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DEVELOPMENT OF THE MULTI-PROJECT FORMING METHOD IN SHIPPING COMPANY'S DEVELOPMENT

Об'єктом дослідження є процеси управління змістом мультипроектів розвитку судноплавної компанії. Предметом дослідження є метод мультипроектного управління розвитком судноплавних компаній. Одним з найбільш проблемних місць є формування стратегії розвитку судноплавної підприємства. Стратегія судноплавної компанії включає в себе постановку довгострокових цілей компанії, визначення ресурсів для їх досягнення та технологію розробки стратегії. Доведено, що формування конкурентної стратегії судноплавної компанії – процес досить складний і тривалий. Мета цього процесу є вибір проектів розвитку, які підвищать ефективність діяльності компанії в довгостроковій перспективі.

В ході дослідження використовувалися методи системного аналізу, які дозволили визначити, що:

- в умовах жорсткої конкуренції та динамічного оточення судноплавні компанії ведуть свою діяльність у ряді напрямів;*
- є необхідність планування багатой кількості паралельних проектів і раціонального використання ресурсів компанії.*

Отримано метод оптимізації змісту мультипроекту, що дозволяє сформувати мультипроект розвитку підприємства, враховуючи не тільки обмеження по ресурсам, але й відповідність результатів мультипроекту стратегічним цілям підприємства. Це пов'язано з тим, що запропонований метод має ряд особливостей, а саме:

- дворівневий характер планування і управління: на рівні окремих проектів і на рівні стратегії в цілому;*
- структурованість процесу стратегічного планування в розподілі ресурсів, часу, прибутку;*
- розвиток потенціалу судноплавної компанії.*

Завдяки цьому забезпечується можливість раціонального розподілу ресурсів компанії. У порівнянні з аналогічними відомими методами це забезпечує такі переваги: досягнення усіх стратегічних цілей, зв'язок стратегії з проектами розвитку, оптимальний розподіл ресурсів.

Ключові слова: *метод формування змісту мультипроекту, розвиток судноплавної компанії, стратегія судноплавної компанії, мультипроектне управління.*

1. Introduction

Scientists have widely researched and scientifically substantiated the significant positive impact of using the tools of project management on entrepreneurial and economic activity from small forms to large business structures, and, as a result, on the economy of the country as a whole. At the same time, in modern conditions of active innovative development of the economy and turbulence of the environment, considerable attention should be paid to the diversified activities of economic entities. It allows taking into account diversification opportunities and strategic directions of consolidation (business expansion) that put into practice the best implementation of shipping company development projects.

Despite the fact that many sources describe the process of strategic management of enterprise development through projects; in practice it is difficult to implement such kind of projects. And the presentation of this process in the form of a set of formalized procedures or in the form of a step-by-step sequence of actions, convenient for implementation in practice, to date, simply does not exist.

Due to the fact that project-oriented management is an approach in which many of the tasks of the organization's production activities are considered as separate projects,

they apply principles and methods of project management. This type of management is a central concept for organizations which activities are carried out in the form of continuous implementation of a plurality of projects. This, first of all, relates to project-oriented shipping companies.

Therefore, it is a very actual to study the development of project management methodology based on the establishment of multi-project management methods and their use to strengthen the position of shipping companies.

2. The object of research and its technological audit

The object of research is the processes of managing the content of multi-project development of the shipping company.

One of the most problematic points is that the enterprises of the transport complex are in the conditions of the most severe competition from foreign companies, as a result of which the volume of transportation of foreign goods by Ukrainian transport annually decreases, while currency revenues for the transportation of goods goes abroad. Managing the content of the multi-project involves processes that ensure the inclusion in the multi-project of those projects that are necessary for the successful

implementation of the strategy. Multi-project management requires special management methods that ensure the achievement of the goals, subject to the specified restrictions (including through common resources) and the conditions for its implementation. Thus, managing the content of the multi-project is a rather complex task, which includes processes that ensure the inclusion in the multi-project of all projects and works that are necessary for its successful implementation. The inclusion of all works means that in addition to the actual work aimed at obtaining the product of the project, all works aimed at achieving other strategic goals are included in the project.

For creating project management systems, it is necessary:

- to solve problems of work organization, responsibility distribution, cost estimation, reporting system creation;
- effectively support the procedures for collecting information about work execution;
- display results in the information management system for generalization of work schedules, cost, resources and completion dates.

3. The aim and objectives of research

The aim of research is increasing the efficiency of shipping companies through the development of a multi-project formation method.

To achieve this aim it is necessary to solve some scientific tasks:

1. To analyze the applicability of the project management methodology for the development of shipping companies.
2. To develop a method for optimizing the content of a multi-project for the development of a shipping company based on the systematic unity of strategic goals, portfolio of projects and multi-project.
3. To develop methodological bases that includes the methods and logical sequence of their application for the formation of a multi-project for the development of a shipping company.

4. Research of existing solutions of the problem

A lot of researches are devoted to the problem of developing a methodology of the organizations. A large contribution was made for the development of enterprises through projects [1, 2]. These works are devoted to the development of scientific-theoretical and scientific-practical basis for the application of project management methodology. In [2] the issue of proactive management of the development of organizational systems was highlighted. The main development management tool is the projects and programs of balanced development, built in matrix technologies. In [3], the problem of transforming project management into a strategic tool for creating and maintaining a competitive advantage was explored. Paper [4] highlights the technological and organizational aspects of project management activities within the framework of implementing the strategy for the development of socio-economic systems. Research in the field of project management within the framework of implementing the strategy for the development of socio-economic systems is presented in [5]. Paper [6] gives an overview of the main differences between the multi-project and project portfolio, focusing on the strategic focus of the project

portfolio. In [7, 8] explore different shipping strategies for business development in a turbulent environment, analyze examples of successful implementation of project management in the shipping industry, and examples of shipping strategies for shipping companies. Paper [9] makes it possible to clearly understand the link between the portfolio of projects and the multi-project. In [10], the issues of conceptual development, improvement of technical methods and solving of typical problems in the field of project management are discussed.

However, the scientific concepts do not clearly define the main components of the multi-project of development in a systematic relationship with the organization's strategy.

Thus, the development of more detailed and adequate conditions for the operation of shipping companies, as well as scientific and methodological approaches to the formation of a multi-project of development, implemented in system unity with the strategy of the enterprise, is needed.

5. Methods of research

Theoretical and methodological basis of the research served as scientific and practical work on the problem under study. The information basis of the study was also made by standards on project management, materials of scientific conferences and scientific publications on related topics of research, work of periodicals with concrete examples of world practice. To achieve the goal, in determining the formulated tasks, their formulation and solution, the general scientific and special methods of research were used:

- the method of theoretical generalization – for clarification of the conceptual apparatus, the essence of multi-project management and the identification of its features;
- the method of deduction – when developing the conceptual foundations of the use of multi-project management, the necessity and the possibility of its use at enterprises of the seagoing complex;
- methods of logic, analysis and synthesis – for classification of projects of development of shipping companies;
- the method of analogy for formalization of the development projects of shipping companies and for improving the structure of the multi-project.

6. Research results

For creating multi-project management systems, it is necessary to reflect goals and results in the management system. And for the successful management of the content of the multi-project, it is necessary that the sequence of its actions be clearly presented and structured (Fig. 1).

The sequence of multi-project formation allows to identify and to take into account an external and internal factors that have a positive or negative impact on the development of a shipping company, identify the directions of the shipping company's development, its strategic objectives. The main purpose of the sequence is the choice of all possible variants of development of one of the most effective. A more detailed sequence can be specified using the methods used in the implementation of the multi-project. At the first stage, it is necessary to identify and take into account the external and internal factors that have a positive or negative impact on the company's development.

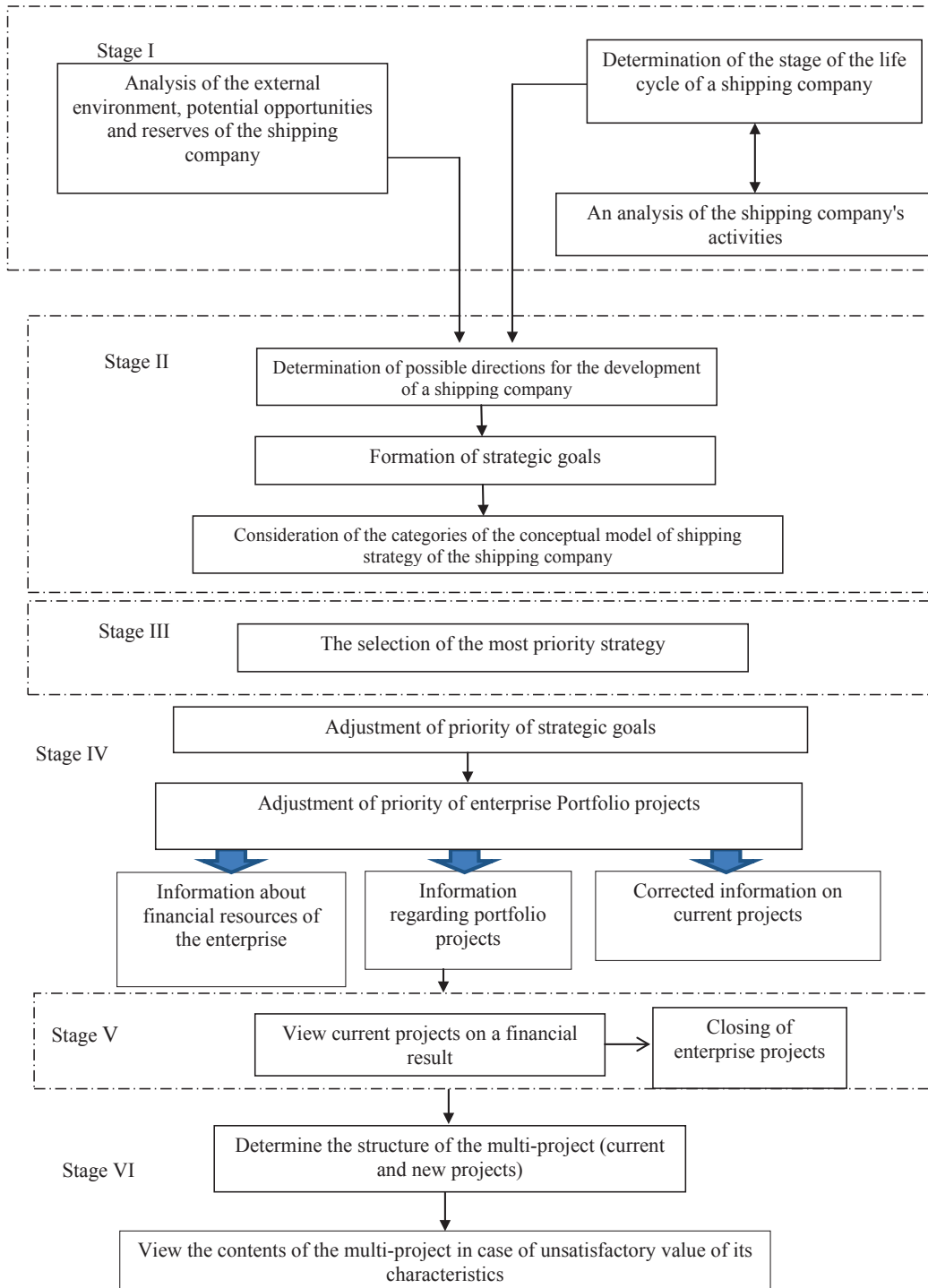


Fig. 1. The method of successive formation of a multi-project development of a shipping company

However, it is necessary to take into account the fact that at first the definition of the phase of the life cycle is very conditional, especially in the case when the company is large and there are several business areas in the company. The practice of conducting financial statements is based primarily on accounting metrics that reflect the control of current transactions and decisions. Therefore, it is difficult to obtain objective information on the movement of funds from operational, financial and investment activities that is required to determine the stage of the company's life cycle. However, this information is necessary, due to

the fact that each company runs its life cycle, and the development strategy should adequately reflect the stage of the enterprise's life cycle.

At the second stage, possible directions of the strategic development of the shipping company are defined, the strategic goals of the enterprise are formulated. The starting point for this is an analysis of the shipping company's activity, which is essential for defining strategic goals and objectives for development.

Methods that can be used at this stage: portfolio analysis, construction of hierarchies, use of the Tree of Goal

method, expert methods. Since at this stage the landmarks of the shipping company are determined, then it should be treated with great care.

After defining the goals and the direction of development chosen, the third stage is the strategy electivity. The stage of strategy formation is decisive, since, by developing a strategy and defining the goals of its development, the shipping company directs all its resources for the implementation of the developed strategy and achievement of the set goals. It should be noted that not all the projects can participate in achieving the strategic goals of the company.

The most common methods and tools for shaping a strategy are:

- portfolio analysis;
- expert methods;
- economic and mathematical methods;
- forecasting methods;
- methods of mathematical programming;
- simulation modeling;
- script analysis;
- road map;
- strategic map;
- BCG matrix;
- Balanced Scorecard System (BSS).

The use of BSS allows to concrete and objective constraints for strategic decisions, strategic planning, measurement of results, and verification of compliance of shipping company strategy development projects.

After the formation of the strategy, strategic goals and objectives, the fourth stage is adjusting the priority of the projects and selecting them for the portfolio. At this stage, it is necessary to consider all possible alternatives for the projects of development of the shipping company. Alternatives may include, for example, various technical and technological solutions, variants of reforms, restructuring, different groups of those who benefit from the implementation of projects, financial mechanisms, scale, timing of the project, etc.

According to a certain strategy of the company, the maximum number of variants of development projects is being developed in the projected portfolio of projects. The starting point for each project is a decision regarding its implementation. For this purpose, the project is subject to a comprehensive assessment on a number of criteria: marketing, financial, economic, technological, social, organizational, and environmental.

The main parameters of the project are:

- duration of the project;
- volumes, course and rates of realization of works;
- cost;
- ratio of costs and results of the project;
- profit;
- quality of work during the project implementation;
- commercial risk;
- reliability;
- viability;
- competitiveness;
- public significance.

However, in a multi-project environment, the effectiveness of the project in all these aspects does not guarantee its adoption. The decision is made on the basis of higher-level objectives: what strategic objectives of the shipping company will allow this project to be dealt with or, more

precisely, a group of projects (since achieving strategic goals most often requires the implementation of several interconnected projects).

Therefore, at the fourth stage, it is necessary to adjust the priority of the strategic goals and, as a result, to form a portfolio of projects. It is possible to do this by such methods as:

- expert: ranking, Delphi method, profile method, interactive selection, hierarchy analysis method, paired comparison method, scoring method;
- financial: NPV, ECV, Performance Index, DPP;
- optimization: targeted programming, fuzzy set method, simulation modeling, game theory;
- mixed: tree of solutions, matrices, bubble charts, model of strategic baskets.

At this stage of the sequence, any of these methods can be used to provide an idea of which set of projects should be included in the portfolio.

At the fifth stage, the current projects are reviewed on a financial result. The content of the project evaluation process and the formation of an effective multi-project development should be such as to ensure the achievement of the strategic objectives of the shipping company. The system-building core of the scheme for assessing the development project is the structure of the strategic objectives of the shipping company, through the prism of which the portfolio of projects is being formed, and a selection of priority projects to be implemented within the framework of the multi-project at the tactical level. If, for some of the current projects, the financial result will be less than acceptable, this will be cause of the project closure.

At the sixth stage it is expedient to use economic-mathematical methods, calendar-network planning and management. These methods will solve the problem of determining the sequence of projects and the distribution of resources between them, which would be optimal from the point of view of certain criteria at the tactical level (project implementation time, costs, risk, etc.).

However, the main thing in the process of forming a multi-project is an analysis of its feasibility and effectiveness. Therefore, after defining the structure of a multi-project with all current and new projects, it is necessary to determine the characteristics of the multi-project and, in the case of unsatisfactory values, to review its contents.

To assess the economic efficiency, various indicators can be used: indicators of the effect, profitability, payback, financial indicators, etc. Some indicators assume that the time value of money is taken into account, and some do not. Those indicators that take into account the time value of money (NPV, IRR, DPP) are based on the basic concept of the theory of finance – DCF (Discount Cash Flows), since the discounting operation is performed.

Due to the fact that the main result of the projects implementation in the financial aspect is the formation of cash inflows, then to formalize the result of the project, let's assume that the receipt of cash inflows is a continuous process, the intensity of which is described by the magnitude $\varphi_i(t)$. Accordingly, within a time frame, the result of the project implementation will be expressed as:

$$F_i(o; t^*) = \int_0^{t^*} \varphi_i(t) dt. \quad (1)$$

In its turn, the result of the multi-project will be the sum of all financial results for projects over the period $[t_k; t_{k+1}]$:

$$F^m(t_k; t_{k+1}) = \sum_{i=1}^m F_i(t_k; t_{k+1}) = \sum_{i=1}^m \int_{t_k}^{t_{k+1}} \varphi_i(t) dt. \quad (2)$$

Implementation of activities in each project requires financial resources, which can also be described with the help of a continuous amount $r_i(t)$ it is the intensity of the use of financial resources. Accordingly, in the same way as monetary tributaries, the costs of projects and a multi-project are formed within the framework of the considered time interval $[t_k; t_{k+1}]$:

$$R^m(t_k; t_{k+1}) = \sum_{i=1}^m R_i(t_k; t_{k+1}) = \sum_{i=1}^m \int_{t_k}^{t_{k+1}} r_i(t) dt. \quad (3)$$

Then the financial result of the multi-project is the difference in cash inflows and outflows, and can be represented as follows:

$$\begin{aligned} \Pi^m(t_k; t_{k+1}) &= F^m(t_k; t_{k+1}) - R^m(t_k; t_{k+1}) = \\ &= \sum_{i=1}^m \int_{t_k}^{t_{k+1}} (\varphi_i(t) - r_i(t)) dt. \end{aligned} \quad (4)$$

Thus, the multiplicity optimality criterion is the financial result of development projects. The proposed indicator can be used to evaluate an already established multi-project or when optimizing that enumerates a possible set of variants of the multi-project composition.

7. SWOT analysis of research results

Strengths are:

- the possibility of assessing the shipping company's potential, identifying existing problems and ways of their solution, defining the directions of development;
- realization of measures on the development and introduction of innovations in the form of concrete tactical actions, as well as in the form of control of the main indicators with feedback;
- increase the efficiency of the company through the use of project management methods.

Weaknesses are:

- «blurriness» of the borders of the introduction of multi-project management and the complex nature of the impact of certain external and internal factors on the shipping company;
- lack of instant results;
- the initiative to develop and implement a multi-project development project for a shipping company in multi-project management may belong only to project managers and program directors.

Opportunities are:

- versatility of tools used to measure results and adjust further strategic objectives;
- rapid adaptation of management processes to a turbulent market environment, which allows not only to control but also timely adjust the strategy of a shipping company;
- increasing the competitiveness of the shipping company on the world market.

Threats are:

- lack of experience of strategic management in the majority of Ukrainian shipping companies;
- expectation of a quick effect from management decisions;
- a shortage of skilled management personnel who have proactive vision, skills in organizing mental space, and the ability to link management objectives to strategic goals.

8. Conclusions

1. The applicability of the project management methodology for the development of shipping companies is analyzed. It is proved that project-oriented management is the central concept for organizations whose activities and development are carried out in the form of continuous implementation of a plurality of projects, which primarily concerns project-oriented shipping companies.

2. The method of optimizing the content of the multi-project has been developed. The sequence of actions on the formation of a multi-project of the development is clearly presented and structured. It enables the achievement of shipping company's goals of different levels. The proposed conceptual model of a multi-project for the development of a shipping company is determined by the scheme of forming the content of the multi-project and the logic of interaction of the projects included in the multi-project. It allows to select from all possible variants of development only one which is the most effective.

3. The methodical bases are developed, which include the methods and the logical sequence of their application for the formation of a multi-project development of a shipping company. This allows to identify and take into account external and internal factors that have a positive or negative impact on the company's development, identify the directions of the shipping company's development and its strategic objectives.

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OPTIMAL PLANNING OF TRIP AND ROUND TRIP CYCLE TIME ON AN URBAN ROUTE

Об'єктом дослідження є маршрут міського пасажирського транспорту загального користування. Одним з найбільш проблемних місць при організації перевезень на фіксованому міському маршруті є встановлення планової тривалості виконання рейсу та (або) зворотного рейсу. Складнощі виникають через те, що тривалість виконання рейсу на міському маршруті зазвичай є випадковою величиною, що необхідно враховувати при встановленні її планових значень, використовуваних надалі при складанні розкладів руху. Це, з одного боку, дозволяє покращити ефективність використання маршрутних транспортних засобів за рахунок зменшення їх непродуктивних простоїв, а з іншого – підвищити якість обслуговування пасажирів за рахунок зменшення тривалості очікування останніми транспорту на зупинках.

В ході дослідження використано метод стохастичної оптимізації планової тривалості рейсу. Це дало можливість знайти компроміс у вартісному виразі між ефективністю використання маршрутних транспортних засобів та якістю обслуговування пасажирів. Особливістю запропонованого оптимізаційного методу є врахування в узагальнених витратах непродуктивних простоїв маршрутних транспортних засобів, недоотриманого прибутку транспортного оператора та вартості транспортного часу пасажирів.

Застосування розробленого методу для умов тролейбусного маршруту № 14 міста Запоріжжя (Україна) дозволяє у порівнянні з існуючими плановими показниками зменшити узагальнені витрати на 12 %.

Наразі значно розширилися технічні можливості збирання, накопичення та обробки емпіричної інформації про умови виконання перевезень на міських маршрутах з використанням супутникових систем глобального позиціонування GPS. У таких умовах з використанням розробленого методу забезпечується можливість оперативного врахування при плануванні пасажирських перевезень як експлуатаційних, так і соціально-економічних чинників, у яких ці перевезення виконуються.

Ключові слова: міський громадський транспорт, тривалість очікування, тривалість рейсу, узагальнені витрати.

1. Introduction

The length of the round trip cycle time on the city public transport route is one of its most important technical and operational indicators. This value is used to determine the required number of route vehicles (RV), frequency and headway, the distribution of transit vehicles between routes, scheduling and timetabling, and the organization of combined modes of communication on routes [1].

The difficulty of rationing the duration of the round trip cycle time on the route is that it is a random variable, depending on which varies under the influence of a number of both controlled and uncontrolled factors. So, the duration of trip in real operating conditions is affected by [2]:

- traction-dynamic properties of the vehicles used on the route;

- design features of entrance and exit devices;
- the number of doors of the vehicle and the distribution of passengers between them;
- the intensity of passenger traffic;
- the intensity of the traffic flow on the route;
- road and climatic conditions (season of the year and time of the day, condition of the road surface, number of lanes, plan and longitudinal profile of the road, availability and frequency of intersections, technical means for organizing traffic);
- experience and psychophysiological condition of the driver.

Under such conditions, the duration of the layover time at the terminal stops of the route is established for several reasons. This is provision, on the one hand, a short-term rest of the driver, and on the other – the