Managing Projects Portfolio in Complex Environments Based On Fuzzy Situational Networks

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Abstract

This article is dedicated to the main approaches used in the modern methodologies of project management and their logical connection as the base for forming fuzzy technology and information system. The purpose of this article is to create an effective tool for the project managers to be able to assess the success of the project in the first stages, including the time when the main planning document is being composed. The task of the project coordinator is to find out the interested party's purposes and find a possible compromise. Considering people and organizations involved in the project, or those whose interests can influence the results of the project's execution or successful completion positively or negatively as an interested parties, the project team should determine them, find out their needs and expectations, and then manage them, influencing them to provide the guarantee of the project's successful completion. Considering people and organizations involved in the project, or those whose interests can influence the results of the project's execution or successful completion positively or negatively as interested parties, the project team should determine them, find out their needs and expectations, and then manage them, influencing them to provide the guarantee of the project's successful completion. Having the goal to solve the multi-criteria linguistically described problem of project success evaluation, this work offers an approach, based on the fuzzy situational rules for multi-criteria selection. Therefore, this work analyzes the setting and discusses the possible ways of solutions and suggests the approach to the project success evaluation, based on a multi-criteria selection problem in the conditions of linguistic description and using the integrated approach of fuzzy situational management with production rules, widely used in the expert systems.

Keywords 1

Project management, project life, information system, innovative technologies, linguistic description, fuzzy networks

1. Introduction

The traditional method of initiating projects and programs, as well as the formation of a portfolio of projects in certain areas and their management, is one of the priority issues in the development of this region. Practice shows that the environment (Enterprise Environmental Factors) greatly affects the entire life cycle of projects and their successful completion. Let's take a closer look at the essence of this question, why the environment has a large weight factor in the successful completion of projects [1].

The vast majority of man-made technologies are based on the imitation and copying of various natural processes and phenomena. Innovative technologies are no exception, they try to model the

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creative behaviour of the individual and are based on the deep historical traditions of different cultures in uncertain conditions. For simulation uncertainty used entropy and fuzzy models [2]. Previously, the main object of various innovative technologies was an individual or a group, the task was to educate, educate, and organize new behaviour in adverse, deadly and aggressive external conditions [3]. The traditions of these schools cover various aspects of activity: philosophy, preaching, commerce, intelligence, diplomacy, and politics. Now, in connection with the rapid development of information technology, a new association has emerged, consisting of a deeper use of computer systems and networks in innovation: artificial intelligence systems, and expert systems [4]. The trend of such penetration is growing and expanding significantly, so there is a need for a new organization of innovation activities with broad involvement of information technology [5].

The creative activity of man, who transforms nature, being a consequence, hinders and hinders the creative activity of the cause, that is, nature, which seeks to improve man [6]. A hypothetical way to solve this problem is to find out the fundamental difference between the level of innovative technology used by nature and which man has been able to master so far [7]. The cognitive process, developing and improving itself, aimed at a simple expansion of needs, may need to be adjusted concerning the unknown motives of nature's behaviour [8]. The emergence of information systems promises to provide a means of expanding the innovative resources of society, which can indicate the path to such innovative technologies that do not conflict but are in harmony with nature. These conclusions, of course, should be considered at the level of hypotheses. For the development of society, the time has already come when it is necessary to flexibly adapt their innovative technologies to natural ones to prevent and avoid global troubles [9].

In project management, there is such a thing as a project environment [10]. What is a project environment? The project environment is a set of external and internal factors that affect the achievement of project results [11]. Anything can be a factor in the external environment of the project - from the political situation in the country to the procurement process adopted by the company. Management of the external environment of the project is most often associated with very great difficulties or even impossible, for that it is external [12]. Of course, you can influence something, but this is more an exception than a rule, and these are factors that affect the project, and which are beyond the competence of the project manager [13].

Therefore, when forming and initiating vital projects in such environments, on the one hand, it is of great importance, and on the other hand, it is very difficult to implement them, due to the complexity of the project environment [14]. We observe similar facts, especially in unstable political and social regions. I would especially like to note that the implementation of any type of project in an environment with difficult circumstances surrounded by projects, ranging from humanitarian, and social to technical projects, is of great importance for this region. The results of the implementation of such projects are fundamentally reflected in the effectiveness of the regulatory processes in the region [15]. Therefore, when forming projects, a careful study of the environment with external and internal factors is required, and following the results of these studies, such projects are initiated that significantly affect the development of this region and the correct formation of project portfolios guarantees the successful completion of projects [16]. The modern stage of development of methods and means of project management in the world is characterized by the general formula "from trust to understanding and active using" [17]. At the same time, with the development of modern information systems and technologies, the results of research in the field of "soft components of project management" (leadership in projects and building effective management teams) are defined as the main areas of research [18]:

- the creation of effective organizational structures based on competence centres, and offices for managing projects, programs and project portfolios;
- effective partnership through joint training in international programs (benchmarking);
- integration of modern information technologies at the enterprise level;
- globalization and effective exchange of knowledge;
- assessment of the potential of project management at various levels of presentation (project manager, team, organization, industry, country) and management of this potential based on a system of models and tools.

2. Analysis of recent research and publication

Studying various scientific literature, we can conclude that today the mechanisms for the formation of project portfolios concerning the environment of global uncertainty are not sufficiently described [19, 20]. At the moment, project management in complex environments is studied within the framework of the theory of active systems, strategic planning, models of proactive development, etc. A special place is occupied by the theory of project management based on values, which are understood as utility and benefit [21]. Thus, the usefulness of projects as a whole is estimated by the degree of their attractiveness to all participants, although individual components of the usefulness of the project result for the environment may have different significance [22]. Considering all the different elements in one package that complement each other creates a complementary relationship between these elements in the process of forming and managing projects in these situations [23, 24].

Based on the foregoing, the author proposes a special tool for the formation of new projects in special regions with a difficult situations in the environment, using linguistic descriptions of the process for the successful completion of projects [25].

3. The multi-criteria task of managing the projects portfolio in a clear statement

A multi-criteria task for well-defined systems is presented as:

$$f(x) = (f_1(x),..., f_n(x)) \to \max_{x \in D} \tag{1}$$

where D - is the allowable area of possible changes in the solution X.

In the case when the set D has large power, then this task is classified as a task of vector (multi-criteria) optimization, but if the number of alternatives in D is small, then the task is called the task of multi-criteria decision making. Assuming that the solution X is determined by k parameters (X_1, ..., X_k) effective (Pareto - optimal, non-dominated), such a solution is called, if there is no other, for which the value of at least one local criterion is better than X^*

It is known that the solution of the multi-criteria task is the Pareto set P, which consists of all possible effective solutions X^*, i.e. the whole area of compromises.

Usually, the project portfolio manager in the conflict zone, acting as a decision-maker (DM), is interested in one or more solutions from P, and therefore the choice is made in the dialogue procedure of the decision-maker - Competence Center - Center of Energy through decision generation - elements of Pareto sets. This process is interpreted by the introduction of global criteria F (super criteria), explicitly or implicitly known manifestations of the project. At the same time, methods for identifying and describing Pareto sets with an adaptive or non-adaptive form of the dialogue organization, are aimed at narrowing the Pareto sets.

Note that the Pareto set is closely related to the idea of forming a convolution of local criteria of the form, where usually they are the result of examinations. In doing so, one should keep in mind the important result of J. Germeier, according to which one can find a scalar function *F(c,f)* such that

$$\begin{aligned} &a)\ \forall \tilde{X} \in P \quad \exists c(X) \in S_c : \hat{X}(c) = \arg\max F(c(X), f(X)) = \tilde{X} \\ &b)\ \forall c \in S_c \quad \exists \tilde{X}(c) \in P, где\ S_c = \left\{ c / c_j > 0, (j = \overline{1,k}), \sum_j C_j = 1 \right\} \end{aligned} \tag{2}$$

The linear convolution of the criteria also satisfies the above requirements (in case **X** is a convex set, $f_i(X)$ is a concave function).

Based on the foregoing, the search methods are based on the selection of the appropriate convolution and coefficients **C** during sequential movement to a new state, which is also an element of the Pareto set. The reaction of the program manager for development (DM) consists either in comparing a pair of decisions **X** with an indication of preferences or in comparing $\mathbf{f_i}$ with an indication of its possible change (increase, decrease).

Along with this, mixed cases are also possible, when the improvement occurs both in the space of decisions and in the space of criteria.

A special place is occupied by a multi-criteria choice based on the preferences of the development program manager (DM). In the clear case, preferences are given as a pair ***(X, R)***, where $\boldsymbol{R_j=\{R_1, \dots, R_n\}}$ – is a vector preference relation, each component of which $R_j \subset \mathrm{E}(j=\overline{1,n})$. In this case, the local criteria $\mathbf{f_i}$ can be represented by the corresponding preference relations

$$R_j = \{(x,y)/\ f_j(X) \geq f_j(Y)\} \tag{3}$$

4. Formalized task statement in the case of a linguistic description

Below we will show the specific features of a multi-criteria choice under the conditions of a linguistic description of the task.

In this model, it is assumed that the vector of input variables, which are targets and described linguistically, consists of four components $X_i\ (i=\overline{1,4})$, including;

X_1 - interests of the customer and donor;

X_2 - interests of the local population and authorities;

X_3 - the creation of a special product for a certain region;

X_4 - other targets, such as state bodies or private companies.

The linguistic criteria (local) $f_j\ (j=\overline{1,3})$ of the parties are dependent on the specified linguistic variables $X_i\ (i=\overline{1,4})$ and reflect the assessment of the success of the project for the three categories presented. It is required to find a compromise solution, such that:

$F(X_i)=\{f_j(X_i)\} \to \max\limits_{x \in D} \quad (j=\overline{1,3}),(i=\overline{1,4}),$ where $\max f_j$ is understood in the Pareto sense. Let's take the production form of the rules to describe the local quality criteria, presented in linguistic form, and get:

$$\{IF\ \ X_{1(i)}\ and\ X_{2(i)}\ and\ X_{3(i)}\ and\ X_{4(i)}, THEN\ f_{1(i)}\ and\ f_{2(i)}\ and\ f_{3(i)}, (as\,well\,as)\}\ (i=\overline{1,N}), \tag{4}$$

here $i=\overline{1,N}$ - is the number of production rules expressed by fuzzy implications. Assuming that there is no interaction between the outputs, i.e. $f_i(j=\overline{1,n})$ are independent of each other, we rewrite the reduced system of productions for each of the outputs f_i separately and obtain:

$$\{IF\ \ X_{1(i)}\ and\ X_{2(i)}\ and\ X_{3(i)}\ and\ X_{4(i)}, THEN\ f_{j(i)}, (as\,well\,as)\}\ (i=\overline{1,N}),(j=\overline{1,3}). \tag{5}$$

As a concrete example, here is some conditional rule from the rule base.

If X_1="very low", X_2="small", X_3="high" and X_4="small", then F_1="satisfactory", F_2="unsatisfactory" and F_3="unsatisfactory". Here the values $X_1 – X_4$ are considered on the term-set {"very small", "small", "medium", "high", "very high"}, and the values $F_1 – F_3$ express satisfaction on the term-set {"unsatisfactory" "satisfactory" and "good"}.

Structural and production description is presented in Figure 1.

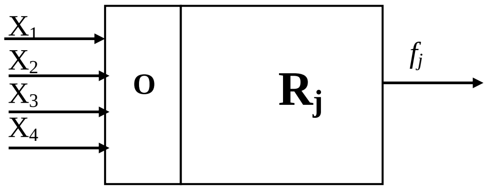

Figure 1: Structural and production description

Here $\boldsymbol{R_j}$ is a fuzzy relation «input-output», i.e.

$$R_j \subseteq X_1 \times X_2 \times X_3 \times X_4 \times f_j \ \ (j=\overline{1,3}) \tag{6}$$

there is a fuzzy subset on a cartesian product of input and output quantities. A fuzzy relation can $R_j \ (j=\overline{1,3})$ be formed in various known ways, from which we choose a fuzzy implication representation using Gödel's logic and get:

$$X_1 \times X_2 \times X_3 \underset{g}{\rightarrow} f; \quad R = Rg = X \times \Im g \rightarrow \aleph \times f \tag{7}$$

with membership function:

$$\mu_{Rg}(x_1, x_2, x_3, x_4, f) = \begin{cases} 1, IF \ \mu_x(x_1,...,x_4) \le \mu_f(f) \\ \mu_f(f), IF \ \mu_x(x_1,...,x_4) > \mu_f(f) \end{cases} \tag{8}$$

$\aleph$ – conditional universe for $X = X_1 \times \ldots \times X_4$

$\Im$ – universe for f; $X_1,...,X_4, f$ – corresponding fuzzysets $x \in \aleph \ u \ f \in \Im$

The compositional inference rule will be presented as:

$$f^{tek}(f) = (X_1^{tek} \times ... \times X_4^{tek}) \circ Rg = (X_1^{tek} \wedge ... \wedge X_4^{tek}) \circ ((X_1 \wedge ... \wedge X_4) \underset{g}{\rightarrow} f) \tag{9}$$

or in terms of the belonging function

$$\mu_{f^{tek}}(f) = \vee(\mu_{X_1^{tek}}(x) \wedge ... \wedge \mu_{X_4^{tek}}(x) \wedge \mu_{Rg}(x_1,...,x_4, f)), \tag{10}$$

The given system of production rules forms the so-called registering knowledge base for expert systems (ES). The logical processor, based on the logical inference, using the compositional rule, generates the possible (predictive) values of the fuzzy values of the linguistic criteria.

The main task in constructing an ES of multi-criteria choice is associated with an automated search for compromise solutions for a set of local criteria $\boldsymbol{f_j}$ specified in a linguistic form. The knowledge base containing the information necessary for compromise decisions will be considered *the control one*.

Thus, in the conditions of multiple goals, the local authorities of the crisis region face a multi-criteria task, the features of which are a qualitative description of the goals, the subjectivity of the choice and the degree of confidence in the assessments when developing a compromise solution on the part of donors. If we assume that in developing a compromise solution for the head of the region, which will support him with information, an expert system will be implied, then the need for donors to communicate with it in a language close to nature should be taken into account.

As for the proposed expert system, the latter has two knowledge bases: registering and managing, which was mentioned above. There are several requirements for the control base:

First, the choice set of alternatives must be small.

Secondly, such a knowledge base should be universal for the application of various methods of multi-criteria selection.

Thirdly, the knowledge base accumulated in the process of finding a compromise must be adaptive, i.e. provide for correction, as well as take into account the interactive exchange of information.

Fourth, the processor interaction system must support the features of the description of the Pareto-optimal approach in the fuzzy case.

Fifthly, since the clarification of the compromise solution is due to the dialogue of the local authorities (DM) with the centre of competence, it is necessary to provide for the originality of this exchange, when both preliminary engineering of expert information is required for the formation of knowledge and clarification of the inference rules, as well as its clarification, correction based on the results of adaptive exchange, the use of criteria convolution, and, in particular, with a fuzzy preference relation, starting with the simplest representations of the convolution coefficients ***Cj (j=1,2,3)*** for cases where ***C*** and ***X*** are linguistic variables.

Comparative analysis shows that the simplest cases of multi-criteria choice in terms of linguistic description are those when the leadership of the region sets criterion estimates as the degree of compliance of alternatives with the concepts defined by the criteria $\boldsymbol{f_j}$ and, thus, each alternative can be described as a set of fuzzy values of linguistic criteria, and the choice is feasible from the maximum correspondence condition.

It is also possible to use such a choice of alternatives, which is based on the ranking, i.e. revealing the significance of criteria $\boldsymbol{f_j}$ and reducing them to additive convolution. These methods are simple, but require prior knowledge and the introduction of estimates of alternatives and "weights" of criteria into the knowledge base; in the logical processor that performs the inference, it is necessary to identify all alternatives, i. combinations of input fuzzy values $X_i\,(i=\overline{1,4})$ and corresponding fuzzy values of linguistic criteria $f_j\,(j=\overline{1,3})$. However, as alternatives grow, a significant amount of memory is required. For example, if the leadership of the region specifies a linguistic description of the importance of local criteria, then in the convolution $F=\sum_{j=1}^{3} C_j\, f_j$, using the operation of multiplying two fuzzy numbers, you can restore the fuzzy values of ***F.***

Another method is not associated with a comparison of alternatives (controlled linguistic variables), but with a direct comparison of fuzzy values of local criteria.

In this case, the region's leadership is also required to have explicit or implicit knowledge of the super-criterion F, previously entered into the knowledge base.

In this case, we most often use an approach based on the representation of a global criterion in the form of an intersection of fuzzy values of local criteria, i.e. as

$$F=f_1\wedge f_2\wedge f_3 \text{ or in terms of membership } \mu_F=\mu(f_1,f_2,f_3)=\mathop{\wedge}_{j}\mu_{f_j} \qquad (11)$$

IF the restoration of the super criterion is carried out using production rules such as:

$$\{IF\ \ f_{1(i)}\ and\ \ f_{2(i)}\ and\ \ f_{3(i)},\ THEN\ F_i,\ (as\,well\,as)\}\ (i=\overline{1,N})\ , \qquad (12)$$

THEN the choice is made based on fuzzy inference rules (composition rule).

In this case, it will be necessary to create a managing knowledge base, i.e. ***F*** in its meaning will reflect the idea of the region's management about the satisfaction or fuzzy usefulness, which will be defined as a fuzzy subset of the unit interval, and the choice will be made based on a comparison of point estimates.

Super criterion ***F*** can also be restored based on knowledge previously obtained by the leadership of the region as a result of the dialogue. For this purpose, a production system seems:

$$\{"IF\ \ f_{1(i)}\ and\ \ f_{2(i)}\ and\ \ f_{3(i)},\ THEN\ \Delta f_{1(i)}\ u\ \ \Delta f_{2(i)}\ u\ \Delta\, f_{3(i)}\ \ \ (as\,well\,as)"\}\ (i=\overline{1,N}),\ (13)$$

where Δf_j – is the deviation of the j^{th} local criterion, i.e. it is assumed that the leadership of the region "owns" the desired characteristics ***f₁, f₂, f₃*** and its response in the form of answers is presented in the form of the desired change Δf . We add that, by analogy with fuzzy controllers, to improve the search, we can recommend, along with setting the deviation Δf , to a large extent also the rate of this change $\Delta\, f$.

Finally, we should emphasize the special place occupied by a multi-criteria choice based on a fuzzy preference relation, in which the source of information is the environment, that is, the region and local authorities (DM), which compare their preferences.

5. Implementation of the multi-criteria task of managing the projects portfolio

For linguistic multi-criteria problems, one can foresee the product system, connecting typical situations with solutions. Such a decision matrix as "situation-action" is a foundation of the managing base. Let's consider these products:

$$"If \begin{cases} f_1 \\ f_2 \\ f_3 \end{cases} , then\ (U_j, V_j, Y_j)" \qquad where:\ U_j \text{ is “increase” managing solution; } V_j \text{ is “reduce”;} \quad (14)$$

Y_j is “not change” accordingly for j criterion of $\boldsymbol{f_j}$. Managing solutions, being linguistic variables, are agreed with term pluralities of condition criteria { “little“, “middle“, “big”} and have fuzzy values such as {“a little”, “much”} for U_j *and* V_j and { “not change”} for Y_j. As an example, we will consider the managing matrix for U_j - (increase) = «a little».

Table 1

Example of fuzzy relation

		Little	Middle	Big
$R_j =$	Little	0,2	1	0,4
	Middle	0	0,3	1
	Big	0	0	1

As demonstrated in the matrix, it sets fuzzy relation on term plurality of f_j criterion, describing the effect of managing solutions from the term plurality of the linguistic variables (here set as U_j). Preliminary task of fuzzy relation (expert method), unlike traditional production fuzzy "input-output" description, allows getting the resulting value of f_j criterion by composing its initial fuzzy value f_j and fuzzy relation R, i.e. $f_j^{result} = f_j^{initinal} \circ R_j$.

For example, if $f_j = \{\langle 0.8/"little"\rangle, \langle 0.4/"middle"\rangle, \langle 0.2/"big"\rangle\}$, applying relation «increase» with the above-mentioned value «a little», one will have the following: $f_j^{result} = \{\langle 0.2/"little"\rangle, \langle 0.4/"middle"\rangle, \langle 0.4/"big"\rangle\}$.

Therefore, by setting the limited number of sample fuzzy situations, for each of which fuzzy values of local criteria are set, and connections between situation and managing action as a product (set of preliminarily prepared decisive matrices) we define a fuzzy situational network (UST). Comparing each current situation with a sample, by operations of fuzzy including and fuzzy equality, we select the most appropriate sample and applying managing effects by the maximin compositions, we estimate new values of the local criteria. Therefore, in production rules «situation-action» and decisive matrices included all preliminarily gathered information for managing the knowledge base.

In return, production rules, such as «If *X*, then *f*», centred in the registering knowledge base, allow to logically estimate the current fuzzy values of *f* local criteria vector, based upon the fuzzy current description of *X* parameters vector.

In cases when the obvious description of the products, providing the output of managing solutions, is absent, the managing effect is based on the analysis of possible transfer between the current situation and the goal. Such models are called «situation – managerial strategy – action». In this case, the goal situation (needed condition) can be set as a product «situation – situation» as a result of preliminary dialogue with the project coordinator (decision maker), for example:

$$\{\text{"}If \quad f_{1(i)} \; and \; f_{2(i)} \; and \; f_{3(i)}, \, then \; \Delta f_{1(i)} \; and \; \Delta f_{2(i)} \; and \; \Delta f_{3(i)} \quad (as\, well\, as)\text{"}\} \; (i=\overline{1,N}). \quad (15)$$

On this base, we can input the information "If condition f_1^* and … and f_3^* then condition f_1^{**} and … and f_3^{*}", to the managing knowledge base, i.e. estimate the space for the possible transfers as a product. It is necessary to notice that such production models are based on the structure of the dialogue with the project coordinator (decision maker).

Along with that, one can determine the goal situation based on the analysis of the selection preference degree of the managing effects on the preliminarily constructed UST (Figure.2).

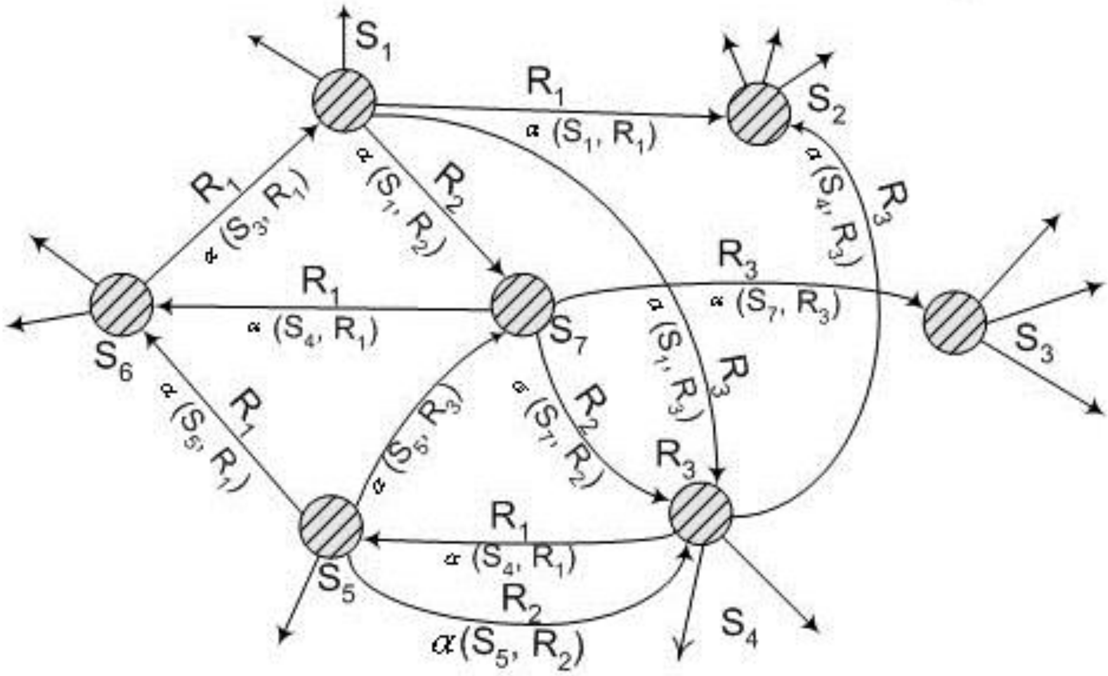

Figure 2: The scheme of fuzzy situational network

The fragment of the above-depicted UST shows that each top of UST is a fuzzy sample (typical) situation, while each arch of it is weighted with managing solution, necessary for transfer from the condition to the condition and degree of preferences of these solutions. I.e. $S=\{S_i\}$is a plurality of sample situations, $R_j=(U_j,V_j,Y_j)$ is a plurality of managing solutions; $\alpha(S_i,R_j)$ is the degree of preference; and α is not changeable for each *S*, and revealed by the expert way. It α is not revealed as a result of the expert survey, one can construct the product such as «situation – solution preference», for example, «If $f_1=f_1^*$ and ... and $f_3=f_3^*$, then $\alpha_1=\alpha_1^* \; for \; R_1 \; and \; \alpha_2=\alpha_2^* \; for \; R_2 \; and \; \alpha_3=\alpha_3^* \; for \; R_3$. Preference degrees can be either fuzzy numbers from [0,1] or ordinary numbers from the same interval.

Therefore, in the model «situation – managerial strategy – actions» two stages are significant:

- the setting of the goal situation;
- review of the product – strategy.

To construct the fuzzy situational network for multi-criteria linguistic tasks, it is necessary, first, to employ an expert survey to reveal a plurality of $R_1,\dots,R_n$ managing solutions, which are set as relations between local criteria values. Secondly, for each $S_i \in S$ situation to form Γ_{S_i}, *i.e.* $S_{i_s} \subset S$, in which one can transfer by managerial effect, connect S_i arches with the tops, where one can transfer and load the arches with solutions and preferences degree. A reverse way is also available, first, input some relations on the plurality of sample situations, the graph of which reflects possible transfers from one situation to another. Secondly, determine the values of managing effects *R* and preferences degrees of their use, necessary for the transfers. So, in the straightway of the construction of the fuzzy situational network, each new situation should be estimated according to the local criteria values, while for the reverse order the ways should be estimated as to means of managing effects. To illustrate the transfers on the network we will consider the example, where the situation is determined by fuzzy values of two criteria f_1 *and* f_2. Let Пусть S_1 have f_1^1, *and* ${}^{f}{}_2^1$ and S_2 have f_1^2 *and* ${}^{f}{}_2^2$. Let's imagine the transfer from S_1 *to* S_2 $(S_1 \to S_2)$ a $\langle f_1^1, f_2^1 \rangle S_1 \to S_2 \langle f_1^2, f_2^2 \rangle$ nd mark managing solutions f_1 *and* f_2 accordingly through R_1 and R_2, in general, the managing solution for $S_1 \to S_2$ will be marked as *R*. Stage-by-stage transfer $\langle f_1^1, f_2^1 \rangle \xrightarrow{R_1} \langle f_1^2, f_2^1 \rangle \xrightarrow{R_2} \langle f_1^2, f_2^2 \rangle$ is equivalent to the "max-min" composition $R_1 \circ R_2 = R$, i.e. $\langle f_1^1, f_2^1 \rangle \circ R = \langle f_1^2, f_2^2 \rangle$ is provided utilizing compositional rule for integral relation *R*. As for the selection of the preference degree of the managing solution, it is estimated as a conjunction of the local criteria degree components $\nu = \min(\nu_{R_{f1}}, \nu_{R_{f2}}, \nu_{R_{f3}})$.

It is important that set the goal situation where the simplest solution is stored in the "situation-goal" products base в базе. This way is complicated and requires significant computer memory, and that is why the more preferable approach is that which uses the information about preferences degree for the solutions, available in fuzzy situational networks.

6. Conclusion

Therefore, this work analyzes the setting and discusses the possible ways of solutions and suggests the approach to the project success evaluation, based on a multi-criteria selection problem in the conditions of linguistic description and using the integrated approach of fuzzy situational management with production rules, widely used in the expert systems. The formation and initiation of vital projects in such environments, on the one hand, is of great importance, and on the other hand, it is very difficult to implement them, due to the complexity of the project environment. We observe similar facts, especially in unstable political and social regions. I would especially like to note that the implementation of any type of project in an environment with difficult circumstances surrounded by projects, ranging from humanitarian, and social to technical projects, is of great importance for this region. The results of the implementation of such projects are fundamentally reflected in the effectiveness of the regulatory processes in the region. Therefore, when forming projects, a careful study of the environment with external and internal factors is required, and following the results of these studies, such projects are initiated that significantly affect the development of this region and the correct formation of project portfolios guarantees the successful completion of projects.

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