Managing Infrastructure Projects Driving by Global Trends

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Abstract. The development of project management systems, programs and project portfolios depends on the global trends in the environment. Significant changes in the environment from "rational economics" to "behavioural economics" require further research on the effectiveness of the application of existing methodologies, knowledge systems and competencies of project managers. The foundation for changing the environment lies in changing the decision-making paradigm in management from the rational to the irrational paradigm. The article examines current approaches to the formation of a "behavioural economy", and specific features in terms of decision-making processes in project management and the anomalies that affect these processes. The substantive model of diagnostics of application of models and methods of project management in “behavioural economy” is presented. Digitalization and strong penetration of competence approach in the development of IT infrastructure projects have a critical influence on development project, program and portfolio management methodology. The patterns of project managers' behaviour in infrastructure product creation and project management are investigated. Such patterns have allowed the authors to identify bottlenecks in the application of modern project management methodologies in global trends.

Keywords: global trends, behavioural economics, digitalization, infrastructure project, information technology, competence, behaviour pattern, project manager.

1 Introduction

The global development of the leading countries of the world is accelerated by the active introduction of innovative information and communication technologies, the increasing global power of computing systems, their openness and the speed of data transmission. At the same time, the global trends of digitalization economies, development of artificial intelligent systems at different levels of society, application of knowledge bases, processing of large volumes of data, information security systems based on blockchain technologies, application of a competent approach in

educational establishments and educational standards, cloud and fog computing and innovations remain. The answer to these trends and challenges has been the transition of many projects and programs to management using the Agile methodology. This methodology is a key driver of accelerating innovation through accelerated product development. On a global scale, this means a squeeze on innovation lifecycles and the expectation of the latest "faster - more powerful - cheaper" formula products.

The next set of trends is related to the changing paradigm of decision-making and the transition from a rational economy to a behavioural economy. The basic tenet of a "rational economy" is that a person makes a choice based on a possible optimal result. That is, when choosing projects, the manager will make his or her choice impartially, acquiring only the best of what we can afford, based on rational expectations [1]. In the transition to a "behavioural economy", irrational decisions are increasingly being made. These trends affect all processes of personal development, organizations and businesses, the economies of countries and the global economy. They form contradictions in the processes of convergence (approximation) of knowledge systems and decision-making. Research on the development of such systems requires the use of flexible approaches to the analysis of management processes, projects and programs. The emergence of a global trend of transition to a new "behavioural economy" to change the "rational economy" significantly changes the tooling of information systems, patterns of behaviour of managers in the application of modern development methodologies based on projects, programs and project portfolios. These trends affect the development of societies, public administration systems and the management of the development of the real economy. The emergence of a global trend of transition to a new "behavioural economy" to change the "rational economy" significantly changes the patterns of behaviour of infrastructure project managers when applying modern methodologies and management framework. At the same time, the global trend of digitalization of economies, use of knowledge bases and innovations remain. These trends affect the development of societies, public administration systems and the management of the development of the real economy. The basic tenet of a "rational economy" is that a person makes a choice based on a possible optimal result. That is, when choosing infrastructure projects, the manager will make his or her choice impartially, acquiring only the best of what we can afford, based on rational expectations.

Another postulate of behavioural economics is conditional optimization, which means that choices come with limited budget, implementation time, and alternatives. "In competitive markets where prices can rise and fall freely, these fluctuations occur so that supply is equal to demand," Thaler wrote in his book, The New Behavioral Economy [2]. The founder of behavioural economics is Daniel Kahneman, winner of the 2002 Nobel Prize for "incorporating psychological research data into economic science, especially those related to human judgment and decision making in an uncertain situation" [3]. Kahneman has proven that, most often, people's actions are at odds with predictions of the theory of preparation and decision-making.

Digitization of economies and active use of accumulated knowledge is one of the key drivers for accelerating global development.

Today, there are three main tools in the behavioural economy.

Heuristics - People often make decisions based on creative, unconscious thinking, which is not always logically correct.

Frame - people use a semantic framework to understand and act in one way or another.

Market inefficiency, market decision, making mistakes that lead to various market anomalies, including mispricing, inefficient allocation of resources.

The problem addressed in this article is related to the analysis of changes in the knowledge systems and behaviour patterns of project managers in the managing infrastructure projects following global trends.

The purpose of this article is to review the application of modern infrastructure project management methodologies according to global trends in the transition to the behavioural economy.

2 Theoretical Studies

Today, it is becoming clear that the transition to a "behavioural economy" is highly dependent on the competencies of project managers, teams and organizations. Modern organizations face an urgent task: to develop the competence of specialists to the full extent, which is extremely important for making the right management decisions and conducting reliable expertise in the course of infrastructure project implementation [4, 5]. However, it should be remembered that for every employee who develops his career in the organization, such development is, on the one hand, a motivating factor, on the other - a threat to an organization that has not formed mechanisms for retaining such employees. At the same time, each employee is expected to learn how to manage and develop their competencies.

Previously, infrastructure projects competency management was seen as a desirable component of an organization's management system, but nowadays it has become imperative. The development of a competency approach is related to the application of the idea of exploring the “field of competence” of the infrastructure project managers and organization [6, 7]. Under the field of competencies, we will understand the area of competence in the areas of project management activities in product creation. To implement the idea of the field of competence, it is necessary to develop an appropriate management system based on the following principles:

- competences should be delineated (principle of independence of components of an effective model);
- the management system should include all the competencies of the field related to the organization's activities (principle of completeness);
- employee competencies should clearly define, periodically review and take into account the current challenges of the organization (the principle of realism);
- all field competencies should be detailed to the desired level (differentiation principle);
- key competence indicators must be developed for all competencies in the field to assess the competence of employees (the principle of dimensions).

Research into the field of project management competency and product development has shown slight variations in the competencies of project management staff and Agile IT product developers.

Diagnosis of project-oriented organizations and businesses in terms of identifying organizational anomalies for the rational application of "behavioural economics"

principles is the first stage of work to create an effective corporate project and program management system [8]. The purpose of organizational diagnostics is to identify the main problems, their interconnections, and to propose appropriate methods of making the necessary decisions for successful development in the new management paradigm. Methods of diagnostics of organizational anomalies are directed on the determination of incompleteness/redundancy of organizational structures and methodology of business organization, their non-compliance with the requirements of business processes of the enterprise, inconsistency with strategic goal setting and achievement, identification of organizational and methodological gaps and conflicts [9]. In practice, the implementation of organizational development projects for diagnostics, as a rule, uses the following methods:

- analysis of product life cycles, production technologies, operations management processes, business development and implementation;
- analysis of the organizational structure and management mistakes;
- work with organizational syndromes at the levels of applied methodologies and their implementation in models of projects, programs and portfolios;
- self-assessment of representatives of the organization by the method of 360°;
- diagnostic interviews;
- graphing problems, challenges and solutions.

Project managers working in industries with high communicative ability may lose interest and motivation over time, resulting in decreased personal efficiency and productivity. High communicative ability is a strong stress factor, especially if a person's work is associated with a highly competitive environment and high client expectations. In these circumstances, the study of the symptoms of emotional burnout, cognitive dissonance and their prevention becomes especially relevant for the project manager.

3 Driving IT Infrastructure Projects by Global Trends

Today, the "rational economy" model, which applies methods of optimization of utility functions (values), ceases to work. This is due to the transition of many organizations to the behavioural economy. Increasingly, heuristic, often emotionally coloured, methods of judging and making managerial decisions are far from ideal and often lead to mistakes. Managers often make incorrect judgments because of misconceptions about the odds, ignoring the presence or absence of necessary information, a priori probability, or overestimating unlikely events. Essentially, behavioural economics is an interdisciplinary industry at the intersection of psychology and economics. Thaler P. [2] was one of the first to notice gaps in the standard economic model and began to rely on the work of psychologists to explain them somehow.

Consider some of the anomalies with the emotional intelligence of behavioural economics:

1. The effect of ownership;
2. An imaginary account;
3. The default selection;
4. Non-acceptance of losses.

Let's look at some cassis of how behavioral economics work in today's organizations. Mistakes and illusions of Entrepreneurs describe in [1].

In Ukraine, the probability of survival of small businesses over the next five years is 10%. However, many, starting their own business, think that these statistics do not apply to them. The analysis showed that Ukrainian entrepreneurs believe in business development: average estimates of the chances of success of any enterprise like yours are 20%, which is almost double the existing ratio of small business success.

Explaining how behavioural economics is used in politics, the proposed Pension Retirement Program does not give rise to immediate government spending, as nothing changes at the moment; an increase in contributions are tied to a pay raise, which translates into a much more enjoyable addition to the budget. What is also important here is that pension increases should be made automatically unless the pensioner submits a waiver application. The automatic variant of such payment is perceived by the person as normal, and writing of the statement of refusal requires effort, not everyone is ready to make.

4 Abnormal Emotional Stakeholder Behavior when Implementing IT Infrastructure Projects

Under the behaviour pattern of the project manager [10], we will understand the model of application of behavioural competencies in management processes. The model of competency groups in the format "Leadership-Intellect-Emotions" is proposed.

From "behavioural economy" the processes of creation and development of organizations will mark two groups of anomalies:

- congenital acquired at the time of the creation of the organization and its management system;
- acquired during the life cycle (creation, development and ageing).

In terms of the organization's activity, there are three types of organizational anomalies [11, 12, 15].

Anomalies in organizational construction (structural pathologies):

The dominance of structure over function (creation of new units to solve problems instead of constructive use of existing assets);

Isolation of units;

- incompatibility of the person with the function (more often it concerns the managers and occurs when the actions of the manager contradict the organizational order);
- bureaucracy (excessive number of procedures).

Anomalies in the construction of organizations cover the entire structure of the enterprise - from the governing body to subordinate units. The result is a breach of links between departments, the centre and departments, slowing down the implementation of decisions, failure in the functioning of the organization system as a whole.

Anomalies of this type are typically typical of large infrastructure projects are matched by maturity and competence. Large Soviet-style organizations were characterized by bureaucracy and the dominance of structure over function.

Incompatibility of personality with function is a special kind of pathology that can occur in any organization. Here the decisive role is played by the personality - the manager or the employee.

In the detection of pathologies of this type in the practice of project management is applied structural analysis, which is based on the identification of the structure as a relatively stable set of relations, recognition of the methodological primacy of relations over the elements in the system, a partial distraction from the development of objects [13, 16]. The basic concept of structural analysis is a structural element (object) - an element that performs one of the elementary functions associated with the simulated object, process or phenomenon.

The structural analysis involves exploring the system with its graphical model representation, which begins with a general overview and then details, acquiring a hierarchical structure with an increasing number of levels. This approach is characterized by:

- partitioning at the level of abstraction with the limitation of the number of elements at each level;
- the limited context that includes only the essential details for each level;
- use of strict formal rules of record;
- consistent approaching the result.

The purpose of structural analysis is to transform the general vague knowledge of the original subject domain into accurate models that describe the various subsystems of the simulated organization.

When modelling systems in general, and in particular, for structural analysis, different models are used that reflect:

- the functions that the system must perform;
- processes that ensure the implementation of these functions;
- data required for the performance of functions and the relationship between these data;
- organizational structures that ensure the performance of functions;
- material and information flow that arise during the performance of functions.

A model is a collection of objects and relationships between them that adequately describes only some of the properties of the simulated system. The model is just one of many possible interpretations of the system. This interpretation should suit the user in this situation, at this point.

The model is generally characterized by four properties:

- reduced scale (size) of the model, more precisely, its complexity, the degree of which is always less than that of the original. Simplification is deliberately introduced when building a model;
- maintaining key relationships between different parts;
- performance of the model, i.e. the ability to work in principle;

Adequacy of the model to the true properties of the original (degree of certainty).

It is also important to emphasize that any model reflects the views of a particular group of designers. Each model has its own goals and objectives, and therefore the object of business, which is a complex organism, as a rule, is described by a certain set of models, collectively forming a common model of a given business system.

Anomalies in management functions and decision-making system (functional anomalies):

- pendulum system of preparation and decision-making (measures and countermeasures);
- duplication of organizational order (orders that repeat mandatory norms, etc.);
- ignoring the organizational order (violation of accepted norms);
- the gap between the decision and the execution of tasks (a complication of implementation of the decision by unaccounted factors or impossibility of its implementation);
- stagnation (inability to change, inability to affect them);
- suppression of development by over-functioning;
- demotivating leadership style (overcoming negative evaluation of employees' actions, lack of incentives);
- inversion (the result of managerial influence is opposite to the goal).

The emergence of anomalies in management decisions is facilitated not only by the wrong decisions of the governing bodies but also by the formed anomalies in the organization building. These anomalies also lead to disruption of the workflow, causing recessions in the organization.

An example is the so-called pendulum solutions. This pathology arises from the lack of a clear decision-making system and plan, and as a result, the result of some actions is neutralized by others. Sometimes it manifests itself in its purest form: a counter-measure is introduced, and the decision is reversed. For example, the creation of a competence centre for managing development programs and its subsequent cancellation, justifying the importance of introducing new technology and returning to the old method of production, etc. The situational approach, the lack of an action program, can be very dangerous because the result of the organization's activities in this the case is reduced to zero. The company is not developing and is losing competitiveness.

Anomalies in organizational relationships are more likely to occur in the background of managerial mistakes. For example, the emergence of a non-subjective management style is facilitated by a demotivating leadership style. Naturally, in the absence of incentives, employees become less active and do not want to come up with new ideas.

A typical example of pathologies in organizational relationships is the scattering of goals. Each organization has a primary goal, but its achievement is only possible by dividing the overall goal into smaller goals and objectives. As a result of constant crushing, the set of sub-goals will not fully meet the strategic goal of the organization, and the result will be a partial fulfilment of the goal or its failure. Among the reasons are mainly subjective factors: inaccurate transmission of information, features of perception, and personal goals of employees. Sub-goals become the main goals of units that no longer seek to accomplish a common task and do not take into account the goals of other units.

This phenomenon is typical for all organizations but is most pronounced in large firms with many divisions and companies with low staff motivation. Because of this anomaly, you can evaluate the degree of controllability of an organization: the higher the dispersion of goals, the lower the manageability [14, 17, 18].

Appling the competency model IPMA ICB 4.0 [3] to determine the key competencies for project product creation and its outcome (Table 1 - Table 2).

Table 1. Strategic competencies for project product creation

Strategic competences	Degree of impact on goal achievement
1. Strategy	High
2. Guides, Structures and Processes	High
3. Regulations, standards and rules	Average
4. Power and Interest	High
5. Culture and values	Average

Having assessed the “Strategic Competencies” of Development IT for the system of Transparency Budget of Ukraine [1] where the implementation of the results has been carried out. Assessment of competences on a 10 point scale, which is shown in Fig. 1. Eleven experts were involved in the modelling process.

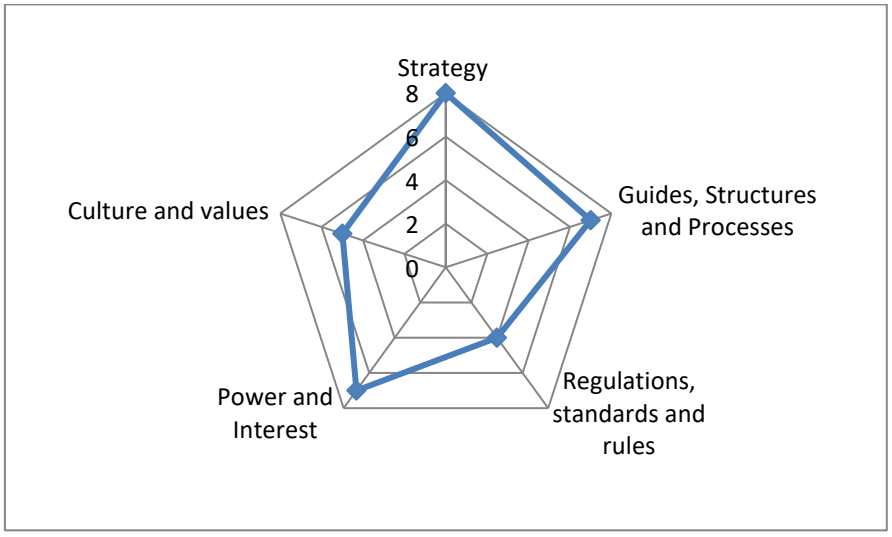

Fig. 1. Results of modelling by the group "Strategic Competencies"

The results of modelling by competency groups have identified the weaknesses in the preparation of project managers who need to improve competencies to ensure the success of projects of the Ukrainian Ministry of Finance [1]. From the results of the simulation, we distinguish one competence "Regulations, standards and rules" where the project manager does not have sufficient competence concerning the requirements for this competency.

Table 2. Behavioural competencies for project product creation

N	Behavioural competencies	Degree of impact on goal achievement

1	Self-reflection and self-management	Low
2	Personal integrity and reliability	Average
3	Personal communication	High
4	Relation and engagement	Average
5	Transformational leadership	High
6	Teamwork	High
7	Conflicts and Crises	Average
8	Resourcefulness	Low
9	Negotiation	High
10	Result Orientation	Average

The behavioural competencies of product creation and the result are specific to the stakeholder involved in product design and output. From the results of the simulation, we distinguish three competencies "Self-reflection and self-management", "Relation and engagement", and "Resourcefulness" where the project manager does not have sufficient competence concerning the requirements for this competency.

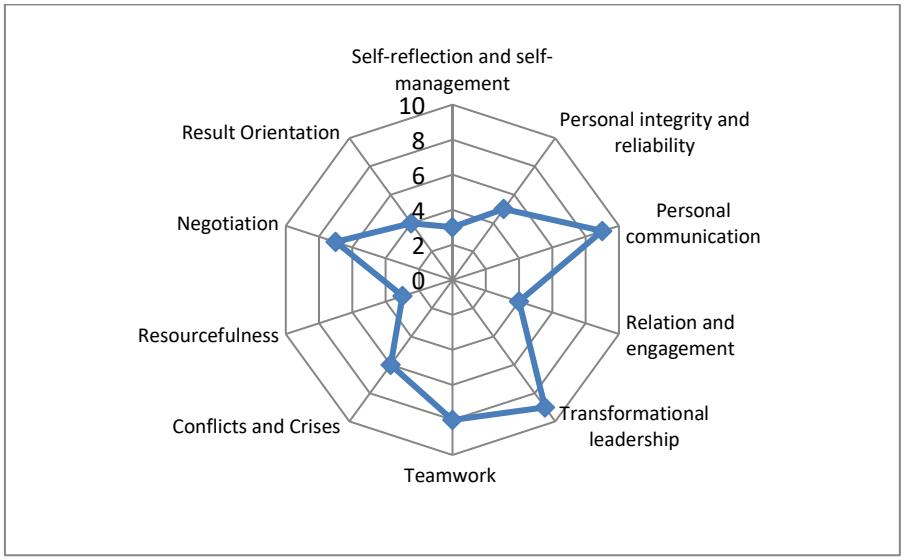

Fig. 2. Results of modelling by the group "Behavioral competencies"

The intersection of the competency of project managers and project management competencies is based on behavioural competencies.

Conclusions

As a result of the study, the principles of behavioural economics were identified and analyzed, and the application of these principles to the development of infrastructure project and programs management systems.

Understanding global trends in the development of infrastructure projects significantly changes the behavior pattern of managers. This is especially true for self-management, resourcefulness, and stakeholder relation and engagement.

The anomalies in management decisions are facilitated not only by the wrong decisions of the governing bodies but also by the formed anomalies in the organization. These anomalies lead to disruption of the workflow, causing recessions in the implementation of infrastructure projects.

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