Ability to perceive strategic elements of the program/project and prioritize them for proper implementation
III	Criteria of integrated thinking: continuous striving to achieve project/program results
	Ability to prevent, evaluate and deal with changes in the project environment to achieve its results
IV	Leadership criteria: leadership to increase added value and innovate
	Ability to focus the team's efforts on innovation and breakthrough
V	Criteria for planning abilities: planning a successful project/program concept, structuring tasks and monitoring implementation
	Ability to plan project goals and objectives, organize resources, manage performance
VI	Criteria for project implementation capabilities: implementation of projects/programs according to plan
	Ability to use a systems approach, team building, project control and problem-solving
VII	Criteria for coordination abilities: harmonization of various actions for full optimization of the project/program
	Ability to balance between different working groups and stakeholders, relieve tension, competition
VIII	Criteria of relationship skills: social competencies and psychological skills
	Ability to support highly effective teamwork through motivation and opportunities for self-realization
IX	Criteria for focusing on achieving results: initiative and commitment
	Ability to take initiative, support enthusiasm to achieve results through teamwork, implement a role model
X	Criteria of self-realization: self-discipline, self-organization, self-realization
	Abilities for self-organization and self-discipline, high standards of ethics, taking responsibility, foresight

Competencies I to III are models of thinking that are needed mainly for the formation of concepts in program and project management and their planning.

- I. Holistic thinking.
- II. Strategic thinking.
- III. Integral thinking.

What is needed here is: the ability to think holistically to formulate a mission, create added value through penetration scenarios, and define the idea for the transition from the «as is» model to the «as will be» model; the ability to think strategically to implement a program or project following the planned success, based on the added value of the organization, competitive advantage, customer satisfaction, balanced social significance, etc.; integrated thinking to represent the value of the program and its support of the originally developed value, despite the resistance of the environment.

The following four criteria relate to the desired behaviours required to successfully manage the concept of planning and implementing projects and programs [22].

- IV. Leadership.
- V. Ability to plan (planning competence).
- VI. Ability to perform (competence of performance).
- VII. Coordination.

These qualities are necessary for the project team (program) to transform the strategy, mission and architecture of the project (program) into a conceptual plan, team organization and implementation of the conceptual plan of the project (program).

The following three criteria of competence complement the 7 criteria mentioned above.

- VIII. Relationship skills.
- IX. Focus on achieving results.
- X. Self-realization

Consider the model of key competencies for the formation of inspiring intuition within the model P2M (Table 4).

Table 4. Model of key competencies for the formation of inspiring intuition within the P2M model

Nº	Group/competence	The level of influence on inspiring intuition
1	Models of creative thinking	Moderate
2	Holistic thinking	Moderate
3	Strategic thinking	High
4	Integral thinking	Moderate
5	Behavioural traits	Very high
6	Leadership	Very high
7	Ability to plan	Very high
8	Ability to perform	High
9	Coordination	Very high
10	Relationships and self-realization	High
11	Relationship skills	High
12	Focus on achieving results	Very high
13	Self-realization	High

The comparative analysis of the two models determines the practical coincidence of basic competencies. However, their structures differ significantly.

4. Neural network model for assessment of project manager inspiring intuition

To specify the operations of neural network analysis of biological parameters (BP) of managers, as well as to justify the list of parameters for evaluating the effectiveness of recognition, a conceptual model of recognition of inspiring intuition (NI) of managers was developed. The model provides a formalization of cause-and-effect relationships inherent in the process of recognizing inspiring intuition, determined by the need to improve the effectiveness of project managers and establish the impact of operations related to neural network analysis of biometric parameters. Mathematical representation of this model:

$$H_{\Sigma} = f(H_D, H_A, H_R), \quad (1)$$

$$H_D = f(h_{D1}, h_{D2}), \quad (2)$$

$$H_A = f(h_{A1}, h_{A2}), \quad (3)$$

$$H_R = f(h_{R1}, h_{R2}, h_{R3}), \quad (4)$$

where H_{Σ} is the integrated efficiency of the inspiring intuition evaluation system; H_D – effectiveness of neural network model development; H_A – effectiveness of using the neural network model; H_R – efficiency of registration of biological parameters (BP) of the manager; h_{D1} – definition of the type of neural network model; h_{D2} – definition of neural network model parameters; h_{A1} – formation of parameters of educational examples; h_{A2} – training sample formation; h_{R1} – determination of BP to be registered; h_{R2} – filtering of registered BPs; h_{R3} – neural network analysis of BP.

The main of these definitions are:

- Emotions are a mental reflection in the form of a direct, biased experience of the vital meaning of phenomena and situations, determined by the relationship of their objective properties to the subject's needs.
- Inspirational intuition (II) is a complex mental state of reflection in the form of experiencing the significance of the influence of external and internal stimuli. It can include several emotions, and the duration of the inspiring intuition is longer than the duration of the emotion.
- BP – parameters that determine the physiological and/or behavioural characteristics of a person.
- Main BP – allows you to determine the II and the identity of its owner.
- Auxiliary BP - allows for determining only the identity of its owner.

The proposed model is based on the following principles.

The principle of the possibility of using neural network tools for emotion recognition is based on the Kolmogorov-Arnold theorem about the possibility of representing a continuous defined on an n-dimensional unit cube. In the theory of neural modelling, the theorem proves the possibility of approximating a continuous function of many variables using a neural network with direct signal propagation and with the number of hidden neurons, which is one more than the number of input neurons.

The principle of determining design parameters provides the possibility of determining the most effective architecture of a neural network model (NMM):

$$h_{D1}(v_i) \rightarrow \max, v_i \in \{V\}_I, \quad (5)$$

$$h_{D2}(v_{\max}, m_k) \rightarrow \max, m_k \in \{M\}_K, v_{\max} \in \{V\}_I, \quad (6)$$

where v_i is the i^{th} type of NMM; $\{V\}_I$ – set of acceptable types of NMM; I – the number of acceptable types of NMM; $v_{\max}$ is the most effective type of NMM; m_k is the k -th combination of parameters of the most effective type of HMM; $\{M\}_K$ is a set of admissible combinations of parameters.

The learning principle is determined by expressions (7, 8) and provides a reduction in the training time of the NMM due to the coding of the expected output signal of training examples taking into account the proximity of image standards and the development of the NMM architecture using expert data.

$$y(u \in \{U_{E_i}\}): y(u \in \{U_{E_n}\}) \sim \chi(E_i, E_n), \quad (7)$$

$$if (x_1 = L_1) \wedge (x_2 = L_2) \wedge \dots (x_K = L_K) \rightarrow P(m), \quad (8)$$

where $y(u \in \{U_{E_i}\})$ is the expected output signal for training examples, for the i^{th} emotion; $x(E_i, E_n)$ is the distance between emotion standards; $x_1, x_2, \dots, x_K$ – values of indicators characterizing BP corresponding to the m^{th} emotion; $L_1, L_2, \dots, L_K$ – fixed values; $P(m)$ is the probability of displaying the m^{th} emotion.

The principle of minimizing resource consumption of neural network tools.

With the use of the proposed principles, BP processing models associated with images have been developed, which allow to level of the obstacles and distortions typical for managers and provide a theoretical basis for the development of methods for forming the input field of the NMM for recognizing inspiring intuition. As a prototype, a face image processing model (FO) was used, in which the procedures for contour selection, centring, scaling, binarization, brightness correction, and control point selection are displayed. The procedure for the priority selection of the FO contour is based on the Viola-Jones algorithm, and for calculating the coordinates of the FO centre, an approach based on the weighted average assessment of image brightness is used. The definition of the axis of symmetry of the FO is based on the search for a straight line, relative to which the degree of similarity of the mirrored $\{A\}$ and base $\{B\}$ parts of the contour, determined using (9), is within acceptable limits.

$$\mu_i = \sum_i \left\{ (v_i^B x_i^B - v_j^A x_j^A)^2 + (v_i^B y_i^B - v_j^A y_j^A)^2 \right\}, \quad (9)$$

Using this model to assess the inspirational intuition of a manager based on biological parameters allows us to form a neural network model. At this stage of the research, estimates were obtained of the presence or absence of the project manager's inspiring intuition on his face during the implementation of the management functions.

Conclusions

The groups of competencies that form inspiring intuition within two models are defined - the Framework for Strategic Sustainable Development (FSSD) and the P2M knowledge system model.

The proposed qualitative model for assessing the impact of inspiring intuition on the processes of preparation and decision-making in IT project management allows us to identify the main creative techniques and competencies that determine the success of IT projects based on inspiring intuition. Thus, in the given example (Table 1) the holistic creative technique had the greatest influence on the strategic success of the projects.

The study of each model allowed us to identify groups of competencies and their impact on the formation of inspiring intuition for the implementation of innovative projects and programs.

Further research is needed to determine the impact of inspiring intuition on the success of innovative projects.

Reference

1. Individual Competence Baseline for project, programme & portfolio management. (2015) Version 4.0. IPMA Editorial Committee. – IPMA: 431 p.
2. Scaled Agile Framework (SAFe®). (2018). <https://www.agilest.org/what-is-agile-knowledge-base/#agile-terms>
3. Bushuyev, S., Bushuiev, D., Zaprivoda, A., Babayev, J., Elmas, Ç. (2020). Emotional infection of management infrastructure projects based on the agile transformation. *CEUR Workshop Proceedings*.
4. Obradović, V., Todorović, M., & Bushuyev, S. (2018, September). Sustainability and agility in project management: contradictory or complementary? In *Conference on Computer Science and Information Technologies* (pp. 522-532). Springer, Cham.
5. Bushuyev S., Kozyr B., Rusan N. (2020). Modeling of Empathy, Emotional Intelligence and Transformational Leadership to the Project Success / Mathematical Modelling and Simulation of Systems. *Advances in Intelligent Systems and Computing Book Series*. Springer AG, 972, 209-222,
6. Azarov, N.Ya., Yaroshenko, F.A., Bushuyev, S.D. *Innovative mechanisms for managing development programs*. K.: Summit Book (2011), 564 p.
7. A Guidebook of Program & Project Management for Enterprise Innovation, Third Edition P2M, Project Management Association of Japan (PMAJ), 2017, 427 p.
8. A Guide to the Project Management of the Knowledge (PMBOK® Guide). Sixth Edition (2017). USA. PMI, 756 p.
9. ISO 21500: 2012 (2012). Guidance on project management. Project Committee ISO / PC 236, 36p.
10. IPMA Organisational Competence Baseline (IPMA OCB) for Developing Competence in Managing by Projects. Version 1.1, 2016. International Project Management Association, Amsterdam, 105 p.
11. Bushuyev, S.D., & Wagner, R.F. (2014). IPMA Delta and IPMA Organisational Competence Baseline (OCB): New approaches in the field of project management maturity. *International Journal of Managing Projects in Business*, 7(2), 302-310. <https://doi.org/10.1108/ijmpb-10-2013-0049>
12. Todorović, M.L., Petrović, D.Č., Mihić, M.M., Obradović, V.L., & Bushuyev, S.D. (2015). Project success analysis framework: A knowledge-based approach in project management. *International journal of project management*, 33(4), 772-783. <https://doi.org/10.1016/j.ijproman.2014.10.009>
13. Bushuyev, S., Murzabekova, A., Murzabekova, S., & Khusainova, M. (2017, September). Develop breakthrough competence of project managers based on entrepreneurship energy. In *2017 12th International Scientific and Technical Conference on Computer Sciences and Information Technologies (CSIT)* (Vol. 2, pp. 11-16). IEEE. <https://doi.org/10.1109/stc-csit.2017.8099420>
14. Imai, M., Gemba Kaizen: A Commonsense, Low-Cost Approach to Management (1e. ed.), McGraw-Hill, 1997. https://doi.org/10.1007/978-3-8349-9320-5_2
15. Coveney, M., Ganster, D., Hartlen, B., King, D., *The Strategy Gap: Leveraging Technology to Execute Winning Strategies*, ISBN: 978-1-119-09082-3, Wiley, March 2003. <https://doi.org/10.1108/ijppm.2004.07953bae.004>
16. Kotter, D.P., Cohen, D.S., *The Heart of Change: Real-Life Stories of How People Change Their Organizations*, ISBN: 9781422187333, Harvard Business School Press, 2002. <https://doi.org/10.1002/pfi.4140430712>
17. Bondar A., Bushuyeva N., Onyshchenko S. Modelling of Creation Organisational Energy-Entropy. 2020 IEEE 15th International Conference on Computer Sciences and Information Technologies (CSIT), 141-145. <https://doi.org/10.1109/CSIT49958.2020.9321997>
18. Bushuyev, S., Bushuieva, V., Onyshchenko, S., & Bondar, A. (2021, April). Modeling the Dynamics of Information Panic in Society. COVID-19 case. In *CMIS* (pp. 400-408). <http://ceur-ws.org/Vol-2864/paper35.pdf>
19. Broman, G.I., & Robèrt, K.H. (2017). A framework for strategic sustainable development. *Journal of cleaner production*, 140, 17–31. <https://doi.org/10.1016/j.jclepro.2015.10.121>
20. Cotterman, H., Forsberg, K., & Mooz, H. (2005). *Visualizing project management: models and frameworks for mastering complex systems*. John Wiley & Sons. New York, NY, 2005. pp. 108-116, 242-248, 341-360
21. Slivitsky, A. (2006). *Value migration*. Mann, Ivanov & Ferber, 432 p.
22. Müller, J., & Rippel, J. (2011). *Crea Leadership: der kreative Weg zur Innovation*. Marketia Publ, 445p.