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WHEEL WORKING SYSTEM IN A TEAM: RELATIONSHIP BETWEEN DIFFERENT PERSONNEL IN A MARINE PROJECT

Abstract. In the article the models of management of the project team are considered, they are most difficult to formalize in the fields of knowledge in project management. The study presents economic and mathematical models for managing the project team for threshold collective behavior, for example, the crew of a sea vessel. When implementing specific projects, the experience of leadership and management of a small team often remains at the level of intuition, which leads to the individualization of knowledge and prevents the effective use of the management potential of the team. In the science of management, there are methods of managing personnel, are considered separately, without taking into account the mutual influence of psychological processes, does not allow to form a single, multifactor management concept for a small team in the project. And even more so in the development of project team management, the impact of project implementation conditions on the choice of management methods for the project team is rather poorly taken into account, requires the leader of the psychologist's experience or significantly reduces the manageability of the project team. This method, unlike the existing ones, includes the team competence radial diagram analysis based on the «balance wheel» principle of a professional team coherence. Input data are professional testing and expert evaluation results (with the involvement of specialists and experts of appropriate qualification). Building and analysis of competence wheel diagrams allow to visualize the compatibility of professional knowledge and skills of all team members together to identify team and personal lack of knowledge and risks of project implementation. As a result, the decision-making person obtains knowledge deviation values, that can help him to make decisions for competence risks elimination. The complexity and multifactoriness of the choice of management methods for the project team, and sometimes the need for managers in direct recommendations for the management of the project team. The practical value of the obtained results lies in the enrichment of the methodology of the researched problems, which is useful for scientists, the possibility to use in business design of crewing companies.

Keywords: crewing company, project, management of the project team, model groups, ship's crew.

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СИСТЕМА РОБОТИ КОЛЕСА У КОМАНДІ: СПІВВІДНОШЕННЯ МІЖ РІЗНИМ ПЕРСОНАЛОМ У МОРСЬКОМУ ПРОЄКТІ

Анотація. Розглянуто моделі управління проєктною командою, їх найважче формалізувати в галузях знань з управління проєктами. У дослідженні представлені економічні та математичні моделі управління проєктною командою для порогової колективної поведінки, наприклад, екіпажу морського судна. При реалізації конкретних проєктів досвід керівництва та управління невеликою командою часто залишається на рівні інтуїції, що призводить до індивідуалізації знань і перешкоджає ефективному використанню управлінського потенціалу колективу. У науці управління існують методи управління персоналом, розглядаються окремо, без урахування взаємного впливу психологічних процесів, що не дозволяє сформувати єдину, багатофакторну концепцію управління для невеликої команди у проєкті. А при розробленні управління проєктною командою вплив умов реалізації проєкту на вибір методів управління проєктною командою враховується досить погано, вимагає досвіду керівника психолога або значно знижує керованість команди проєкту. Цей метод, на відміну від наявних, включає аналіз радіальної діаграми командних компетенцій, заснований на принципі «колеса балансу» професійної згуртованості команди. Вихідними даними є результати професійного тестування та експертної оцінки (із залученням фахівців та експертів відповідної кваліфікації). Побудова й аналіз діаграм колеса компетенцій дозволяють візуалізувати сумісність професійних знань і навичок усіх членів команди разом, щоб виявити командну та особистісний брак знань і ризики реалізації проєкту. У результаті особа, яка ухвалює рішення, отримує значення відхилення знань, які можуть допомогти йому ухвалити рішення щодо усунення ризиків компетентності. Складність і багатофакторність вибору методів управління для проєктної групи, а іноді і потреба керівників у прямих рекомендаціях щодо керівництва проєктною командою. Практична цінність отриманих результатів полягає у збагаченні методології досліджуваної проблематики, що є корисним для вчених, можливості використовувати у бізнес-проєктуванні крюїнгових компаній.

Ключові слова: крюїнгова компанія, проєкт, управління командою проєктів, модельні групи, екіпаж судна.

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Introduction. Hundreds of thousands of sailors are not able to return home from long flights. About the same number of people cannot board and start work due to the COVID-19 pandemic. All this affects the economic, social and psycho-emotional state of seafarers, members of their families and even entire national communities. Tension is growing both on board and in families. Currently, an acute problem has arisen regarding the employment of seafarers (officers and rank-and-file) of crews of sea vessels.

Since millions of people who have maritime specialties work as «under-flags» on ships of foreign shipping companies. Without this, the problem of unemployment in the maritime sector in the country would have become much more acute, especially during the crisis period. Thus, the mediation system for the employment of a seaman abroad was officially legalized, including in Europe, because crewing companies, agencies that are now massive.

Thus, the task arises of creating an effective project management team for the shipping company (that is, picking up the master of the vessel and hiring assistants, staff), and then, based on their characteristics, recruit their subordinates and so on, up to the last executor (junior sailor, minder, cadet), on which at a certain moment, the economic fate of the entire project may also depend. This should ensure high-quality selection of the team in several directions and protects from the increased risk of constant change, cancellation of the crew of the vessel at each port of arrival-parking [1; 2].

Analysis of research and problem statement. There are many studies on managing team or project personnel. But in such works [3—8 etc.], for the most part, only the stage of forming the project team (personnel) is considered separately, or the decisions concern mainly office workers, and not the people who directly carry out the project, in particular the management of the shipping, crewing company (as is the case with teams' ships) in extreme conditions.

World practice shows that the separation of teams is advisable in projects in which it is necessary to clearly fix the positions of its various participants (rights, powers, responsibilities, participation and shares in profits, etc.) [9—12 etc.]. In particular, the allocation of several project teams is appropriate for large, mixed, medium and long-term projects or when the number of project participants is large enough and their interests are contradictory [13—17 etc.].

Problems of motivation of a member of the project team are determined not only by the incentives offered to him, but also by his perception of the product and the environment of the project, and participation in the process of professional activity in this project [18—23 etc.]. Evaluation of the manager's actions to intensify the professional activities of the project team should take into account not only the quality of work of team members, but also the preservation of their psychophysical ability to perform such activities throughout the project, taking into account the specifics of the project.

Unresolved is the problem of streamlining personnel capable of carrying out a project in the maritime sphere, space in extreme conditions. In many cases, the decision of such an important task begins with the determination of the head of such a project (on seagoing ships this is the captain of the vessel).

The aim of the study is to develop a system model of wheel management of the project team, which takes into account the characteristics of the product and the project implementation environment by companies, and is the basis for revealing the economic dependence of quality criteria for team formation and development. Description of models of the wheel of motivation of project team members and forecasting of professional burnout of project team members, which is the basis for the formation of a system of targeted incentives for project team members and ensuring their efficiency during project implementation — sea and river vessel voyage.

The main factor in the formation of teams is the specifics of the project, which is one of the main factors in the formation of the crew of a ship. This determines the formal management structure (managers, employees, officers and sailors, i.e. the crew of a sea vessel).

The project personnel, regarding the crewing — the crew of the vessel — is the deck and engine crews that carry out all the technical processes of the vessel's functioning. As a rule, on a ship, the crew (crew) is divided into deck and engine.

At the same time, at the stage of formation of a specific unique team for the transportation of a specific cargo (drilling rig, platform, military, space, energy equipment, etc.), each ship's crew is considered as a specific project team for a separate unique project created for transportation, delivery bulky, heavy, dangerous cargo. This requires outstanding training, qualifications and experience of the ship's team for each such specific project [3; 4].

Research results. Thus, the project is a set of actions in which human, material and financial resources are organized to perform a unique set of work of a certain content in conditions of limited cost and time [3; 4]. As you know, the size and composition of the project team should be planned for the future in accordance with the regulations, characteristics and needs of the vessel [5]. The project has a life cycle within which the necessary changes take place in accordance with the established quantitative and qualitative goals.

Thus, any project can be defined as a temporary action that is performed to create a unique product or service [6]. Temporary means that each project has its own beginning and end, and uniqueness testifies to the fundamental differences between the work and services performed from their analogues. That is, they have common features common to all projects:

- changes as the main content of the project should be considered as a process of changing the crew of a sea vessel;
- goals — the final desired result, which is determined in the planning process and is governed by management functions. The goal should imply or stipulate the possibility of measuring / checking the result. The goal should be feasible for a specific contractor — shipowner, crew, and crewing.
- temporary limited duration of the project — selection according to various criteria for a certain period (voyage) of the crew for the vessel;
- relation to the budget — estimated cost, staffing schedule of payments, distributed over the periods of the project;
- limited resources required — expressing the finiteness, rarity, scarcity of resources available to the project and the person at any given moment, their relative insufficiency in comparison with the unlimited needs for which these resources are used;
- the uniqueness of a project that is exceptional in its segment;
- novelty — connecting subjective and objective moments in a project and expressing ultimately the attitude of a person (society) to the result (product of activity) [7].
- comprehensiveness involves the coordination and coordination among themselves of all the service functions performed by the various services of the vessel during the same period of time and at the same facilities;
- legal and organizational support should be guided by conventions and resolutions of IMO & ILO and other documents of a legal nature, which prescribe how to do and act in a specific environment.

Team composition — a set of characteristics of team members that are important for analysis as a whole, the size of the team, age, gender, and others. Identification of the level of theoretical training of a sailor, as a manifestation of the availability of fundamental knowledge, using conventional testing (corresponds to the characteristics of knowledge at the level — it is adequate to understand call, define, reproduce, etc.) determine the personal position, opinion of the sailor, as a manifestation of the systematic nature and orderliness of his knowledge, (corresponds to the characteristic of knowledge at the level — apply, use, find a solution, interpret, confirm).

The main criterion for the effectiveness of the teams in the project is the success of the project. If the main project manager believes that the differentiation of teams reduces risks and contributes to the success of the project, then in this case it is he who takes full responsibility for the successful achievement of the project goals. However, it should clearly stipulate the conditions for its implementation, achieve a formal description, separation and consolidation of competencies of various types of project teams [8]. Since the teams in the project differ in their goals, objectives, competence and measure of responsibility for the results of the project, their position, place and role in the project and in relation to the project is determined by the goals of their members and representatives of the project participants, the degree of team participation in the processes project

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and its responsibility [9]. The team is organized, as a rule, for large long-term projects with a large number of participants who, perhaps, do not directly participate in the management of the project processes, but determine the project policy and strategy based on their own interests. The Project Management Team is also organized as part of sufficiently large projects or when the project («controlling package») is mainly owned by the executing (or parent) organization [2]. In this case, individual managerial functions or the implementation of certain project processes may be entrusted to the technical staff or functional units of the organization (for example, part of the project cost management functions or communications related to the information infrastructure of the executing organization) [10].

A feature of the Project Management Team is that it simultaneously takes an external (control subject) and internal (element that changes during the course of the project) position in relation to the project (as a control object) and to the processes of its implementation.

The point is also that the Management Team in the Project is a set of managerial roles that can be performed by several people as well as one professionally competent main project manager [5]. This set of roles includes such roles as «manager», «administrator», «coach», «leader», «project manager» [11]. In each case, the distribution of role management functions between individuals — participants in the project, their completeness and content are unique in nature, depending on many factors (culture of the executing organization, class, type and type of project, available resources, etc.).

The relationships between these types of teams depend on the project. For large projects, the presence of 3 types of commands is fairly obvious. And in small projects, the Project Team and the Project Management Team can «fit» into the Project Management Team [9]. The separation of competences in the field of decision-making — political, strategic and tactical, their implementation and ensuring operational management allows us to assess the feasibility of creating certain project teams within a specific project [12].

The nature and characteristics of project management teams

The complexity of creating and developing an effective Team Management Project is due to the fact that it takes a threefold position in the implementation of the project:

1. From the perspective of a systematic approach: Project Management Team — this is the subject of management in relation to the processes and objects of management (subject — object relations) in the project with all its tasks and functions [13].
2. From the perspective of the psychological approach: Project Management Team — a self-governing and self-developing subject (subject — subjective relations). Within the framework of project management, this position is determined through self-developing, self-orienting and self-motivated Project Management Teams [10; 14].
3. From the perspective of the project approach: Project Management Team — is an end-to-end developing element of project implementation technology [7].

On the other hand, the Project Management team is the basis of any project management technology and is an integrated set of heterogeneous elements. An incomplete list of characteristics, elements and components of the Project Management Team (*Table*), which must not only be taken into account, but also to link them in the integrated project space [11], shows the complexity of the task of Team Building one or another type of Team in project.

Table

Characteristics, elements and components of a management team in projects

Culture	Ethics
Synergy	Conflicts
Communications	Humor
Leadership	Informal communication
Staff qualifications	Styles
Organization	Solutions
Promotion	Delegation
Motivation	Roles
Line items	Functions
System of values	Competencies
Mentality	And etc.

However, the main problem when creating the Team Management Project is not so much in its 3 «entities» (hypostases), in the quantity and quality of elements, but in the fact that all this set of elements should work in a coordinated and purposeful way [11]. Moreover, it is difficult to single out priorities from this totality, since for different purposes and at different phases of the project life cycle, they can change. Therefore, when creating and developing the Team Management Project, technologies are required that would allow the integration of Team Management Project members into the workspace of a particular project during its implementation in a targeted manner for specific goals and objectives. This type of technology is called cross-cultural and cross-professional integration and is used both in creating the Team Management Project and in integrating the Team Management Project into the project [13]. It should be especially taken into account when forming a team that an effective Team Management Project cannot be created at all for any projects. For each specific project, you need to create your own Team Management Project, the most appropriate for him. It should also be borne in mind that the Project Management Team changes as the project moves from one of its life phases to another. The changes concern not so much the personal participants of the project as the redistribution of roles, functions and responsibilities among the members of the Project Management Team [14].

Nine factors are combined into a model known as the «Wheel of Types of Marguerison — McKenn Team Management Activities». To facilitate the use of the model, the author will be called the «Wheel of the team». Studies have shown that eight external factors (known as types of work functions) contain one or another fundamental type of labor activity, while the central concept of relationships is common to all work functions [9]. To fully realize the potential of the work of the team, all groups must demonstrate high performance for all nine factors. In other words, it is necessary for the team to have the ability to independently adjust their work. According to the «Team Wheel», each person has advantages and disadvantages in certain areas. Team Wheel has two aspects. One of them is related to the tasks and functions of the team. The other, which will be discussed later, focuses on the individual aspects of the activity and work preferences. Thus, the «Team Wheel» is a practical tool. The model has the following characteristics:

Provides a benchmark for evaluating team strengths and weaknesses.

- Each member of the team using the system can evaluate their personal merits, for which a special questionnaire has been developed and approved.
- «Team Wheel» indicates which areas need to be linked together for integrated activities, rather than individual operations.
- It provides a system that promotes relationships between two or more teams to help coordinate their work and form relationships between them [15].
- It is based on the language used in the daily work of a plant, institution, laboratory or any other workplace [9].

For individual employees, the language and visual model provide an easy-to-use system with which they can discuss their work problems, priorities and contribution to the team.

In addition, it serves as a valuable tool for evaluating career plans and professional development.

The model can help an employee make a choice when moving to another job or make a meaningful decision about which type of activity will best allow him to improve his skills. All team members need to consider the nine most important factors and be able to assess the situation when any problems arise. If any link is not strong enough, the team should analyze its shortcomings and take measures to correct the situation [12]. Similarly, the team wheel allows individual members of the group to evaluate their contribution to the common cause, their training needs, career paths and working methods [7].

Economic and mathematical model of project team motivation:

Executive organization of the management team:

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$$Vorg_M = \sum_{MValue=1}^{NMvalues_M} [PRst_{Mvalue} \cdot (VOpr_{Mvalue} + VOcm_{Mvalue} + VOres_{Mvalue})] \quad (1)$$

Product management project:

$$Vprod_M = \sum_{Exit=1}^{NExits} \left(ACexit_M^{Exit} \cdot \sum_{MValue=1}^{NMvalues_M} PRst_{Mvalue} \cdot Vexit_{MValue}^{Exit} + \sum_{Mpc=1}^{Nmpc_{Exit}} \left(PRmpc_M^{Mpc} \cdot VIexit_M^{Mpc} \right) \right) \quad (2)$$

Content of activities in the project:

$$Vwork_M = \sum_{MValue=1}^{NMvalues_M} \left[PRst_{Mvalue} \cdot \sum_{W=1}^{NW_M} Vtfun_{MValue}^{W} \right] \quad (3)$$

Work in the project management team:

$$Vteam_M = \sum_{MValue=1}^{NMvalues_M} \left[PRst_{MValue} \cdot \left(Vtpss_{MValue}^{M} + \sum_{Crole=1}^{NCrole_M} Vrole_{MValue}^{Crole} \right) \right] \quad (4)$$

Proposed value incentives for team members:

$$Vst_M \quad WLem_M^{Team} = Wem_M + Wstress_M^{Team} \quad (5)$$

Motivational potential of the project for team members:

$$Vproj_M = Vst_M + Vteam_M + Vwork_M + Vorg_M + Vprod_M \quad (6)$$

Predictive value of motivation of project team members:

$$Eprojp_M = Vproj_M \cdot QAim_M \cdot (1 - AltW_M) \quad (7)$$

Emotional burnout of a project team member:

$$Aem_M = (Eprojp_M \cdot PTem_M - Kstress_M) + Kiem_M \cdot A0em_M \quad (8)$$

Henry Ford wrote about group behavior «To get together is the beginning, to stay together is progress, to work together is success». The creation of project teams in the form of ship crews should be considered [15].

Each crew of a sea vessel — can be considered as a specific project team, for a separate unique project created for transportation, delivery of bulc, heavy, dangerous cargo. Creation of project teams and their management (for example, crews of sea vessels), which take into account the specifics of team formation, the professional qualities of the project participants and the psychology of the relationship between them, which are of great importance especially in the initial stage of the project, at the stage of the so-called «rubbing» of members of the newly formed ship teams [16; 17].

A project management team is a group that consists of a project manager (on board the ship is the captain) and people directly subordinate to him (deputies and assistants; as an example, on the deck team of the ship, as a rule, it means from the senior assistant to the captain, the second assistant to the captain, the third assistant to the captain, the boatswain (the subject sailors of the vessel of 1—2 classes, welder, stewards, cooks, and the like are not part of this team) [14]. Regarding the engine crew, this is, first of all, the chief engineer of the ship's engine room, his deputies and assistants are the second engineer, third engineer, and the like, an electrician (performers, namely, sailors-minders, vipers, and the like, depending on the class of the ship and engine type of a sea vessel of its cargo characteristics, navigation class, seaworthiness of a vessel) [15].

Problems of selection of seafarers for ships by crewing companies

The Covid-19 crisis, in addition to the pandemic, dealt a devastating blow to the global economy and shipping companies suffered the most serious consequences. About what awaits the maritime industry in the near future, what is the situation on board ships now, how are replacements

being done, what are international organizations doing to resolve the crisis, and how to maintain a stable psycho-emotional state on board and at home our webinar Marine industry in crisis Covid-19.

While there is no legislative definition of the word «crewing», it can be used in any meanings [18]. The concept of crewing is the majority of dictionaries, including Cambridge, as the meaning of the word (verb) «crewing» is offered by the derivatives of «crew», ie crew. In a semantic translation, this verb would probably sound like this — «equipped (by people)» [19].

In variations, the word «crewing» is used as a noun, which can mean anything: from the provision of intermediary services when hiring abroad to, in fact, hiring a team on their own ships. Every sailor knows what is crewing and crewing company. First of all, crewing has the function of selecting ship specialists for shipowning companies in accordance with the requirements of these companies. Crewing's job is to search for a sailor, check the availability of maritime documents, prepare documents for the flag of the ship, knowledge of the English language and work experience, conclude a contract, and send the sailor to the ship with a further search for a replacement. The crew is changed at the port by marine agents for a fee that includes: transportation costs, immigration and customs formalities, etc. Typically, Crewing works with certain shipowners and recruits' crews for the entire fleet of the shipowner, or for part of the fleet, depending on the size of the crewing company. Some Crewing companies provide training services for marine specialists [20; 21].

This entire group, as in the classical project management, is created for the period of the project and upon completion it is dissolved, leaving the vessel after the cruise in a seaworthy, proper working condition [4].

Problems that officers and rank-and-file crews of naval vessels face daily [8]: training of a sailor (low level of education, competence, experience) from maritime safety (ship accident, fire, piracy, terrorism, etc.) in accordance with the requirements of international conventions and resolutions IMO/ILO: SOLAS-1974, CTCW-78/95, ISM Code, ISPS Code, CONMARCON-2006 [10]. Due to the fact that a long stay of a seaman in extreme conditions at sea, limits the range of his treatment on board [22]. Crewing companies that select crews are usually responsible for this aspect of the project. Thus, only a company that concludes an employment contract on its own behalf can call itself a «Crewing agency». And there are such companies — these are, as a rule, divisions of large shipowners / operators, but they are single [11].

The tasks performed by the crewing company at the stage of the careful formation of the crew of the sea vessel for such a separate unique cargo or voyage, by testing in the crewing companies for the psychological compatibility of the deck and engine crew members, which in general add up the corresponding qualitative composition of the sea vessel [20]. Unresolved is the problem of streamlining personnel capable of carrying out a project in extreme conditions. In many cases, the resolution of such a task begins with the determination of one head of the marine project (on sea vessels — the captain, superintendent) [6]. Also, the task of the crewing company at the stage of the careful formation of the crew of the sea vessel for such a separate unique cargo or flight, through testing in crewing companies for qualifications, psychological compatibility of the deck and engine crew members, which in general creates the appropriate quality composition of the sea vessel [21—23].

This saves the money of the customer of the carriage of goods and the shipowner. Unfortunately, now this practice is not used much, it is used in the modern economic realities of the world, although it has great practical benefits and the prospect of being used by shipowners, stakeholders, every crewing agency.

Conclusions. The ability for the customer of the services of crewing companies, namely for shipping companies, to independently model the situations it needs before going to sea, or directly at sea, to effectively manage both the course of the project (voyage, cruise) ship and optimize the smaller parameters of the project related to people.

1. Crewing agencies should take the practice and rules of compliance with high quality standards for the provision of employment services for seafarers abroad on ships in accordance with the requirements of the international quality system series ISO, TQM.

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2. The ability to use the results of this personnel analysis to determine the compatibility of the work of the project team members and the distribution of roles and responsibilities on the vessel, based on the analysis of the response time parameters, as well as knowledge and value orientation of the sailor's personality.

3. The opportunity for the customer of the project (shipping companies) to independently simulate the situations he needs, setting tasks for the crew of the ships to test the sequence (shift) or priority of crew actions in certain situations at sea during a long transition, approach, entrance to the seaport , in the parking lot, stay at the port (unloading, loading, bunkering of cargo, guarding the vessel in voyage and port) in accordance with international and national requirements and standards. It is in the economic interests of shipping, crewing companies, sailors, and the state.

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