Approach to Organizational Structure Modelling in Construction Companies

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Abstract. Effective management system is one of the key factors of business success nowadays. Construction companies usually have a portfolio of independent projects running at the same time. Thus it is reasonable to take into account project orientation of such kind of business while designing the construction companies' management system, which main components are business process system and organizational structure. The paper describes the management structure designing approach, based on the project-oriented nature of the construction projects, and propose a model of the organizational structure for the construction company. Application of the proposed approach will enable to assign responsibilities within the organizational structure in construction projects effectively and thus to shorten the time for projects allocation and to provide its smoother running. The practical case of using the approach also provided in the paper.

1 Introduction

The change in approach to running a business in today's information society results in the fact that the advantage is possessed by those participant of the market who are better adapted to the changing environment and provide innovative solutions to meet the market challenges. Many companies show a growing interest in project management as a method by which they can work with unique challenges both for implementation internal organizational changes and for running core activities.

Many companies are project-oriented by the nature of their business, and their activity can be considered as a portfolio of projects in various stages of execution. Project-oriented companies can be found in such industries as engineering, construction, IT-sector, machinery manufacturing, consulting, banking, and many others. Such companies need to implement a unified corporate standard for project management in order to provide the quality of each project and effective management of a portfolio of projects as a whole. [1] Implementation of a unified project management standard in such companies is a prerequisite for competitiveness, and project management principles are to form a foundation of the organizational management system of the company.

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A construction company is a classic example of a project-oriented company. During last two decades, Russia has experienced a significant growth of industrial and civil construction, as well as the need for the reconstruction and modernization of outdated facilities. Many construction companies are aware of the need to revise their internal management system in order to bring into compliance strategic business objectives, business processes and organizational structure to form a balanced enterprise architecture, which in turn can enable a high level of business performance. As a result, many companies of the industry have started to pay serious attention to the need of organizational structure reforming, which means management architecture restructuring in the mean times.

As the personnel is one of the key resources of any business, the way a company organizes and uses its human capital defines its performance indicators. In order to perform construction projects effectively, construction companies need to form an appropriate organizational structure that from the one hand would allow to run core activities (engineering design, constructing, servicing) and from the other hand will be flexible enough in order to form effective temporary project teams. The paper examine the project-oriented nature of construction business and declares that it is reasonable to form organizational structure of construction companies basing on the typical project management team structure. The approach of adopting the existing organizational structure of the construction company to those of the project management team is presented in the paper. Such a project-oriented structure will effectively support both business process system of a company and its project portfolio execution. An effective organizational structure, ready to meet challenges of the market, can form one of the main prerequisites of sustainable development of the company.

2 Method

Nowadays construction business in big cities of Russia is actively developing in spite of the several global financial crisis of the last decade. The competition on this market is rather high and the competitive advantage is possessed mainly by big companies that have a convincing story of survival during difficult financial periods of 21st century. [2] The main reasons which force construction companies to revise their enterprise architecture, and specifically to pay attention to organizational structure, are the following: [3]

1. Absence of the precise strategy of management architecture development
2. Absence of an integrated architecture adaptability to market conditions
3. Discrepancy between the organizational structure and increased business demands
4. Discrepancy between the organizational structure of companies and organizational structures of projects/
5. Absence of a common corporate standards of project management
6. Absence of precisely prescribed roles and responsibilities in the current organizational structure
7. Absence of detailed and transparent business processes

To face business challenges effectively, companies try to build their enterprise-wide management system in such a manner that would allow a company to be in the mean time stable from the inside and flexible in reactions to the external challenges. Development of such a management system requires an integrated approach in order to create a solid foundation for the whole management system. The concept of the enterprise architecture as a complex management tool has become a sort of mainstream management concept in recent decades. One of the definitions states that “enterprise architecture is a coherent whole of principles, methods, and models that are used in the design and realization of an enterprise’s organizational structure, business processes, information systems, and infrastructure” [4]. Traditionally, the enterprise architecture can be represented as a set of

components which are grouped into layers. Different authors state for different names, numbers and composition of layers [4-8], but from the point of view of the whole set of the components and their interdependencies the main idea in all the sources is more or less the same (the comprehensive review can be found in [9]). For example, [5] focuses on the following three layers:

- Corporate mission and vision, strategic goals and objectives;
- Business architecture: business processes, organizational structure, workflow system;
- System Architecture (IT architecture): applications, data, hardware.

Some researches confess that the business architecture is the primary element that shapes the effectiveness of the company [4, 10-13].

Enterprise architecture is a system view of the key structural sections (certain key components and their relationships), applied for various practical problem solving of the organization [14]. The feature of the enterprise architecture is its heterogeneous composition – business processes, functions, organizational structure, document flow, information technology, etc. While forming the enterprise architecture it's necessary to solve the following tasks in coherent and interconnected manner [1]:

1. Mission and strategy of the company, strategic goals and objectives;
2. Business architecture «as is» and «to be», including business process system and organizational structure as key elements;
3. IT-architecture «as is» and «to be», including information system, data bases, technical tools and solutions;
4. Structure of project portfolio for enterprise architecture migration from its current state («as is») to the planned state («to be»), including business processes reengineering projects, organizational structure reengineering projects, IT-systems implementation or reengineering projects, technological equipment projects.

A large number of companies in various fields of activity (including construction business) must address the unique business tasks that can not be resolved by the operation of standard business processes – the project approach is required to solve such business challenges. [15] It means that such kind of companies in order to be effective have to introduce project approach as a part of their enterprise architecture. Project orientation influences the business process system of the company, its organizational structure, document flow. Thus the objective of modeling the enterprise business architecture based on project activities becomes very relevant for such companies.

The basis of the business of the construction company is the portfolio of contracts for execution of construction projects. Construction companies decide separate business tasks by means of temporary organizations – projects and programs. Project approach for business management has its features:

- The project is considered as a unique combination of project delivery processes;
- Rights and responsibilities for project results delivery belong to project manager and project management team;
- Certain budget of the project;
- Implementation of specific project organizational structure and motivation of project management team members;
- Development and implementation of specific standards of project processes performing [14].

The mission of the company as the main objective of its development defines the strategy, including the strategy of architecture development management. [16] The first step in the formation of the enterprise architecture is analysis and reengineering (if needed) of business processes with the subsequent formation of the organizational structure. The organizational structure of the construction company, on the one hand, should match the system of its business processes, providing its effectiveness, and the other hand – it should

match the corporate standard of project management. For effective implementation of project management activity, it seems reasonable to introduce a single enterprise-wide project management standard. Its presence is intended to ensure a common understanding of objectives and procedures of project management by all participants of the project, to provide all project participants with a common methodology and uniform terminology, to make more effective communication within and outside the project team. [17] As a basis for the corporate project management standard in a company one of the standard methodologies, well-known and highly referenced by practitioners, can be adapted.

Currently, there are a number of world-wide accepted project management methodologies, developed by leading professional associations and organizations. These methodologies are the result of analysis, synthesis and formalization of best practices in project management. The most famous in the world of professional community are the approaches developed by organizations such as the AXELOS (successor of Cabinet Office, UK), PMI (USA), IPMA (Switzerland), Microsoft (USA), etc. The methodology of each organization is documented in the form of a guidelines – Managing Successful Projects Using PRINCE2 (AXELOS), PMBoK (PMI), ICB (IPMA), MSF (Microsoft) – and is associated with a certain certification system. [18]

The authors propose the following approach of developing the project-oriented organizational structure of construction companies (and related sectors):

1. Examine process model of the company;
2. Make correlation between business process system of the company and typical project stages and project management processes;
3. Develop or adopt a corporate project management standard;
4. Examine organization structure of the company;
5. Make correlation between organization structure of the company and project team structure from the chosen standard;
6. Reengineer existing organization structure (in terms of organizational units, roles and responsibilities) according to the requirements of project team structure.

The step-wise algorithm of organizational structure development, described above, can be considered as a main contribution of the paper.

3 Results

The top management of a construction company (hereinafter referred as a Case Company) initiated a project of organizational structure reengineering. Roles and responsibilities in the existing organizational structure were designed to provide the quality of particular functions within the construction project, but did not take into account the overall project success. Thu, it was a lack of attention to project portfolio management level, where company's business interests are defined and controlled. The top management of the Case Company has identified the goal of the reorganizational project: to revise the existing business processes and organizational structure in order to optimize the latter for the sake of sustainable business development. This objective implies a re-engineering of business processes and reforming the organizational structure, which on one hand would provide compliance with the principles of the organizational structure of project management, on the other hand – would create conditions for the further optimization of business architecture based on several criteria: the exclusion of redundant business processes and their segmentation within the various organizational units, minimizing organizational interfaces, improved internal and external communications, increasing flexibility on the market.

To realize this goal the following consequence of objectives was set, according to the organizational structure development approach, described in Chapter 2 “Method” of the paper:

1. To adopt the corporate project management standard;
2. To model and analyze the business architecture (including business processes and organizational structure) «as is»;
3. To analyze roles and responsibilities in the existing organizational structure in order to make correspondence between project team structure of the adopted standard and the existing practice of roles and responsibilities distribution in projects;
4. To model the business architecture (including business processes and organizational structure) «to be»;
5. To implement the updated system of business processes and organizational structure.

The application of the algorithm, presented above, should result in optimized organizational structure from the project management effectiveness point of view.

The Case Company has adopted PRINCE2 as a corporate project management standard as the most procedural one, that includes the precise process-oriented instructions on how to manage projects step by step [19]. PRINCE2 (Projects in a Controlled Environment) is a structured method of project management based on thousands of best practices of successfully realized projects. This method has the following advantages:

1. Includes the best practices that has proved its effectiveness;
2. Can be implemented for any kind of the project;
3. Is widely known and provide the common language for all the members of the project;
4. Is oriented on strategic goals achieving;
5. Sets certain roles and responsibilities for project management;
6. Is oriented on delivery of project results.

Basic principles of project management according to PRINCE2 are [19]:

- Continuous business justification;
- Learning from experience;
- Defined roles and responsibilities;
- Management by stages;
- Management by exceptions;
- Focus on products;
- Tailoring to the environment.

For the purpose of architecture forming of engineering company based on the revision of management processes and organizational structure, the principle of defined roles and responsibilities is particularly important. PRINCE2 allows to create a system of hierarchy and interaction of the participants of the project which form a well-functioning structure that takes into account the interests of the three interested parties in the project – business, future users and suppliers. Such a structure provides certain subordination levels of project management, each of which controls the interests of different levels, ultimately subordinate to the strategic goals of the business. Responsibility delegation to the higher level is performed according to the «management by exception» principle. This provides the lower levels with more management freedom and the higher ones are not involved into routine processes of lower level processes.

PRINCE2 prescribes to have three levels of project management authority within a project management team – Directing, Management, Delivering (Fig.1). The first one is responsible for overall success of the project, the second one provides day-to-day project management and coordination of activities, while the third one manages directly project products delivery. In addition to the distinction between levels of project management, the organization of the project team according to PRINCE2 implies specific roles and responsibilities, which allow to avoid function duplication, to provide a clear procedure of

project control at all stages, as well as ongoing expert and administrative support to the project management team.

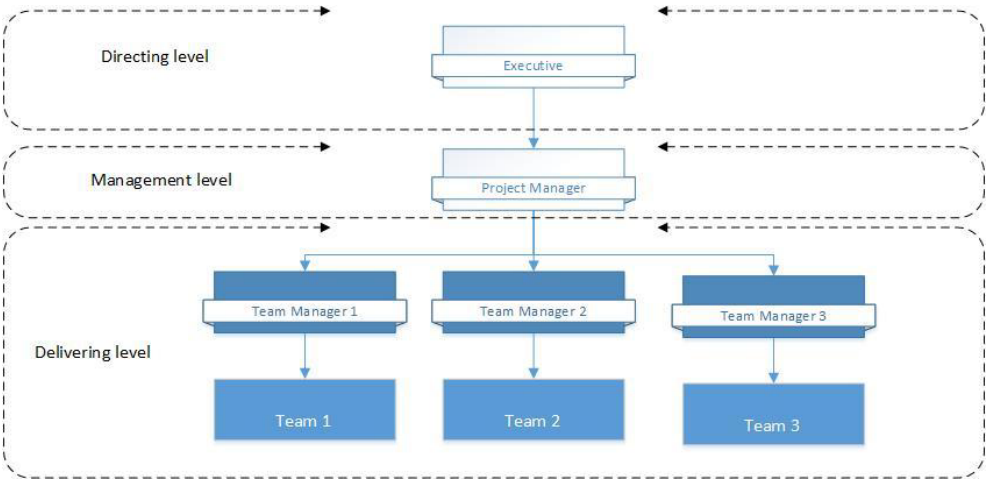

Fig. 1. PRINCE2 project management team structure.

After staff interviewing and document analysis, the diagram of added value chain, containing the business-processes of the upper level and the correspondence organizational structure were developed. Analysis of the detailed process breakdown structure allowed to classify processes for core and supporting business processes, to identify «bottlenecks» in terms of duplication and inconsistency of prescribed responsibilities for different roles. The analysis of the upper-level processes showed the correspondence between sequence of core processes and stages of the typical construction project: pre-project and initiating stages (incoming order processing), project delivering stages (engineering design, construction and installation), post-project activities.

Analysis of the departments and key positions of the existing organizational structure revealed the following distribution of functions and responsibilities while managing contracting projects:

1. Sales Director, the head of Contract Department – responsible for overall success of each construction contract, concluded by the Case Company;
2. Head of Designing Department and Chief Project Engineers (hereinafter referred as CPE) from Designing Department – responsible for managing everyday activities of particular projects from the contract conclusion till the end of construction works and project transfer to the customer; CPE can participate in managing designing stage of the project;
3. Employees of Contract Department, Designing Department and Construction Department – perform the appropriate part of project work.

Analyzing the existing organizational structure and current roles and responsibilities, it was identified the inconsistency of responsibilities distribution between the management levels and the discrepancy between the management organizational structure and project organizational structure. As a result, on the one hand there is a lack of proper control of the division from the strategic business objectives point of view, on the other hand – duplication of functions and control at lower levels. Thus, managers, responsible for the overall management and coordination of the work of the design («Directing» level) in reality is involved not only in the management of individual projects («Managing» level), but also in the control of the projects' execution («Delivery» level). At the same time, the CPE («Managing» level) factually does not have sufficient authority to carry out project

management and is substantially involved in the control of direct execution of projects («Delivery» level).

The analysis of the «as is» organizational structure revealed the "bottlenecks" of the existing project management approach. The following changes to the organizational structure and system of roles and responsibilities were proposed:

1. To provide a clear demarcation between the «Directing» and «Managing» levels of project, prescribing the responsibility for the business interests control to the Sales Director and giving more management authority for individual projects to the CPEs;
2. To increase the number of managers of the «Managing» level (CPE) to enable the execution of greater number of projects;
3. To form project delivering teams from the employees of the appropriate departments.

Taking into account all the proposed changes for organizational structure after revising the existing roles and responsibilities, a new «to be» model was performed (Fig.2).

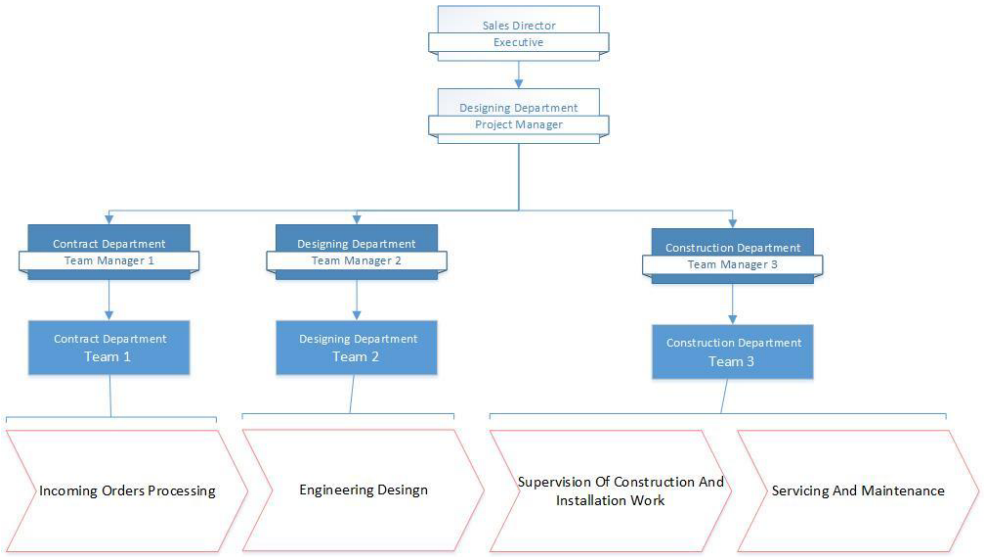

Fig. 2. Project tem roles and responsibilities.

The proposed model of the «to be» organizational structure has a number of advantages:

- It enables the use of common and proven approach to project management (such as PRINCE2 for the Case Company);
- It provides a basis for distinguishing between the roles and responsibilities in the project management team and the organizational structure of the whole unit;
- It forms the organizational basis for further growth of the company in accordance with the strategic goals of the company.

4 Conclusion

The company as a system requires a systematic approach while implementing any organizational changes. The approach for the organizational structure development of the construction company, proposed in this paper, means using of project management methods for the sake of improvement of the team performance. Development of organizational structure according to the developed approach allows filling of different management levels of project management with real responsibilities, to provide correspondence between

system of management business processes and organizational structure of the engineering company from one hand and its strategic goals and growing business interests from the other hand. The approach can be adopted as for full-cycle construction projects (those which include construction from Greenfield to operations) and for projects for only certain parts of engineering or constructing services.

The quantitive estimation of the effectiveness of organization structure modelling approach is beyond the scope of this paper as it requires a specific research and a wide experimental database. It could be the subject of further development of the topic arisen in the paper.

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