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Concerning the project company division work optimization using the virtual work methods

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Abstract. This article describes the issue concerning the virtual divisions of project construction companies and the directions of their business improvement in present-day conditions. The analysis of the project companies' organizational structures work has shown the efficiency of virtual techniques and methods application. There is provided to integrate this techniques and methods into the business practices of the current project companies. The subject of article is the project department of OOO "GSE-Giprokauchuk" (Moscow, Russia), the company on the design and scientific researches for the synthetic rubber, chemicals and petrochemicals companies, on the basis of which the first part of research has been performed. This company organizes the construction projects integrated performance. OOO "GSE-Giprokauchuk" operations cover a significant part of the territory of our country, including the Extreme North regions. The object of research – the department raw map execution (specific features and performance indices), analysis of work of employees, using the modern information technology, determination of a general percent of the project medium "virtualization". For the first part of research used was a method, assuming the lead experts-projectors written inquiry. This inquiry consisted of two sections of questions. The first section aimed to formation of image of the modern project department projector, and the second one – to determination of work place "virtualization percent", and further development prospects of "virtual media". The research results are the project department characteristics, the regularities of development of the projectors field of activities, and "virtualization degree" of the work process. Thus, the necessity of improvement of the project department employee work process by means of its activities "virtualization" has been revealed, and the proposals on optimization of interaction among the employees of the project company division have been offered.
Key words: construction, project division, researches, inquiry, virtualization, personnel.

1. Introduction

The object of this article is to find the main characteristics of construction organization project department, the regularities of development of the projectors field of activities, and "virtualization degree" of the work process.

The study of specialized literature has allowed determining the similarity of phenomena occurring in the construction field, and appeal to the foreign colleagues' materials has expanded the understanding of modern "virtualization" processes of techniques and methods for the project documentation development [1,2,5,6,7].


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The transfer of certain functions to a single company operations control center is widely used in the business community. The feasibility of this phenomenon involves the maintenance of competitiveness and the need for achievement of the highest efficiency for all company operations.

In the construction industry, the participants of the process are the technical customers, construction and installation contractors, engineering organizations, suppliers, transport organizations, research organizations, project organizations, etc. The role of each participant of the construction process is specified in the normative and other documents.

The interaction of project division areas is shown in Figure 1, where the company manager takes responsibility for work with the investor, customer, contractor, finally not giving into a consumer in person. This diagram allows making a high-efficient team and having clear operating result. The manager of specific project takes responsibility for all processes and phenomena, existing within the team. This manager can select personnel in such a manner, that a common synergistic effect of the team will be higher on account of high level of its subordinates education and experience [3, 4, 5].

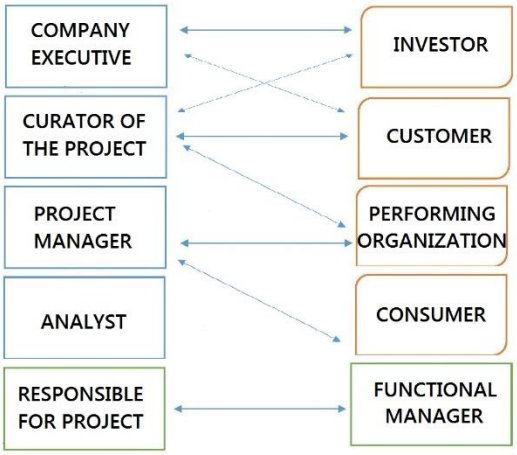


Figure 1. Scheme of interaction of project division participants

Project work allows joining the participants located both in the same room and in remote. Virtual media gives an opportunity for remote execution of certain processes. Virtual form of work organization has been reflected in operations of such companies as Host Universal, “UBS”, Digital, IBM and others, that gives grounds for certain tasks performance in “virtual” media, including the construction industry.

The principle of construction and organization of the virtual structure involves using network approach modifications, where, for a certain project execution, involved are the experts on a temporary basis without their permanent standing at a specific geographic centre; these experts execute the whole work by means of information technology. In case of virtual form of work the project “team” has a certain freedom of action; it monitors the processes and results by itself. The attendance in person is not required on account of electronic information exchange. The modern software allows several virtual employees working simultaneously with the same document. In turn, the virtual work participant is not limited to one facility and may be simultaneously involved in several ones.

Despite the current solutions in the area of computer-aided design systems, the use of virtual form of work is not common enough. This is caused by complexity of the work model building and by the absence of employees’ interactions clear algorithm. To solve this problem the resolution of design process into components and increasing of virtualization level of each of them, as well as of the other work processes, can be proposed. The generalization of actual Russian and foreign experience in

development of a fully virtual company gives the prerequisites ensuring that in case of finding the necessary work mechanisms this model will be developed in the construction industry as well [3,8].

For all clear advantages of virtual structures integration in the company operations, there are a number of issues, for which it is required to explore the possibilities of construction operations relating to these structures implementation in a project organization division [4,10].

2. Methods

To search the possibilities for implementation of "virtual" technology for construction facilities project solutions development, the research was performed in OOO "GSE-Giprokauchuk"; the main purpose of this research is the department raw map execution (specific features and performance indices), analysis of employees work, using the modern information technology, determination of a general percent of the project medium "virtualization".

The principal directions of OOO "GSE-Giprokauchuk" business – the pre-project works execution, including the facilities construction strategy development, feasibility studies performance, declaration of intentions development, base project performance; design, including the project documentation development, detailed documentation development, designer supervision performance; engineering research: geodesic, geological, hydrometeorological, ecological, land planning.

Availability of such a wide range of business allows OOO "GSE-Giprokauchuk" organizing the integrated construction projects performance, from engineering and geological researches and pre-project developments, following project and detailed documentation execution in all project phases, and to construction designer supervision [2].

The general program of research within the research work is given in Table 1, and in Fig. 2.

Table 1. Program of research of information in the project organization

Phase No.	Phase description	Phase content
1.	Company review	Receiving of the main data about GSE-Giprokauchuk. Purpose of the company, basic projects, quantity of branches, departments, etc.
2.	Personnel management structure review	Quantity of employees (in whole in the company, in its branches, etc.). Basic programs used for personnel development. Specific features of personnel management in the company of this type.
3.	Company project department review	Department tasks, principal work directions. Quantity of department employees. Programs and information systems used in work. Current projects, their results.
4.	Review of work experience in virtual space	Basic mechanisms of virtual work, system components. Virtual system model. Mechanism of employees' interaction among themselves during the real work and in virtual media. Specific features of the company employees interaction involved into design process.

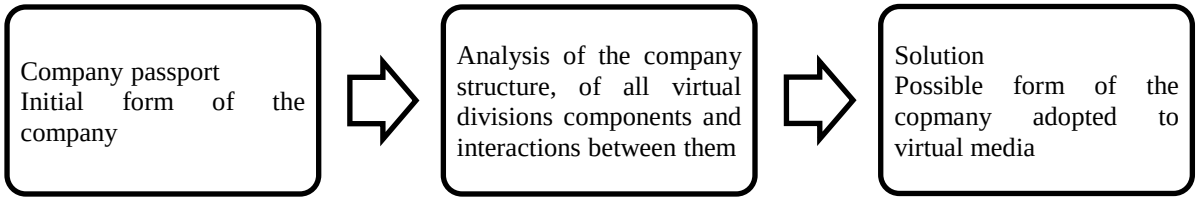


Figure 2. General scheme of research

Staffing issues are the key moments in assessment of the construction company in general, concerning its ability to perform the certain types of work, the investment feasibility, the reliable partner selection, etc. Indeed, these are the company personnel qualification and experience, psychosocial climate in the group, ingenuity of individual employees, from which the quality of works performed, the effectiveness of managerial decisions made, and hence the company business final results depend. Thus, the plan for OOO "GSE-Giprokauchuk" personnel data acquisition was developed (refer to Table 2).

Table 2. Program of personnel data acquisition

Phase No.	Description	Content
1	Review	Company profile Quantity of employees - general - working on the virtual scheme Quantity of virtual tasks to be performed Specific features of virtual work Specific features of personnel chart concerning the virtualization
2	Connections tracing	Who is in contact with whom, how this contact is carried out (personally or by using computer and phone networks) Quantity of contractors and external companies, with which the company contacts virtually
3	Percent of possible virtualization of each position (specialty)	Description of each position and example of its changeover to virtual field General percent of the company virtualization (ratio of total working hours to working hours in virtual space)

The range of the company divisions, works location, nature, type, organization, technologies used have been considered during the analysis of the construction companies' personnel work. The impact on the personnel management system, and the macroeconomic situation in the country and throughout the region, in particular, the average level of wages in the industry, unemployment rate, regulatory and legal framework have been considered as well. The essential component of assessment – the interactions among the employees, personal and working contacts, which directly impacted on the working climate and work in whole.

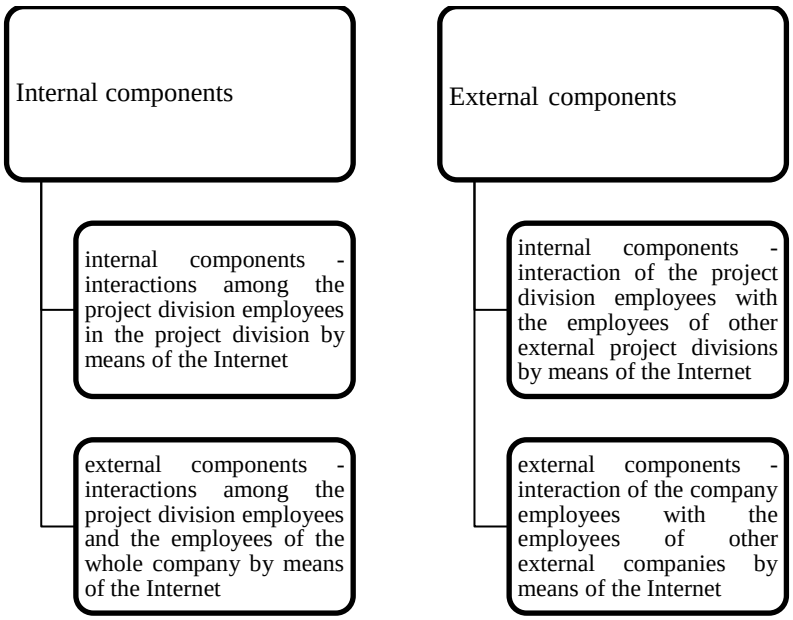


Figure 3. Employees interactions schemes

Personnel management system assumes the formation of purposes, functions, personnel management organizational structure, vertical and horizontal functional interactions of managers and experts during the grounds, development, making and implementation of managerial decisions.

3. Results

At the first phase we carried out the inquiry. The purpose of this inquiry was the determination of work places virtualization degree in OOO "GSE-Giprokauchuk" project departments. This department was selected according to scientific paper subject.

The first part of the questionnaire included the issues, concerning the personal data (full name, full age), education, academic degree availability, additional education, length of work.

The second part concerned the work place, the estimation scale – from 1 to 10 points:

1. Availability of the personal work place;
2. Assessment of the work place equipment;
3. Availability of free Internet connection;
4. Amount of time during a working day spent in the Internet;
5. List of programs used in work, and ones connected with the Internet;
6. Assessment of its position virtualization;
7. Availability of the local network;
8. Quantity of persons, with whom an employee deals during a working day;
9. Percent of the contacts total amount, carried out by means of the Internet;
10. Partners geographic location;
11. Work means with remote partners to be added to the employee work.

36 employees took part in the inquiry in total.

4. Discussion

The inquiry first part results are given in Table 3; according to the data acquired, a list of the project department employee characteristics may be executed as follows:

- higher education availability;
- wish for further training;
- age from 25 to 50 years equally (25-30 & 30-50);

- length of work to 10 years;
- academic degree (if any).

Table 3. Inquiry first part analysis results

Parameter	Result
Sex	W-37.5% M-62.5%
Position	Superior – 18.75%
Age	To 30 years – 43.75% 30-50 years – 43.75% Over 50 years – 12.5%
Education	Higher education – 93.75% Incomplete higher education – 6.25%
Academic degree	Available – 12.5%
Length of work, in total	To 3 years – 6.25% 3-5 years – 31.25% 6-10 years – 50% More than 10 years – 12.5%
Additional education	Available – 31.25%
Advanced training courses	No – 12.5% 1 time per half a year – 12.5% 1 time per year – 43.75% 1 time per several years – 31.25%

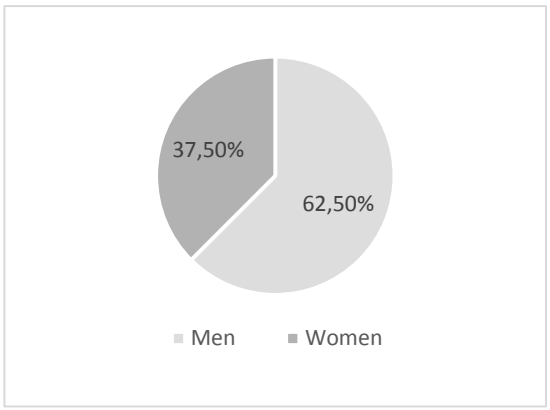


Figure 4. Men & women ratio

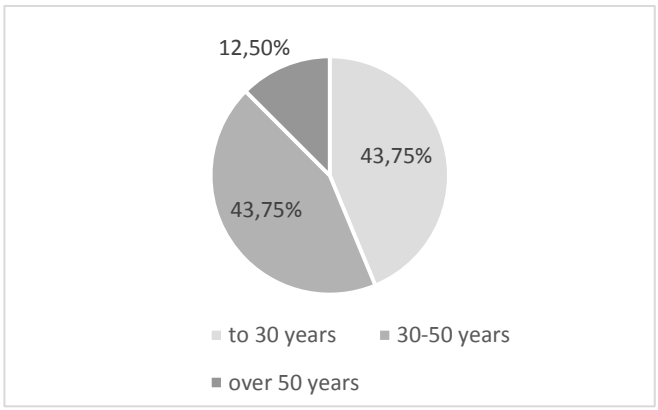


Figure 5. Employees age

The second part analysis has produced the following results:

All employees are satisfied by their work places equipment. The local network functions in the department. Every employee has its own personal computer with the required software;

All participants of research note that the time period in the Internet per day занимает less than 3 hours, in 80% - less than 1 hour;

Virtualization degree does not exceed 3,5 points of 10 in total.

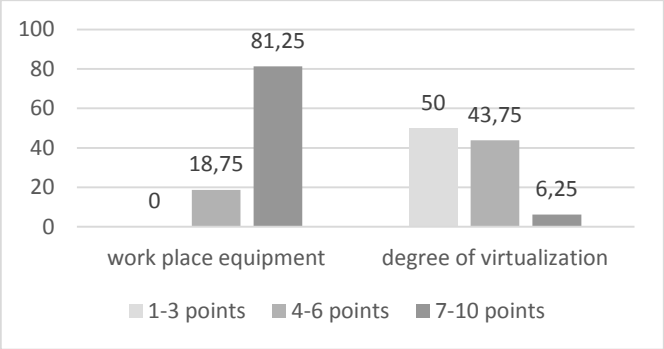


Figure 6. Work place and degree of virtualization

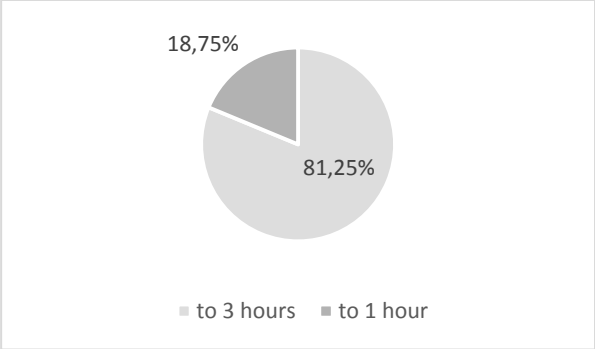


Figure 7. Time period in the Internet per day

The inquiry participants within their work interact with the colleagues, being in the different cities of Russia (Ryazan, Kazan, Sevastopol, Voronezh, Nizhnekamsk, Ufa, St. Petersburg), and in Tatarstan and Bashkortostan.

The programs used during the work: MS Office, AD Photo Editor, VMware, PDF-Viewer, KeePass2, Instead, Configuration Manager, Visual Studio, 1C, SCMS, proprietary programs, AVEVA complex, Autodesk, Revit, Tekla, Auto CAD, SCAD, Lira, Norma CS, Robot Structural, etc. MS Office, OpenPVN, MSLync, VMware, e-mail, proprietary programs, AutoDesk Vault Bosic, MS Lync, VM ware, Tekla, Revit, Norma CS are related to the Internet.

Upon the inquiry completion, the participants were invited to make its own recommendations on the means of work with remote partners, which are to be added to the employees work. The following points have been identified: video transmission for the regional divisions; possibility of the program monitoring by the remote divisions from the desktop, visual writing board, Skype, Dropbox, foogla Drive, Yandex Disk, Trello, Slack.

5. Conclusions

According to research performed of OOO “GSE-Giprokauchuk”, the following conclusions may be drawn:

1. Project department group is interested in the department development and is ready for its competence improvement;
2. In most cases the total length of work is equal to the length of work in this department, which indicates the group interest and vision of prospects;
3. The majority of employees are satisfied by the desktop equipment;
4. Each employee uses the Internet every day, from 1 to 3 hours;
5. 30-50% of the total contacts amount per day are carried out with the Internet support;
6. 80% employees apply the work programs associated with the Internet use;
7. There is a sufficient degree of virtualization and of work by means of the Internet;

8. Virtual structure use has an advantage in case of work with remote users on a regular or temporary basis, reducing the timeframes for decisions-making and tasks performance.
9. To maintain the virtual basis of the work place it is necessary to add the conditions for work using the Internet into the work process.

Thus, according to the data acquired, it can be concluded that OOO "GSE-Giprokauchuk" project department is the structure with the traditional form of management and with virtual structures integration into work. At the present time the total department virtualization does not exceed 30%. Therewith, the increasing of the business general virtualization may lead to the higher results of business and to extension of list of partners.

References

[1] Ginzburg A. 2013. Queuing Systems in Management Construction / Applied Mechanics and Materials Vols. 405-408 (2013), pp. 3352-3355.
[2] Ginzburg A., Khripushin A. 2013. Risk Management in oil refinery construction projects / Applied Mechanics and Materials Vols. 411-414 (2013) pp. 2313-2316.
[3] Sinenko S, Slavina A. 2017. Performance indices of project companies virtual divisions in the construction in CAD conditions MATEC Web of Conference 106 08019
[4] Saabeel, W. 2004. Model of Virtual Organization Structure & Process. Electronic Journal of Organizational Virtualness. Vol.4. No 1.
[5] Bolshakov S., Volkov A. 2013. Concerning the design and creation of virtual organization structures in the construction Vestnik MGSU 11 pp. 218-225.
[6] Katayev A. 2002. Analysis of specific features for virtual companies' organization and management Izvestia TRTU 24 1 pp. 182-185.
[7] Serdyuk V. 2012. From virtual reality to virtual management: fiction or reality? Management in Russia and abroad 2 pp. 25-37.
[8] Slavina A. 2017. Main indices of effectiveness in construction in terms of project divisions, construction-formation of the living environment pp. 393-395.
[9] Tkatcheva E. 2006. Virtual organizations as a new form of economic systems Functional contents and principles of management 08.00.05.
[10] Warner M, Vytzel M. 2005. Virtual organizations, new forms of doing business in the XXI century.