Modelling of Training Program Development for Supply Chain Management Business Project Development: Practical Research Results

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Abstract- **the article discusses the issues related to information-analytical support of the management/strategy development for international supply chain management business projects within training program development (level 2 of IEBP management model system): the selection of the key meta-competences , forms and formats of project-based learning, the most preferred for the main task types characteristic of the attractive activities, selected during HR-organization strategy development for IEBP management (they provide a brief description of the problem statement for this level). The article describes in detail the development of MAI-hierarchies (general preliminary and refined in VS-modification) developed for this level. They provide calculations of multi-expert assessments during the implementation of the supply chain management business project "New supply chain management", and analyze the main problems associated with the made choice made. A brief overview of additional (corrective) models of the supply chain management process optimization/rationalization is provided for this level. It was founded that governments around the world need to play a prominent role in developing strategies to protect supply chains for the future and put in place more robust disaster recovery plans, including relevant stockpiles, to enable more resilient outcomes.**

Keywords: *supply chain management, information and analytical support, supply chain management, business project management, strategy development, development of training programs, meta-competencies, forms and formats of project training*

1. Introduction

Any supply chain management business project is a complex system of various types of activities, stages and activities in all aspects: institutional, political, legal, economic, technical, technological, social and psychophysiological. As a rule, such systematic activities are organized in the form of a project/program using modern project management technologies, either classic-PMBoK, TOC, etc., or non-classic/"flexible" (Agile)-SCRUM, SMC, etc. From this article author's viewpoint, the latter are more preferable in the conditions of the VUCA world and the replacement of traditional management concepts with innovative and creative ones. Due to the same conditions, and, above all, the impossibility of a clear structuring of the tasks and problems to be solved, purely analytical/mathematical methods, including statistical ones, are ineffective. The way out of this situation can be the use of expert methods that use "soft computing" (fuzzy logic).

The main, key problem is the lack of a unified hierarchical system of models that uses certain types of scientific rationality and truth (specific for each level of the hierarchy), implements the principles of system analytics and describes all the functions of such project development and implementation, which allows to implement the synergistic effect of management at all levels of project management.

The analysis of the available studies by expert estimates shows that the difference between them (even for one problematic situation) is explained by the use of different types of scientific truth/rationality [1-3]:

1. ontological (truth as conformity to a given picture of the world) - classical rationality;
2. epistemological (truth as the correspondence of ideas about the truth itself) - classical rationality;
3. praxeological (truth as practical value, possibility and expediency of implementation) - classical rationality;
4. methodological (truth as the correspondence between the used concept/methodology and/or the correctness of the applied methodology) - non-classical rationality;
5. axiological (truth as the correspondence of the subject value system) - post-non-classical rationality;
6. ludological (from lat. Ludus - game) (truth as the level of the result creativity) - post-non-classical rationality;

The results of annual HR organization self-examinations, primarily higher supply chain management institutions and consulting firms focusing on supply chain management consulting, show the need to use new forms and formats for supply chain management process organization. Existing forms of supply chain management do not keep pace with the rapid changes of the supply chain management market, requiring a transition to a competency-based model based on practice-oriented forms and formats of supply chain management. Under these conditions, one of the key goals of some HR organization is to search for the most effective and to form new models of training forms and formats. The relevance of the task determines the topic of this article: the analysis of existing forms and formats of training and the choice of the most attractive ones for HR organizations engaged in the management of supply chain management business processes (IEBP). The choice of such forms involves multi-agent expert surveys taking into account key (closing) innovative technologies, optimal areas of HR organization activity, typical types of tasks inherent in such areas of

activity, as well as key meta-competencies necessary to solve these problems.

Methodology and methods. System modeling in the management of supply chain management business projects (IEBP) is th use of five-level hierarchical system of models [4]. This article discusses the system of models designed to manage the second level: the development of training programs, forms and formats intended for the formation and development of professional, general and metacompetencies (development of production and operational strategies in the case of an HR organization) - the answers to the issues of supply chain management content and methods (forms and formats): the specific content and duration of training programs, technical and technological and methodological support, the composition of teachers, trainers, experts, etc., to ensure the most attractive areas of activity and types of tasks that were selected during the first level (analysis, diagnostics and evaluation, motivation-accumulation of consent, psychological resistance increase to stress and interpersonal/team interaction, forecast, planning, management/regulation, incl. the breakdown of "bottlenecks", and behavior in "cognitive impasse" situations, etc.). At this level, expert soft computing technologies are used in the strategic mode [5] in real time, as it is possible to adjust the process and programs in the course of training taking into account intermediate results, as well as integer tasks for optimal development of training programs ("The backpack problem") [6], etc. The alternatives in the hierarchies of the second level are specific competencies and other technical parameters of programs (including training forms and formats). They use mainly ontological, epistemological and axeological types of truth. In order to increase the management efficiency of IEBP, additional, rationalizing and optimizing models can be used at each control level besides MAI/MAC technologies used in "vertical" hierarchy models, as the main guiding models: statistical and cognitive modeling, optimization tasks, artificial intelligence methods, DSM-method by V.K. Finn, as well as the "horizontal" MAI hierarchies, the parameters of which are specific quantitative parameters for supply chain management process management (the development of curricula and timetables, load calculation, formulation of training tasks, selection and concretization of training content, selection of the best combination of training forms for these conditions, the choice of a rational combination of teaching methods, drawing up an optimal training plan, the greatest possible improvement in the conditions of the training plan implementation, the implementation of the chosen training plan, as well as the analysis of task optimal solution) [6-10]. Together these models form an integrated network of control models for IEBP [11]. Additional ("horizontal") systems of models provides the following at each of the control levels:

a) more effective expert search/development of alternatives in the "vertical" hierarchies of all levels; and/or

b) their more effective (rational/optimal) implementation at this level.

Scientific results and discussion. According to the results of specific marketing research [12], The most attractive areas of activity in HR service market were the following ones: management consulting, supply chain management consulting, expert project support, formation and development of metacompetencies (including management culture), diagnostics (including express diagnostics) of individual and team characteristics related to the communicative and cognitive potentials of students. According to the wishes of customers, they added another trend related to startup management. The corresponding MAI hierarchy was built to solve the main task of IEBP control (the second level) (Figure 1).

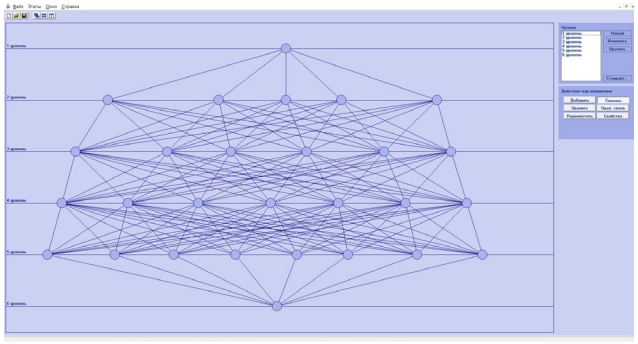

Fig. 1. The hierarchy of various forms of training attractiveness evaluation for some HR organization managing by IEBP according to the expert evaluation results of strategy choice (level No. 1).

The initial data for the study were periodical press materials ("Expert" and "Money" magazines, "Financial News" and "Kommersant-daily" newspaper, etc.), and the analytical reviews of Russian and foreign consulting agencies. To get estimates, aggregated indicators, etc. mathematical methods were applied using the theory of fuzzy sets. The following provisions were adopted as the basis for analysis:

The analysis was carried out for some HR organization working in the market of supply chain management and consulting services that uses a competitive marketing strategy of the "patient" type [13, 14], involving the activities of some HR organization that manages the IEBP "under the wing" of an supply chain management organization(s) that has a high reputation in the field of supply chain management (in our case, this is NRU Moscow Aviation Institute (University), NRU Belgorod State University and the University of Chongqing (China);

The organization work experience in the field of team "tuning" is extremely insignificant and was not taken into account during the analysis, although the organization has all the technical capabilities (a specially equipped computer class with the Internet) and the software that allows this work to be carried out;

An organization has some experience in the field of management and supply chain management consulting service, as well as project management;

An organization does not have a developed scheme for collecting and processing the necessary information, primarily HR information;

HR organization staff makes 10 people, without highly qualified experts;

Administrative ties with government agencies are inconsistent and poorly adjusted.

Expert assessments were developed for this level of IEBP management taking into account the results of the foresights of the leading Russian scientists-futurologists [15-17], the teachers of Moscow universities, as well as the results of foreign foresight studies (International project

"Global supply chain management futures" 2014; the forecasts of “global technological revolution 2020” and “Inner frontier" by Rand Corporation. The goals of Japan in the 21st century; Shell Global Scenarios to 2025, "Phillips" and others).

The first level of the hierarchy corresponds to the goal: determination of the most effective forms of training for some HR organization.

The second level of the hierarchy includes five peaks characterizing the most attractive areas of HR organization activity obtained as the study result [6]: Management consulting, supply chain management consulting, expert project support, formation and development of metacompetencies (including management culture), diagnostics (including express diagnostics) of individual and team characteristics related to the communicative and cognitive potential of students, as well as another, sixth top - startup management obtained as the result of additional expertise.

The third level of this hierarchy includes six vertices associated with typical tasks specific to selected areas of activity: analysis (including forecasting and planning), psychological resistance to stress increase, psychological readiness increase for interpersonal interaction, effective behavior in a cognitive impasse situation, the ability to reflection, an effective development of key goals in projects and the selection of criteria for their achievement.

The fourth level of the hierarchy includes seven metacompetencies required to solve typical tasks of the third level. These metacompetencies were determined as the result of a multi-agent expert survey [9]: collective thinking, mediation in conflicts, quick help in a difficult situation, the ability to change dramatically and quickly, high search activity, depth and retention of the discourse complexity, and empathy.

The fifth level of the hierarchy includes eight vertices characterizing the forms and formats of project teamwork necessary for the development of metacompetencies for the third level (typical tasks): “hackathons”, Scrum/Smc-technology for management design, NLP-technology such as “brainstorming” and “Synectics”, organizational-activity games (OAG), “knowledge reactors”, TF-team design, and “hirams”.

The sixth level is a “generalized scenario”, which includes state variables: the net profit of some HR organization, the constancy of income sources, the reputation of some HR organization, information and analytical security, the financial stability of some HR organization, the communications of some HR organization, the motivation of HR organization staff, HR personnel professionalism.

The MAI hierarchy was calculated using the TTRP-EURICA software package (Official registration certificate of the Federal Service for Intellectual Property, Patents and Trademarks No. 20066610693).

After multi-expert calculations (5 experts), the following weights were obtained for the alternatives “work forms and formats”:

“Hackathons” - 0.12, Scrum/Smc-technologies of managerial design - 0.06, “brainstorming” (A. Osborne) - 0.03, “synectics” (W. Gordon) - 0.04, organizational and activity games (OAG) (G.P. Schedrovitsky) - 0.11, “knowledge reactors” (S.B. Pereslegin) - 0.19, TF-team design (M.A. Fedotova, V.A. Mikheev, A.V. Shevyrev) - 0.26, “hirams” (V. Oleskin) - 0.19.

The average time for filling in the hierarchy by each expert was about 2 hours, the average consistency indices (CI) of expert assessments by levels were the following ones: 1st level - 7.4% (the correct consistency index according to T. Saati’s methodology should not exceed 10%), 2nd level - 3.4%, 3rd level - 2.2%, 4th level - 1.4%, 5th level - 4.2%.

The described state variables are used to interpret the generalized scenario based on Figure 2. The most attractive forms of training considered in the main MAI hierarchy were used for the analysis: knowledge reactors, TF teams, and hirams.

A brief analysis of the generalized scenario allows us to conclude that state variables will grow quite significantly after the use of 3 forms of training indicated above.

Simultaneously with the analysis of the “generalized scenario”, the analysis was made concerning the appropriateness of training form change as the analysis of benefits/costs ratio (VS-modification of the combined MAI technology) for each of the selected forms of work. The evaluation methodology was to study the possible transition benefits (Fig. 2) and costs (Fig. 3) to a particular form of training and then to calculate the benefits/costs ratio.

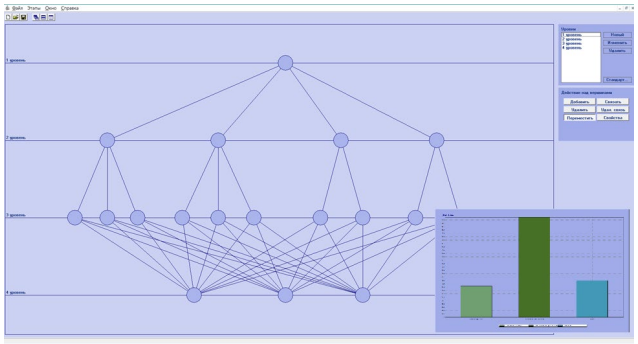

Fig. 2. The results of benefit hierarchy assessment

The hierarchy of benefits includes 4 levels: the first level - the goal of a hierarchy development (determination of the most attractive forms of training organization in terms of benefits), the second and third levels - the criteria for goal achievement and their detail: 2. economic (2.1 net profit, 2.2 liquidity, 2.3 financial stability), 3. organizational and managerial (3.1 the level of diversification, 3.2 professionalism, 3.3 the level of connections), 4. political and legal (4.1 organization prestige, 4.2 market experience), 5. technical and technological (5.1 technological security, 5.2 technical support), the fourth level includes the most attractive forms of training organization, determined on the basis of the main MAI hierarchy: knowledge reactors, TF teams, and hirams.

The cost hierarchy (Figure 3) includes 4 levels: the first level is the goal of a hierarchy development (determination of the most attractive forms of training organization in terms of costs), the second and third levels are the goal achievement criteria and their details (it should be noted that the values of expert assessments for individual vertices of this level may not coincide with the values of the benefit hierarchy): 2. economic (2.1 total costs, 2.2 financial risks), 3. organizational and managerial (3.1 costs for business process organization, 3.2 costs for staff selection and its

qualification increase, 3.3 costs for internal relation organization),

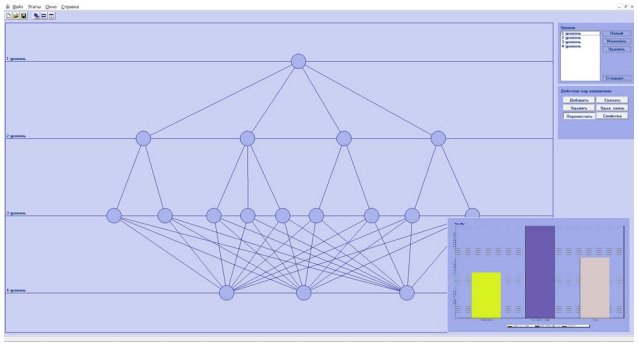

Figure 3. The results of cost hierarchy assessment

4. political and legal (4.1 costs of finding and monitoring partners, 4.2 costs of external relation organization), 5. technical and technological (5.1 technological risks, 5.2 technical risks), the fourth level, as well as in the hierarchy of benefits, includes the most attractive forms of training organization, determined on the basis of the main MAI hierarchy.

Consideration of the VS-relationship between the MAI hierarchies of benefits and costs allows us to conclude that the most preferred form of training organization for some HR organization is TF teams, although the other two forms are also quite attractive.

Conclusion

Based on the analysis results, it can be concluded that the most preferred forms of training for HR organizations are the following ones: TF teams (0.46), “knowledge reactors” (0.29) and “hirams” (0.25).

Along with expert analysis, potential problems were identified (see the estimates of the hierarchy of costs), which include the level of expert training, inadequate communications with the authorities (officials) in charge of international project and supply chain management activities, the organizational structure of some HR organization inadequate to international requirements, and also unsatisfactory "smoothness" of business processes.

Based on this, the most successful production strategy related to the development of programs and the choice of forms and training formats for some HR organization will be the following one (implementation period - 1.5-2 years):

The transition from existing forms of training (supply chain management and managerial consulting) to the forms of training in TF teams. Upon reaching the planned results (no later than 1 year from the plan start), it is advisable to conduct a test of strength in the field of “knowledge reactors” and “hirah” use, which will allow HR organizations to move to a new level of supply chain management business project management.

The following measures are required (functional and operational strategies) to implement the proposed production strategy over the next year:

1. Corporate development strategy of some HR organization: the goal is the effective provision of the data collection and operational processing, the development of “supporting” functions, the organization of business processes corresponding to the chosen forms of training. In this case, it is necessary to form an analytical group (2-3 people) for regular monitoring of a situation. A general reorganization of some HR organization structure is also needed - optimization of management hierarchy, distribution of responsibilities, organization of work, and information flows. Establishment of long-term partnerships with other training and consulting organizations in Moscow, St. Petersburg, Vladivostok and China (Beijing, Shanghai, Chongqing).

2. Competitive marketing strategy: the "patient" mode activity with the simultaneous development of initial (innovative) forms and formats of training using artificial intelligence technologies, an aggressive strategy towards weaker market participants. The goal is to capture a market share controlled by weaker market participants. Development of long-term relations with government and corporate officials making decisions or influencing decision-making in the field of supply chain management and project activities.

3. HR strategy is one of the key strategies for an organization. The goal is to increase the staff professionalism and provide the necessary staff (special attention is paid to the attraction of experts in the field of team and project management). Qualification and professionalism improvement of HR organization employees through training or an employee participation in the implementation of joint projects. Particular attention should be paid to the training of experts-moderators of managerial projects with the "Joker" team role [7].

4. Development of a creative internal atmosphere in an organization using the system analytics and system-creative thinking (SCT) technologies [10], the development of some TF team to manage an organization (with the help of external consultants), and the expert reward and remuneration system correction (special attention should be paid to the organization HR-brand development).

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