THE STAKEHOLDERWIDE ASSESSMENT OF THE IMPACTS OF ACCEPTED VALUES OF STOCHASTIC FUNCTIONS OF PROJECT IMPLEMENTATION ON THEIR SUCCESS

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Abstract: The article suggests an approach of decision-making, which increases the probability of successful implementation of the project. The use of process-stochastic project management under dynamic economic and social conditions is argued. The method of calculation of the probability of project function realization is based on feedback of stakeholders.

Keywords: project management, stakeholders, process-stochastic management, homeostatic management.

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Introduction

The development of technical progress, the emergence of new technologies and materials, free movement of products and information across the borders results in increased competition. In the struggle for clients, companies adopt client-oriented approach introducing the project approach. As a result, new project management approaches and methods, aimed at satisfying the needs of changing needs of stakeholders, emerge. One should also take into account the dynamics of the appearance of new values and the division of stakeholder groups. Each new group of stakeholders is related to values accepted in the society.

The aforementioned prerequisites give rise to new methodologies and project management systems. The most famous among them are flexible project management methodologies Scrum and Agile. The leader in the implementation of flexible methodologies is the IT industry. The basic principles of flexible methodologies are the orientation towards the wishes of stakeholders and the flexibility of using project management methods and tools. The attitude of stakeholders to the product and its implementation technology are the determining factors for the success of the project. The selection of functions with a high degree of probability will lead to the successful completion of the project is the main task of the project manager.
Related work

An analysis of the impact of stakeholders on the project and the development of methodologies and systems with a focus on meeting the needs of stakeholders is a research topic of great scientific interest. In the first place, the methods and approaches for defining and describing project stakeholders, as well as ways of their interaction, are analysed [Belokon 2016]. In addition, the analysis concerns not only the interaction of stakeholders within the project, but also their interaction with the external environment, in the first place, with representatives of the organization implementing the project. [Finogeeva 2017]. The general principles of working with both project teams and all of the other specialists in the organization are developed [Grabar 2014]. All of these studies offer methods and tools for working with stakeholders in a relatively sustainable environment when stakeholders do not have to radically change their wishes or significantly influence the course of project implementation. The dynamics of changes in the economy and society increases greatly, therefore, there is the need for new methods and tools which ensure the successful implementation of projects under these conditions.

Task and challenges:

The purpose of the article is to develop the method of decision-making under the conditions of stakeholder influence. The objectives of the research are:

- The substantiation of process-stochastic project management.
- The description of different types of relations between project stakeholders and their influence on the project.
- The description of the method of evaluation of the project function realisation taking account of the feedback from stakeholders.

Task and challenges

The classic way of project realisation is the definition of the technological process of product development and business process of project management of the process realization. Given that the technological process is unstable and can change depending on the influence of stakeholders, the project management business process changes as well. The processes of project implementation and management are not sustainable, as they are formed in the process of project implementation, depending on the wishes of the stakeholders regarding the product of the project and the process of its creation.

Within the process of stochastic project management, a set of functions for creating a project product development and management is formed. The analysis of the wishes of stakeholders enables to calculate the probability of realization of particular functions. The calculation of the required values of
stochastic functions in the process of project implementation increases the likelihood of success of projects. But now the question is how to form these values with project management methods. It requires:

1. Finding the value of stochastic functions of project management (baseline values), which increase the probability of getting accepted values. For example, if the accepted value of completion of physical works on the project is 30.06.2018 (where the probability of success is 0.9), the probability of the completion of the works by 30.06.2018, while maintaining the equipment supply by 01.04.2018, is 0.8. In case the equipment supply is not maintained by the stated period, the probability of the completion of the works is only 0.2.

2. Defining the management decisions, which will allow changing the division of stochastic functions probability in order to maximise the probability of getting accepted values.

The process-stochastic project management is based on the accepted values of stochastic functions. The method of determining accepted values of stochastic functions hinges on a general assessment of the project success. In fact, such an assessment as it follows from this method can only be based on the certainty of the success of projects for stakeholders. This implies the need to develop a method that integrates the target functions of individual stakeholders in the general assessment of the project success. Let us consider these tasks.

In order to implement process-stochastic project management, it is necessary to determine the relationship between accepted values of stochastic functions of project implementation and the success of projects from the standpoint of all stakeholders. This will determine the success of projects through decision-making, which affect the accepted values of stochastic functions.

The association of stakeholders in the decision-making process is a common practice. There is an association at the expense of the common values, which are formed as a result of the implementation or non-implementation of a particular function. The duration of the association of the stakeholders depends on the divergence of their values. The larger the set of values is, the longer is the duration of the association of stakeholders.

The types of interaction between stakeholders during the solving issues related to the project can be different. The types of interaction are as follows:

- **Cooperation.** Two stakeholders can be interested in taking the same decision, which would lead to the creation of a value in which both stakeholders vest interest. For example, the decrease of contracted works costs, in which both the developer and the project investor are interested.
Conflict. Two stakeholders are in conflict when the decision leads to the creation of values for one stakeholder and impedes the creation of values for another.

Neutrality. The neutrality takes place when the decision in which one stakeholder is interested does not affect the values of another stakeholder.

The decision-making process involves all the types of relations between stakeholders. The absence of conflict indicates that not all stakeholders were initiated or that there are non-priority stakeholders, the opinions of which are not taken into account. Neutral type of relationship is rare, as in most cases stakeholders have little relevance to the decision, and in most cases ignore it.

Such a relationship between stakeholders indicates that a relevant homeostasis is formed in the project. The project team is a leading homeostat which ensures the homeostasis between project stakeholders. The disruption of homeostasis will lead to withdrawal of key stakeholders from the project and failure of the project [Oberemok 2017].

Back to the question of definition of project success:

- The project is considered **absolutely successful**, if it is successful for all stakeholders.
- The project is considered **relatively successful**, if it is successful for some stakeholders.

In this case, a problem arises. If some accepted value increases the probability that the project will be absolutely successful, one needs to aim for it. And if another accepted value forms the relative success of the project? And it increases the likelihood that the project will be successful for \( k^+ \) stakeholders and reduces the likelihood that it will not be successful for \( k^- \) stakeholders. Then, should one aim for this value or not? How to link in a single assessment the success of the project in the eyes of different stakeholders?

For it to be done, each stakeholder is aligned with the coefficient of stakeholder importance. Some numerical value, which reflects the success of the project, is multiplied by this coefficient. The result of multiplication indicates whether this decision is acceptable or not. If it is positive – the decision is acceptable. If it is negative – the decision is not acceptable. The coefficient of importance depends on the values that a stakeholder holds in the project. The higher the uniqueness of the transferred values and their importance for the implementation of the functions of the project are, the higher is the importance coefficient.

This question can be solved in two ways by:

1. Evaluation of accepted values in terms of the probability of absolute success of the project.
2. Evaluation of accepted values in terms of the probability of relative success of the project (for groups of stakeholders).
The method of flexible assessment of project success, which aligns the accepted values in a single project success assessment, is proposed. The method allows aligning the aforementioned ways of assessment of the decisions impact on the values of the stochastic function, which defines the success of the project. The method is as follows:

1. The definition of weight coefficients, which correspond to the importance of stakeholders in the project $\pi(L_i)$
2. The definition of accepted values of stochastic functions

\[ X^+ = \{x_{k,j}\}, k = \overline{1,n^+}, j = \overline{1,m_k^+}, \]

where $X^+$ — a set of accepted values;
$x_{k,j}$ — accepted value $j$ of stochastic function $X_k$;
$n^+$ — a number of stochastic functions with accepted values;
$m_k^+$ — a number accepted values of stochastic function $X_k$.

3. The definition of probability of project success for each stakeholder

\[ \forall L_i, p(E_i), \]

where $L_i$ — a stakeholder;
$E_i$ — a predicate, which defines the project success for stakeholder $L_i$;
$p(E_i)$ — the probability of project success for stakeholder $L_i$.

4. If $\exists L_k, p(E_k) = 0$, proceed to paragraph 8.

5. For each accepted value of stochastic functions (refer to subsection 3.6) there is an assessment of probability of project success for each stakeholder $\forall L_i, x_{k,j}$: $p(E_i/x_{k,j})$ — the probability of success in case of getting accepted value $x_{k,j}$.

6. The definition of the subset of accepted values, for which

\[ \forall L_i, \exists X_s \subseteq X^+, X_s = \{x_t\}, l = \overline{1,b}: p(E_i/x_t) \geq p(E_i), \]

where $X_s$ — a subset of accepted values, for which the probability of project success for all stakeholder increases;
$b$ — a number accepted values, for which the probability of project success for all stakeholder increases;
$x_t$ — an accepted value, for which the probability of project success for all stakeholder increases.

7. If $b \geq 1$, the calculation is completed.

8. The assessment of benefits of the accepted values. The calculation of the positive impacts on the project success:
∀xᵢ : \( S^+(xᵢ) = \sum_{\pi(E_i/xᵢ) \in p(E_i)} \pi(Lᵢ) \cdot \frac{p(E_i/xᵢ) \cdot (1 - p(E_i)) \cdot p(E_i)}{\sqrt{(1 - p(E_i/xᵢ)) \cdot p(E_i)}} + \frac{(1 - p(E_i/xᵢ)) \cdot p(E_i)}{\sqrt{(1 - p(E_i/xᵢ)) \cdot p(E_i)}} - 2 \),

where \( S^+(xᵢ) \) – the integrated positive impact of accepted value \( xᵢ \) on the project success.

9. The calculation of the negative impact on the project success:

∀xᵢ : \( S^-(xᵢ) = \sum_{\pi(E_i/xᵢ) < p(E_i)} \pi(Lᵢ) \cdot \frac{p(E_i/xᵢ) \cdot (1 - p(E_i)) \cdot p(E_i)}{\sqrt{(1 - p(E_i/xᵢ)) \cdot p(E_i)}} + \frac{(1 - p(E_i/xᵢ)) \cdot p(E_i)}{\sqrt{(1 - p(E_i/xᵢ)) \cdot p(E_i)}} - 2 \),

where \( S^-(xᵢ) \) – the integrated positive impact of accepted value \( xᵢ \) on the project success.

10. The definition of the subset of accepted values of stochastic functions of project implementation, for which

\[ \exists X^+ \subseteq X^-, X = \{xᵢ\}, l = 1, c : S^+(xᵢ) + S^-(xᵢ) > 0, \]

where \( c \) – a number of accepted values, for which the probability of project success for the majority of priority stakeholders.

11. If \( c = 0 \), there is no solution. The recurrence to paragraph 1 with changing the weight coefficients of stakeholders.

12. The completion of calculations.

According to this method the assessments of impact on project success are specified based on the accepted values of stochastic functions of the project implementation.

It is important that usually stakeholders are subjective in project success assessment. The representatives of stakeholders evaluate the project success according to their values and views of the situation, as any other people do. For example, a technical expert of the company assesses the project product and its compliance with the established quality requirements, and the financial expert evaluates the cost of investments and possible profit from selling the project product. The level of project success depends both on the fact of attaining the expected outcome and the resources used for its achievement. In other words, it depends on the values transferred to stakeholders in order to obtain new values. This peculiarity should be taken into account when developing methods of interaction with stakeholders.
Case study or implementation of results

The presented research proposes the method of assessment of the successful implementation of the project functions with regard to the attitude of stakeholders. The described method was proposed within the framework of the methods of process-stochastic and homeostatic project management, which are being developed by the authors. The combination of these approaches in quite uncommon, but the authors argue that the further development of these approaches will facilitate the enhancement of the flexible methods of project management. The development of the method is largely based on the theory of non-power interaction.

Conclusion

Finally, we can draw the following conclusions:

- The process-stochastic approach is the alternative to the consecutive sequence during the realization of technological processes or business processes. The combination of the process-stochastic process and project management helps to quickly react to any feedback from the key stakeholders of the project.
- The provision of the homeostasis during the interaction between stakeholders leads to the minimization of the negative impact of conflicts and with a higher probability to implement the project successfully. Taking into account the homeostasis during the exchange of values between stakeholders, the project team facilitates their interest in the participation in the project.
- The assessment of the probability of implementation of different functions of the project permits the project manager to take decisions with due consideration of the feedback of stakeholders, which increases the probability of its successful implementation.

Further work

The authors further plan to integrate the process-stochastic and homeostatic approaches with a view to developing a more precise and convenient instrument of the assessment of project decisions. The authors plan to develop the methods for conducting the stakeholder polling, which will further be used for practical realization of the discussed method.
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