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# METHODS OF FORMATION PROJECT TEAMS IN THE SYSTEM OF CIVIL PROTECTION

**Abstract.** The article describes approaches to solving scientific and practical problems of forming of project teams in the system of civil protection. Existing methods and models of staff selection in project-oriented management analyzed. Basic structural elements of employee competences in the system of civil protection systematized. Method of formation of project teams in in the system of civil protection based on temporary virtual structures using neural networks theories proposed.
**Keywords**: project team, system of civil protection, neural network, the virtual structure.

# METODY I MODELE TWORZENIA ZESPOŁÓW PROJEKTOWYCH OCHRONY LUDNOŚCI

**Streszczenie.** Artykuł opisuje podejście do rozwiązywania problemów naukowych i praktycznych polegające na tworzeniu zespołów projektowych w systemie ochrony ludności. Proponowana metoda tworzenia zespołów projektowych w systemie obrony cywilnej oparta jest na tworzeniu tymczasowych obiektów wirtualnych z wykorzystaniem teorii sieci neuronowych.
**Słowa kluczowe:** zespół projektowy systemu ochrony ludności, sieci neuronowe, struktury wirtualne.

## Introduction

Professional selection and recruitment are essential components of human resource management. Recruitment involves a series of actions based organization to attract candidates for vacant jobs. The selection and hiring of staff manning the main task is to state candidates, business, moral, psychological and other qualities which could contribute to the achievement of organizational goals.

Recruitment is the only complex and must be supported by scientific and methodological, organizational, personnel, logistics and software. Scientific and methodological support to justify the selection of a common methodology, scientific principles, methods and criteria, and uses mathematical tools. Organizational support – a set of research-based activities that are carried out simultaneously or sequentially at different stages of work in order to reduce the time and improve the quality of selection. Staffing aims to bring all the necessary professionals at various stages of selection: senior management and relevant departments, psychologists, lawyers and economists. Logistical support includes the necessary funding of the activities and equipment necessary office equipment. Software is used to automate some procedures of recruitment.

The basic structural unit of management personnel in the organization, company or institution has a department personnel with responsibilities for receiving, selection, evaluation and dismissal of personnel, and also with organizing training and retraining of personnel. To perform the latter function is often created by training department or departments of technical education.

Service of personnel management, typically have low organizational status, poor professional competence so system management in the recruitment, selection and evaluation of personnel in many areas of manufacturing enterprises and service is far from perfect and needs constant review and adjustment. Therefore they do not perform a number of tasks to assess candidates for employment. The effectiveness of any organizational and technical system depends on rationally chosen staff. World experience shows that a combination of organizational structure within individual virtual units gives a significant effect on project-oriented management. In particular, if we consider a system of civil protection, virtually all of its tasks are project-oriented nature. It is necessary to distinguish between routine operations, which can be reduced to an application project, and in fact, unique temporary projects for which the involved experts of various departments, sectors which, in turn, form project teams within temporary virtual organizations. Such structures are usually referred to as virtual project management offices. After completion of the project a virtual office stops its activity, the operating activity is organizational and technical system continues within the structural units of civil protection. That is why the task of devel-

oping scientific methods and models forming project teams in a civil defense system based on temporary virtual bases is actual.

**Analysis of the literature.** The issue of the formation of project teams in project-driven organizations covered in the scientific work [1]. In particular, the evaluation notion of personal knowledge and experience of project work of employees in the organization is considered. The model is based on the standard ICB 3 and allows to evaluate different categories of project team such as project managers, staff, management and technical staff.

In research [2], the term "competence management" reveals the category of "project potential", which takes into account the informative, energetic and physical potential.

The concept of virtual production in project-oriented management is introduced in research [3]. The organization of large-scale production in frames of virtual enterprise using mathematical models and modern information technologies is considered.

Summary results of solving the scientific problem of human resource management in the implementation of production programs examined in the scientific paper [4]. However, all the above works mainly the management of project teams and the evaluation of its members are considered but not the selection of personnel.

**The purpose of the article** is elaboration of systematic approaches of development of methods of project team formation in the system of civil protection within temporary virtual structures using the theory of neural networks.

**Main part of the research.** As the research object propose to choose a typical structural unit of the system of civil protection, which is The Main Departure of emergency state service of Ukraine in Zaporizhia region (the MD). System of Civil Defense of Ukraine consists of the central office of the State Emergency Services (SES) on the top level, the main departments by region (II level) and practical units that deal with the prevention and elimination of emergency situations (third level). If we consider the activities of the Main Department, then as mentioned earlier, it can be conditionally divided into two types: the daily operational activity, which can be leaded down to a program of projects and project-oriented, which involves experts of various departments of MD within temporary virtual structures. The first type - daily operational activity includes prevention and elimination of emergency situation tasks. The design- oriented type includes unique temporary measures. Recently in Ukraine such unique projects as System 112 in the activities of main offices SES (Kyiv, Lviv, Kharkiv) implemented, as well a variety of activities in preparation to Euro – 2012, projects related to the development of new technology and innovation. So-called ad hoc working groups or committees formed for such projects, which by its nature are temporary virtual structures [5] within the permanent organizational structures (Fig. 1).

Generalized model of staff selection for project teams in the system of civil protection is represented in Fig. 2. The main element is the database of those employees of project driven organization to which requests of information system are sent, including methods and models of formation of project team. Database is a historical part of information provision of project organization and includes reference data on different categories of employees.

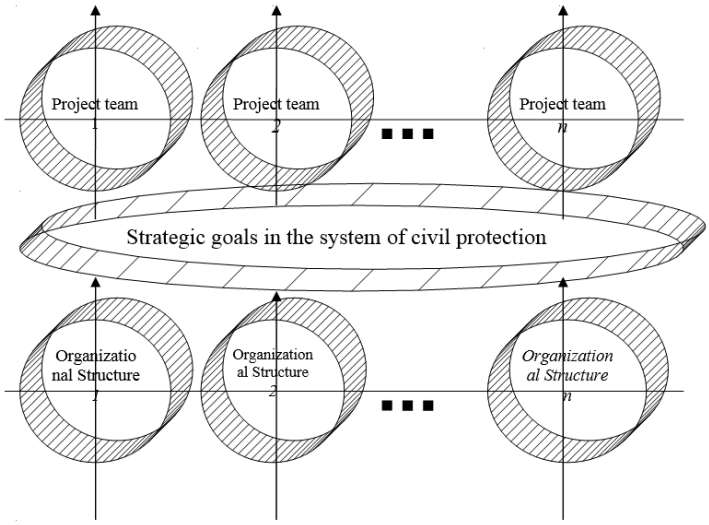


Fig. 1. The organizational model of project teams in the system of civil protection

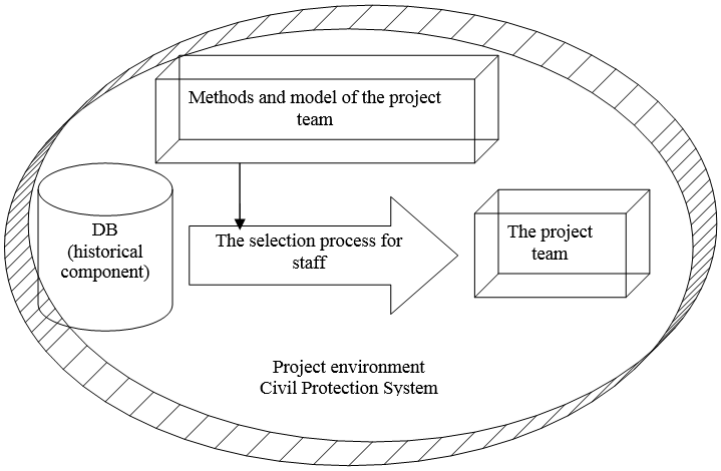


Fig. 2. The generalized model of staff selection in the system of civil protection

The eventual result of the model (Fig. 2) is project team formed. Within the framework of MD the diverse projects are performed (plural $P = \{P1, P2, ... Pn\}$), which form the departmental program of projects in the system of civil protection. Project teams (plural $K=\{K_1, K_2, \ldots K_n\}$). are involved in the execution of this program of projects. In general, all these elements form a virtual office with project management in the system of civil protection (Fig. 3).

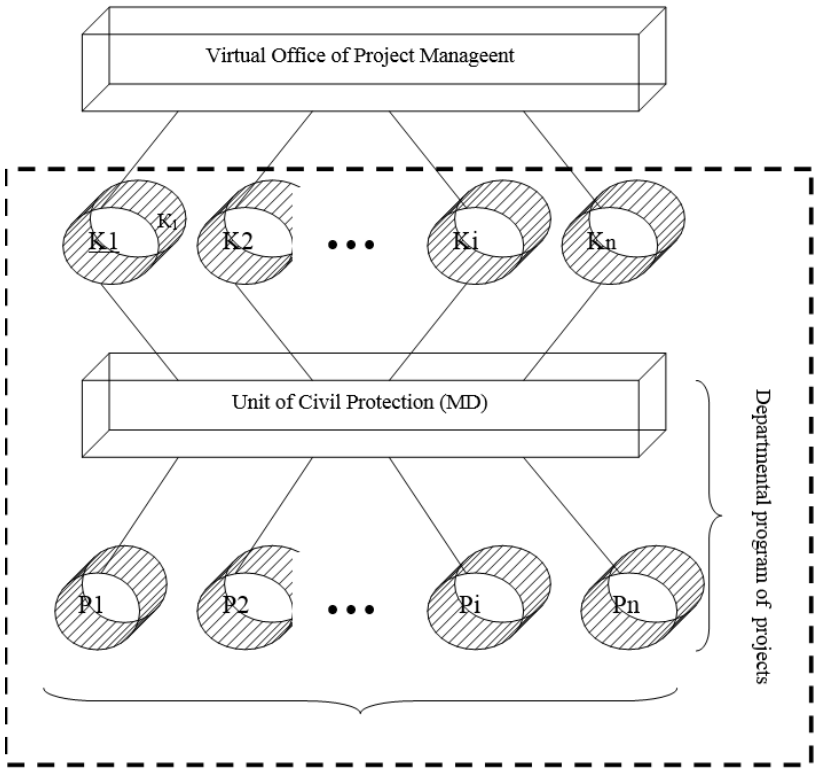


Fig. 3. The model of virtual office in the system of civil protection

Formation of the project team foresees a systematic base of elements that form competence of employees in civil protection. In summary, these are elements of both knowledge (tuple $a_1, \ldots, a_2=A$), skills (tuple $b_1, \ldots, b_2=B$), experience (tuple $c_1, \ldots, c_2=C$), practical skills (experience (tuple $d_1, \ldots, d_2=D$).

Fig. 4 shows the neural network model of personnel selection in teams of projects of Civil Protection System using the model of the "black box". The neural network includes 4 layers, the input layer provides criteria by 4 items of competence of employee of in the system of civil protection. Two layers of the neural network are intermediate and provide non-linear conection between dependent and independent variable. The output of the neural network is a man-

agement decision to include the applicant in the project team (tuple y = {+; ±; -} where "+" - the inclusion of the applicant in the project team, «±» - inclusion of the applicant in the project team in terms of personnel shortages, "- "- the unsuitability of the applicant to work in the project team).

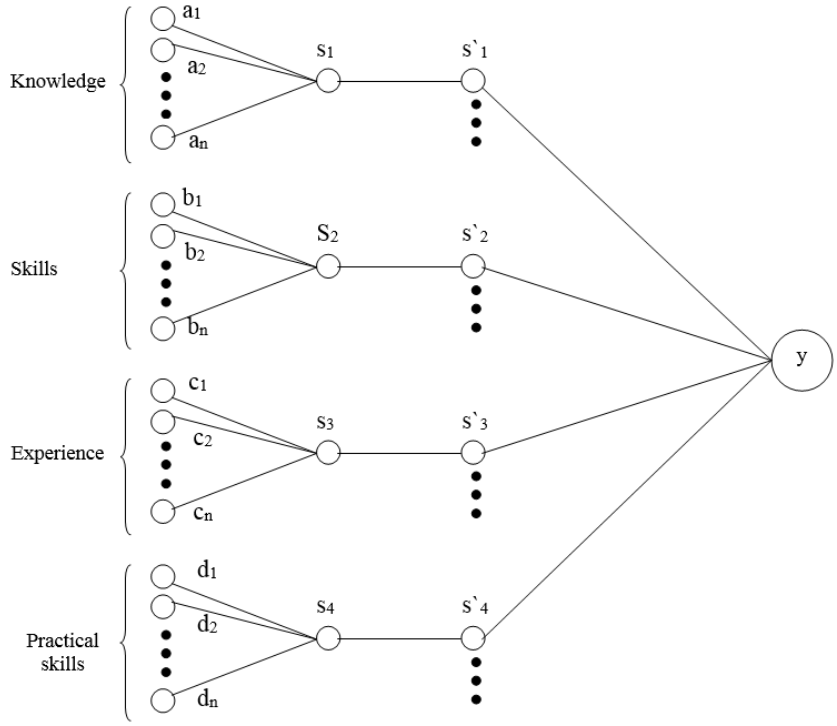


Fig. 4. Model of personnel selection in the project team using the theory of neural networks

**Conclusions.** The scientific and practical task of systematic approaches development to the formation of project teams in the system of civil protection is reviewed in the article. The following results are obtained:

1. Informational and literary analysis of existing methods of formation of project teams is carried out which shown their inability to be applied in terms of civil protection system.
2. Structural elements of concept of civil protection employee competences are proposed, taking into account three components: knowledge, experience and skills.
3. A method of formation of project teams in the system of civil protection for temporary virtual structures using the theory of neural networks is developed.

## Literature

[1] Bushuyev S.D. Project Management. Fundamentals of professional knowledge and competence evaluation system of project managers/ S.D. Bushuyev, N.S. Bushueva ( Competence Baseline National KBC UA version 3.1). K.: IRIDIUM, 2010, 208 s.

[2] Rach V.A Simulation of managing the development of competencies of the users of the category "handle" /V. A Rach, O.M. Medvedeva, O.V Rossoshanska // Project Management and development of production : Mon . Sciences. works. - Lugansk : National University of Eastern Europe. Dal 2008 - . № 1 (25). - P.156–163.

[3] Koshkin K. Development of Visual Enterprises in Shipbuilding // Proceedings of the 5th International Conference on Unconventional Electromechanical and Electrical Systems. - Szczezin : Technical University of Szczecin, Poland , 2001, Vol 2 - P. 483–488.

[4] Gogunsky V. D Human Resource Management in the implementation of production programs [Text] / Gogunsky V.D , Weissman W. A // Bulletin of NTU "KPI": Thematic . Analysis of the problem " system , management and computer science . Technology . " - Kharkiv : NTU " KPI " . - 2005 - . № 54 - . S. 124–129.

[5] Virtual University: Manual / M.M. Kozyar , T.E. Rak , O.B. Zachko . - Lviv State University of Life Safety , 2009 . - 168 pp.