

# The Functional Model Approach to the Consulting for Vertically - Integrated Construction Group

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**Abstract.** Managerial decision making in the framework of functional modeling of the consulting process have a direct effect on other business - processes of vertically - integrated group of construction companies. As a result, the experience of consulting companies tends to be used for the making managerial solutions. Consultancy is known as one of the most complicated types of business process. It requires a huge and deep examines and researches of targeting area, therefore need to be provided with special methodology, included internal standards of the consulting companies. Correct methodological support, planning process and implementation of managerial solutions should be based on the survey of the direct and inverse connections and interdependence of all group's business – processes. Functional - process modeling of the vertically - integrated construction group could be considered as an instrument of examination and analysis of the issue how the managerial solution impact on the business-process for the construction group functioning. The main result of the research is the formalized process-oriented model – prototype of the business - processes of vertically - integrated group of construction companies.

## 1 Introduction

For modelling business processes of company, including vertically – integrated group it is essential to distinguish managerial, basic and supporting processes. Lists of business processes and functions of vertically integrated institution could be used as an "entry" for the further functional modelling.

The business processes reflect in details all the procedures that have to be done in frames of basic, supporting and managerial systems of an enterprise [1-5].

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## 2 Methodology

The totality of the vertically integrated companies' business processes could have diverse combination. These combinations depend on the level of companies' concentration and diversification. Sometimes some of the operation processes could be excluded from the common integrated manufacturing system [6]. However, to provide compound approach to the management of vertical integration companies, which is aimed to the legal merger of all kind of the construction business processes, we suggest that all complex of business processes could be represented in the form of the process-oriented prototype model in the Figure 1.

1 Management of vertically integrated construction company	1.1 Strategic management	1.2 General horizontal coordination and unification	1.3 Cascading the strategy for a horizontal level	1.4 Process oriented management support	1.5 Financial accounting and taxation managing		
2. Customer interaction	2.1 Sourcing of investment projects and tenders	2.2 Contract formation	2.3 Monitoring of relationship with the investors and project managers throughout the execution of project	2.4 Interaction with customers at the stages of completion and post-project support			
3 Constructional designing and marketing	3.1 Investment projects and tenders market monitoring	3.2 Constructional designing	3.3 Coordination of project execution terms	3.4 Brand management	3.5 Product promotion		
4. Material and technical management	4.1 Procurement management	4.2 Inventory management and resource allocation		4.3 Technical support management			
5. Manufacturing	5.1 Construction planning	5.2 Material manufacturing	5.3 Construction works	5.4 Related and subcontracting works	5.5 Transport support	5.6 Horizontal cost control	5.7 Horizontal quality control
6. Facility commissioning and product sales	6.1 Planning and organizing the commissioning of project results	6.2 Certification and standardization of project result		6.3 Other sales management	6.4 Storage logistics of finished products		
7. Supporting business processes	7.1 Safety and human resources management	7.2 Research and development and testing subprocesses	7.3 Software and information support	7.4 Financial management	7.5 Assets management		

**Fig. 1.** Reference prototype model of the business - processes that executed by the group of vertically – integrated construction companies.

The first level business processes of the vertically integrated group include those kinds of activities that provide the group's basic aim – the execution of a capital investment project. We presume that seven basic business processes could be interpreted as the first level processes of the model. Respectively, they include:

Enterprise management process - it provides setting of companies' goals as well as organizing of companies' interaction;

Customer interaction process - it is aimed at establishing of relationships with the customers, ensures the promotion and sale of the product of integrated group;

Constructional designing and marketing are targeting at development of competitive product of integrated companies that could meet the demands of the market;

Material and supply management is aimed at material, technical and resource support for the basic operating function;

Manufacturing process organizes the interaction of investment resources for the implementation of project which have to be legally and contractually relevant;

Facility commissioning process provides sales of group's product;

Supporting business processes include the processes that are diverse in a content but similar in functional meaning, they provide the provision and assistance for basic operating processes of integrated group.

The details of main business processes are reflected in the model as well. These details have an influence on the way how to specify the separation of tasks between the working group staff of consulting company and could be considered as a basis for contract relationship between the customers and consulting companies including the identification of consulting company's contract stages [7-12].

In accordance of the model the certain items of works could be represented as follows. The features of diversified company strategic management are reflected in the structure of the sub-processes that are belonged to the management business process of vertically integrated construction company. In frames of the process we could identify some sub-processes: the sub-process of strategic management (it generates key long-term strategic targets for results of the group's functioning); the sub-process of general horizontal coordination and unification (it generates certain methodological approaches that focus on the standards and uniformity of the group's elements, group's results and group's technology); the sub-process of cascading the strategy for a horizontal level (it includes certain controlling mechanism for each horizontal level); sub-process of process oriented management support (it aimed at collecting the data for business analysis); sub-processes of financial accounting and taxation managing (provides the collecting accounting data, bookkeeping and preparation of the financial, statistical and tax returns).

Customer interaction process includes some sub-processes. Firstly, it is the sub-process of the sourcing of investment projects and tenders for their implementation. It is targeted on meeting the construction market demands. Secondly, contract formation, thirdly, monitoring for correct relationship with the investor or project manager throughout the implementation of certain types of work. It includes the determination of contract conditions, contract planning process, the conclusion of a contract and control of contract fulfillment. In addition, the last sub-process involves an interaction with customers and the investors at the stages of completion and the maintenance of the finished project (post-project support).

Constructional designing and marketing involve conducting of market monitoring, where company – client operates. The next sub-processes are the execution of constructional design stages and the coordination of project execution terms, the brand management and, finally, the marketing promotion of the group product (sub-marketing policies and corporate product advertising).

Process of material and technical management consists of some sub-processes, namely, procurement planning, inventory management and resource allocation and technical support management (including energy, processing equipment, water supply, availability of appropriate facilities and machines tools and etc.).

Manufacturing process can be divided into seven parts. It essential to distinguish such kinds of activities as setting up of production (construction planning), the actual manufacturing process (including materials manufacturing, construction works, related and subcontracting works, transport service and support), the horizontal cost control of group’s product, the quality and certificate requirements control of group’s product.

Sales process involves stages (sub-processes) of planning and organizing the commissioning process of construction project result, certification support of construction object, related products sales management and product storage logistics.

Supporting business process involves safety (including ecological, energy security, fire protection) and human resources management sub-process, research and development and testing sub-processes (including laboratory tests of construction materials), software and information support of construction group, financial management and assets management.

The indicated sub-processes provide auxiliary but essential kinds of activities for the execution of the basic processes, the sub-processes and the procedures (Fig. 2).

			Functional tasks		
			Manufacturing	Management	Supporting
Business processes	Vertically integrated group management	K1			
			R11	R12	R13
	Customers support	K2			
			R21	R22	R23
	Designing and marketing	K3			
			R31	R32	R33
	Material management	K4			
			R41	R42	R43
	Manufacturing	K5			
			R51	R52	R53
	Sales	K6			
			R61	R62	R63
	Supporting business sub-processes	K7			
			R71	R72	R73

**Fig.2.** The consolidated function - process model of consulting services for a group of vertically integrated construction companies.

In a balance, reference prototype model of the business - processes that executed by the group of vertically – integrated construction companies could be used for the detailed description of key stages consulting services. The model could be interpreted as one of the

"entrances" for functional - process model for vertically integrated companies. The second "entrance" for the model is the list of certain functional tasks that have to be done by consulting company.

The authors of researches devoted to the functional - process modeling claim that such functional tasks should be divided for some categories. For instance, other author admits that it is advisable to distinguish at high level followed basic functions of any enterprises:

Basic function tasks that is directly connected with conversion of external resources to the final company's product or service;

Managerial function that are devoted to company management;

Auxiliary function which provides supporting for manufacturing, commercial and managerial activities and creates certain conditions for them [13-16].

The target of creating function-process model is to determine the extent of details, the list and the content of selected functional tasks. The combination of consolidated function-process model and the reference prototype model of the business – processes could be used as a basis for general function – process modeling of a company. This model, in its turn, we believe, would be the basis for the working-out a consulting procedures' program.

For elaboration the most general function - process model of consulting services for vertically-integrated construction group it is essential to take into consideration the particular features that are indicated in the proposed referent prototype model of the business – processes for integrated companies (Figure 1) as well as consider those three basis function that are proposed by economists and were mentioned above. We think that such function-process model of consulting services could be represented by a certain visual form (Figure 2).

This is the matrix, the rows of which describe business processes, the columns include functions. In general the number of rows and columns depend on the required extent of details. The details are determined by the requirements of management level [17].

At this version of the model we set limits for the number of rows and columns by business processes of first level and by basic functions of enterprise. At the crossing of rows and columns (processes and functions) the structural element of the system should be offered. It describes the execution of the certain function for the certain business process.

Speaking about modeling particular tasks it is important to evaluate those elements. Such assessment reflects the significance and depth of function execution for the certain business process. As the result we obtain the function-process model of a construction group. The methodological approach to the solution of managerial tasks through the function - process modeling includes the following sequence (stages). The solution concerning individual functional tasks distribution within business – processes could be made after the analyses of crossing the areas of responsibilities by the process and functional description. In mentioned above reference prototype model we additionally introduced weighting coefficients  $K$  and  $R$ . These coefficients indicate the significance of the certain business process ( $K$ ) and certain function ( $R$ ) [18-20].

This modeling approach could provide advantages for consulting experts. Particularly it is useful for rationalizing the distribution of resources across groups' products and functional tasks. To evaluate the resource consumption for certain function (including consumption for all business processes) we need to sum up the value of resource along the matrix rows. To evaluate the resources requirement for certain business process for all its function we need to sum up the value of resource along the matrix columns.

### 3 Conclusions

The function-process model that we described above could be applied for the distribution of a predetermined amount of resources between system elements. However, it could be useful

for the opposite aims. For instance, for evaluation of resources requirements for the system functioning in the conditions when the resource requirements for certain business process are known in advance (the value of matrix cells are known). Also it is possible to meet the situation when only requirements of some elements are known in advance and the aim is to evaluate the resource consumption for other elements and for the system in general, sometimes in a condition when restrictions for each of the required parameters exist. We suggest that for the management of innovative research in a group of vertically integrated construction companies at the stage of planning of managerial solutions concerning innovative research (according with the model of management of innovative research), it could be useful to apply the proposed method of the resources distribution, including finance resources, between the certain research stages and works.

To sum up, at the offered modeling approach we tried to reflect the basic innovative ways of consultancy development. We believe that our results could be considered as a contribution to the development of new, more complex and informative types consultancy services.

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