

Research on the Project Portfolio Technology Based on Functional Objective*

Jingchun Feng¹, Xin Zhang¹, Zhanjun Liu², Haiyang Li²

¹Business School of Hohai University, Nanjing, China;

²Administration Bureau of South to North Water Diversion Middle Route Project, Beijing, China.

Email: feng.jingchun@163.com

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ABSTRACT

The portfolio technology is used to solve project portfolio problems from strategic-level and tactical-level, namely, project portfolios based on goals and similarities, respectively. On the basis of analyzing and proposing the type of portfolio of project, we analyzed the relation between the project functional goals and the project, introduced the project portfolio technology of functional goals. On this basis, we studied the principle and process of the project portfolio technology which is based on project functional goals and the formation of program were studied accordingly.

Keywords: Multi-Project, Portfolio of Projects, Functional Objective of Project, Project Portfolio Technology

1. Introduction

The management problem at the two levels of strategy and tactics need to be solved as for multi-project management of large complex projects. According to the functions of project management, two kinds of portfolios need to be implemented: one is to combine the projects with the same goal and form the program [1]; the other is to combine the project with the similar goal and then form the project portfolio. This leads to two kinds of portfolios: one is at the strategic level, namely, project portfolio based on project goals, which includes strategic goals, functional goals and control goals and aims at achieving the project goals; the other is based on the tactical level, namely, project portfolio which is based on similarity and aims at to improve the management efficiency and benefit the management. Because the starting point and requirements of project portfolio based on strategic and tactical level are different, therefore, project portfolio technology at the two levels of strategic and tactical need to be investigated in order to combine

the project at the strategic and tactical level [2]. By analyzing the type of project portfolio and functional goals of project, the paper will do an emphatic study on project portfolio technology based on functional goals.

2. Functional Goal and Projects

2.1. Type of Project Portfolio

Project is an important means to achieve strategic goals. Each project and each component of the project has certain capabilities, however, in order to achieve the functions, quality, schedule, cost and other goals need to be controlled. Project includes three goals, namely, the strategic goals, functional goals and control goals. Therefore, there are three kinds of project portfolio: project portfolio based on strategic goals, project portfolio based on functional goals and portfolio of projects based on control goals [3-5].

2.2. Relationship between Functional Goals and Project

Relationship between functional goals and the project is more complex, there may be four types of relations: the first one is a functional goal corresponds to a project; the second one is a functional goal corresponds to a number of projects; the third one is multiple functional goals correspond to various projects; the fourth one is multiple functions correspond to a project. Regarding a functional goal corresponds to a project, a functional goal corre-

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sponds to a number of projects, project portfolio is more easily, but for functional goals correspond to multiple projects and multiple functional goals corresponds to a project, its portfolio is more complex. Appropriate portfolio technology is needed to adopt for the last two cases.

3. Principle and Process of Project Portfolio

3.1. Principle of Project Portfolio [6-11]

As for the functional goals, two combinations need to be achieved according to the relationship between functions and projects: one is combining project with the same level together; the other is combining the project with different levels together. Therefore, the corresponding programmes can be constructed through the portfolio method, according to function breakdown structure, project breakdown structure and the relationship between functions and projects.

The project portfolio based on functional goals has two significant characteristics according to the relationship between functional goals and projects: the first one is the relationship between functional goals and the project are more complex, and project portfolio issues between the multi-functional goals and multi-project need to be resolved; the second one is to consider the requirements of construction management. Even if a functional goal corresponds to a project, however, the project isn't the lowest one during the level of work breakdown structure generally, that is, the project requires to be decomposed into sub-projects furthermore, and these sub-projects belongs to different levels of work breakdown structure. Therefore, it is required that the corresponding relationships between functional goals and project breakdown structure need to be solved. Therefore, the work break-

down structure (WBS) and Value Engineering (VE) could be introduced.

3.2. Process of Project Portfolio

3.2.1. Functional Goals Breakdown [12-16]

Functional goals contain comprehensive functional objective and sub-functional goals generally. Because of large-scale projects need to be implemented in phases, it is required that functionality in phases can be added according to management needs. It can be seen in **Figure 1**.

3.2.2. Project Decomposition

According to principles of the work breakdown structure and the requirements of project management, the project is divided into phased project, individual projects, unit projects, part work and item through the style of top-down.

3.2.3. Conversion between Functional Goals and Projects [17-20]

The conversion model between functional goals and the project can be established according to the relationship between functional goals and projects. It can be seen in **Table 1**. There are four kinds of relation of conversion between projects and functional goals according to the relationship between functional goals and projects and the requirements of project management:

- 1) Functional goals related to individual projects. Conditions of project portfolio: one is the correlation between individual project and functional goals; the other is individual projects belonging to the same project.
- 2) Functional goals related to unit projects. Conditions

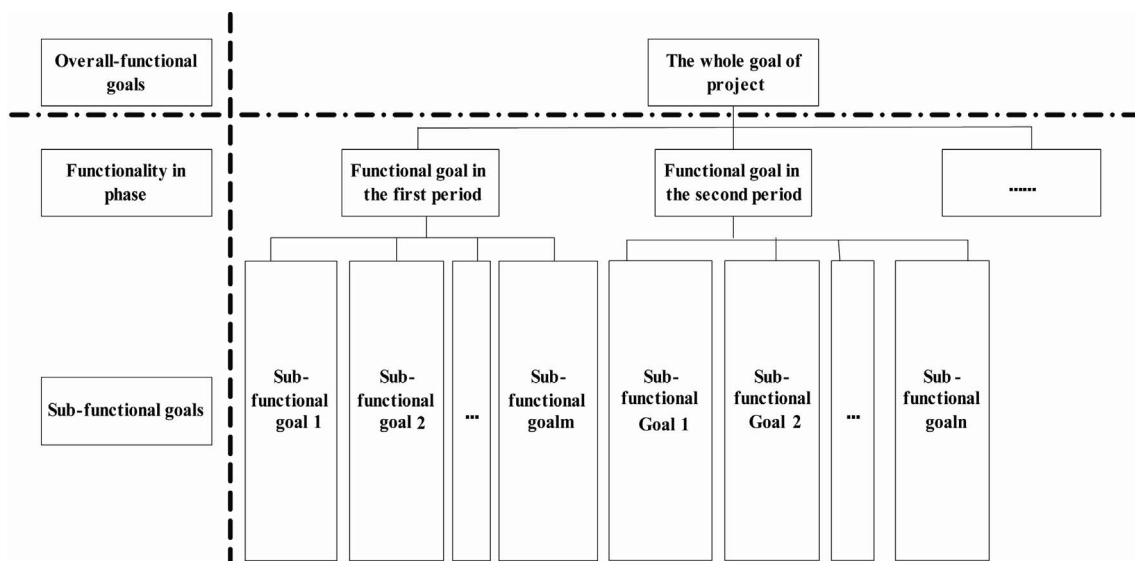
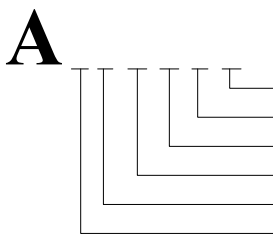


Figure 1. Functional goals breakdown of project.

Table 1. The valuation coefficient of project function.

Project code number	Project Breakdown Structure					Function Breakdown Structure						
	Project	individual projects	unit projects	part work	item	Functional significance coefficient (Function important for the coefficient F_1)		Functional goals ₂ (Function important for the coefficient F_2)		Functional goals _n (Function important for the coefficient F_n)		Function valuation coefficient (M)
						Weight (A1)	Weight value (M1)	Weight (A2)	Weighted value (M2)	Weight (A _n)	Weighted value (M _n)	
P1	××Project					A ₁₁		A ₂₁			A _{m1}	
P1.1		individual projects 1				A _{11.1}		A _{21.1}			A _{m1.1}	
P1.1.1			unit projects 1			A _{11.1.1}						
P1.1.1.1				part work 1		A _{11.1.1.1}						
P1.1.1.1.1					item 1	A _{11.1.1.1.1}						
P1.1.1.1.2					item 2							
...					...							
P1.1.1.2				part work 2								
P1.1.1.2.1					item 1							
P1.1.1.2.1					item 2							
...					...							
.....												
P1.1.2			unit projects 2									
P1.1.2.1				part work 1								
P1.1.2.1.1					item 1							
P1.1.2.1.2					item 2							
...					...							
P1.1.2.2				part work 2								
P1.1.2.2.1					item 1							
P1.1.2.2.2					item 2							
...					...							
.....												
P1.2		individual projects 2										
P1.2.1			unit projects 1									
P1.2.1.1				part work 1								
P1.2.1.1.1					item 1							
...					...							
.....												
		Total	100%		100%	100%		100%	



of project portfolio: one is the correlation between unit project and functional goals; the other is unit projects belonging to the same individual projects.

3) Functional goals related to sub-division projects. Conditions of project portfolio: one is the correlation between sub-division projects and functional goals; the other is sub-division projects belonging to the same unit project.

4) Functional goals related to sub-project. Conditions of project portfolio: one is the correlation between sub-project and functional goals; the other is sub-project belonging to the same sub-division projects.

3.2.4. Functional Importance Coefficient

There are two methods of calculation for functional importance coefficient: one is 01 score; the other is expert score. This paper introduces 01 grading method and expert grading method.

1) 01 grading method. By the contrast between every two functions, the importance order of functions can be determined and functional importance coefficient is obtained accordingly. Steps: first, in accordance with the degree of functional importance, doing comparison as “one to one”, the important one to get a score of 1, the minor one to score zero, the score value of each function and the importance order of functions can be obtained; secondly, score value of each function obtained divides the total score of all functions, and results the importance coefficient of each function. It can be seen in **Table 2**.

2) Expert grading method. The steps includes: firstly, experts score each function by centesimal system according to the importance of each function; secondly,

cumulate each function to score; thirdly, score of each feature obtained divides the total score of all functions, results important function coefficients. It can be seen in **Table 3**.

3.2.5. Project Portfolio

Project portfolio should consider two factors: one is the level of work breakdown structure; the other is the correlation between project and function. Types of project portfolio include:

- 1) Individual project portfolio based on a functional goal.
- 2) Unit project portfolio based on a functional goal belongs to the same individual projects.
- 3) Sub-division project portfolio based on a functional goal belongs to the same unit projects.
- 4) Sub-project portfolio based on a functional goal belongs to the same sub-division projects.

4. The Generation of Program at Different Level of Project

4.1. Program at the Level of Sub-Division Project

Individual project portfolio is formed according to the relationship between each individual project and function and the functional importance coefficient. Any individual project related to a specific function shall be a program.

Function Name: individual project based on the function m shall be program.

Program: $\{P_{1.i} | A_{m.1.i} > 0, i = 1, 2, \dots\}$;

$A_{m.1.i}$ is The weight of project $P_{1.i}$ to function m.

Table 2. Functional importance coefficient (01 grading method).

Serial number	Function	Function 1	Function 2	...	Function R	Score value	Importance order	Functional importance coefficient
1	Function 1	-						
2	Function 2		-					
3				
4	Function R				-			

Table 3. Functional importance coefficient (Expert grading method).

Serial number	Function	Score staff						score	Functional importance coefficient
		1	2	3	4	5	...		
1	Function 1								
2	Function 2								
	...								
	Function R								
	Total score								1.00

4.2. Program at the Level of Unit Project

Unit project portfolio is formed according to the relationship between unit project and functional importance coefficient during each individual project. Any unit project related to a specific function and belongs to the same individual shall be a program.

Function Name: unit project based on the function m and belongs to the same individual project shall be program.

Program:

$$\{P1.i1,i2|Am1.i1,i2 > 0, i1 = 1, 2, \dots, i2 = 1, 2, \dots\};$$

$AM1.i1.i2$ is The weight of project $P1.i1.i2$ to function m .

4.3. Program at the Level of Sub-Division Project

Sub-division project portfolio is formed according to the relationship between various sub-division project functions during each unit project as well as the functional importance coefficient. Any sub-division project related to a specific function and belongs to the same unit project shall be a program.

Function Name: sub-division project based on the function m and belongs to the same unit project shall be program.

$$\{P1.i1.i2.i3|Am1.i1.i2.i3 > 0, i1 = 1, 2, \dots, i2 = 1, 2, \dots, \\ i3 = 1, 2, \dots\}$$

$AM1.i1.i2.i3$ is The weight of project $P1.i1.i2.i3$ to function m .

4.4. Program at the Level of Sub-Project

Sub-project portfolio is formed according to the relationship between various sub-project functions during each sub-division project as well as the functional importance coefficient. Any sub-project related to a specific function and belongs to the same sub-division project shall be a program.

Function Name: sub-project based on the function m and belongs to the same sub-project shall be program.

$$\{P1.i1.i2.i3.i4|Am1.i1.i2.i3.i4 > 0, i1 = 1, 2, \dots, i2 = 1, 2, \dots, \\ i3 = 1, 2, \dots, i4 = 1, 2, \dots\}$$

$AM1.i1.i2.i3.i4$ is the weight of project $P1.i1.i2.i3.i4$ to function m .

5. Conclusions

1) Function goal is an important symbol to achieve strategic goal as well as the basic goal of the project. Through program management based on functional goal, it helps to realize each sub-function goal, staging function goal, and the whole functional goal afterwards.

2) Compared to the project portfolio technologies based on strategic goals and control goals, portfolio technologies based on functional goals have their own requirements, its core is to use functional importance coefficients to identify the relationships between functional goals of project and project at different level, convert from project function into project, and on this basis, constitute the combined project based on different functional goals.

3) Program based on function is to combine a set of project with the same functional goals, which manages the function, cost, quality, and time of project. Therefore, program management based on functional goals can not only overcome the lack brought by analysis based on function, cost, quality, and time of a single project effectively, but also access to greater management efficiency.

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