

Key Core Project Management of Construction Industry to Study

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Abstract

The term “project management” has been applied widely in various industries for several decades. Project Management Institute (PMI) in United States claims that the five processes are specially emphasized in project management. They are also necessarily applied with the nine great knowledge aspects of project management, integration, scope, time schedule, cost, quality, human resources, communication, risk, and procurement. Project Management Association (IPMA) under European system indicates that method application is a key aspect to achieve efficiently the planning schedule, cost, quality, and scope. According to discussions from British and American systems mentioned above, what is the core aspect in project management? On which aspect shall we expect the project executives to focus in order to achieve the target more efficiently? For this purpose, this research is focusing on proving the three core aspects of planning schedule, quality, and cost, basing on Kano II dimension quality mode. Also, the research result will be provided to operators in project management and the related researchers.

Keywords

Project Management; Knowledge Systems; Two-Dimensional Quality Model; Key Project

1. Introduction

1.1. Motivation

“Project management” is a term which has been raised up rapidly in these few decades and has been developed widely in every country and various industries. In almost every new business and new products, especially big construction projects, we can see “Project Management” is applied as a managing method which results well.

So far, the associations of Project Management have been divided into two systems: European system and American system. International Project Management Association, IPMA, under European system, is started around 1965, which pursues project managing method applying to efficiently achieve the planning schedule, cost, quality and scope. On the other hand, Project Management Institute, PMI (Project Management Professional, PMP), under American system, now has been developed as an international association. PMI emphasizes

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the five essential processes in Project Management and nine great knowledge aspects: integration, scope, time schedule, cost, quality, human resources, communication, risk, and procurement. Though PMI has marked the five processes and nine knowledge aspects in Project Management, in practice we can easily discover that time schedule, quality, and cost are the three main concerns for executors [1,2].

Despite how IPMA or PMI defines the main core of Project Management, cost, time schedule, and quality have been listed on top during this research in practical, which are the main breakthrough points of the research.

1.2. Purpose

From the motivations mentioned above, the purpose of this research has been summed up as following: 1) to discuss the main aspects that project managers in general concern the most; 2) to verify the research's emphasis of time schedule, quality, and cost being the key aspects in Project Management is true, basing on Kano II dimension quality mode; 3) to explain the PMI's confirmation to the key aspects in Project Management.

1.3. Field and References

The scope is defined in the influence and evaluation between time, quality and costs in project management in construction industry. The references are collected from professional interviews of expert and scholars in industry, government and scholar to understand the key points and ideas in project management in construction industry. Also, the related reviews, essays, books, and governmental researches, reports and related websites are considered as sources of the reference.

1.4. Process

The research is conducted in the following steps by order:

1. Collecting related references as research basis.
2. Pointing out the theories from the collected references and drafting paper-survey basing on Kano II dimension quality mode.
3. Building up "Kano II dimension quality mode of Project Management in Construction" in order to design the Kano II dimension quality mode-expertise questionnaires.
4. Analyzing the results from the Kano II dimension quality mode-expertise questionnaires, in order to verify the research's emphasis of time schedule, quality, and cost being the three key aspects in Project Management is true which can be a basis for the further research.
5. Providing the results and suggestions of this research to the related professional executors, managers and researchers (see **Figure 1** study structure).

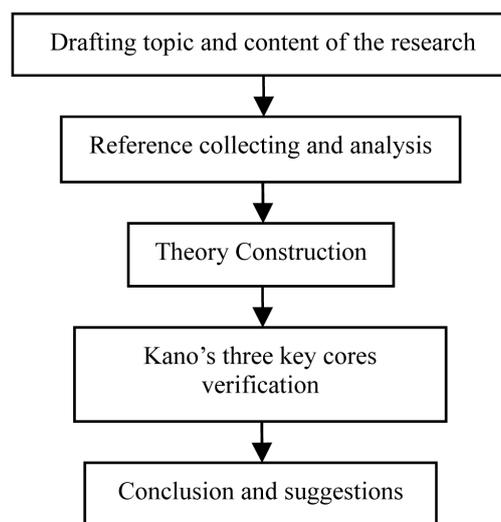


Figure 1. Study structure.

2. Document Review

2.1. Project Management

In the human history of civilization, Projects have already existed though not yet be named. The great movements and constructions, such as building up Pyramid in Egypt, castles and cathedrals in Europe, constructing Great Wall in China, developing sailing adventures, digging canals, were all considered individually as big projects to operate and execute which were required the knowledge, so called Project Management.

Paul O. Gaddis has published “The Project Management” in Harvard Business Review May/June 1959, which is assumed as the first essay related to Project Management. Gaddis has mentioned several basic concepts in Project Management which still have deep influences in this field and the associations in project management [3].

Today, Project Management is defined as: having a specifically defined life cycle for the basis of designing and executing business strategies; also being the pioneer of new products and innovating the associations, products, services, and business. It provides a philosophy and strategy in business management innovation. It builds up a conjoint between functions to functions, associations to associations in cross-functioning/associations integration. Traditional management functions are applied to plan, organize, motivate, instruct, and control in order to realize project management. It also depends on talents of leadership and the abilities of management to achieve the target function, cost and plan; then the project is completed when the target is achieved. However, when the result is differed from the project target or the target is not achievable, the project will be discontinued.

With the reason that PMI under American system is more often discussed and applied, the reference of this research will be more focusing on PMI.

In *The Project Management Scorecard* by Jack J. Phillips, one of the authors, it is approved that every project is influenced by three different aspects, quality/scope, time, and cost [4].

2.2. Two-Dimensional Quality Model

Two-dimensional quality model is developed by two Japanese scholars, Fumio Takahashi and Noriaki Kano, with the basis of Herzberg Motivation-Hygiene theory. Two-dimensional quality model is mainly used on exploring the availability of products and service quality by the similarity of its positive and negative pairs of questions and the objective discussions of the quality [5]-[7].

2.2.1. Herzberg Motivation-Hygiene Theory

Psychologist Herzberg has proposed Motivation-Hygiene Theory in 1959. It is also known as two-factor theory which is the first binary concept and originally developed for motivating employees in associations. Herzberg has found during the research that there were two factors leading employees gaining satisfactions and dissatisfactions in work. One was hygiene factors or maintenance factors, while another is motivators or satisfiers. These theory has pointed out the reverse of Satisfaction does not equals to Dissatisfaction, but two different but parallel factors—the reverse of Satisfaction should be no satisfaction; Dissatisfaction should be no dissatisfaction, which means Satisfaction gains when motivators maintains but it will not lead to Dissatisfaction when motivators is lack; Satisfaction will not rise when hygiene factors is enough but it will lead to Dissatisfaction when it is lack. This is so called dual-continuum (see **Figure 2**).

2.2.2. Kano's Model

Based on Motivation-Hygiene Theory, Fumio Takahashi and Noriaki Kano have brought out “Attractive quality and must-be quality” and divided, according to quality situation and users’ satisfaction, into attractive quality, one dimensional quality, must-be quality, indifferent quality and reverse quality (Yang Jing-Chou, 2002) [8].

Doctor Noriaki Kano has classified three levels of quality, first is quality control, second is quality manage-

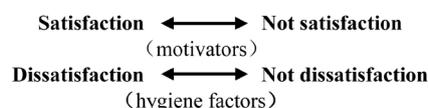


Figure 2. Herzberg two factors theory of two continuations.

ment, and third is attractive quality creating. For the third level of quality, Kano has created a well-known Kano's Model in 1984. Kano used the binary concept to explain the concept of quality level and avoid Two-dimensional quality model (Su Tzong-Toung, 2004) [9]. It is worth to mention that Kano's Model's development was originally for applying on product development in manufacturing industry. However, today it has been widely applied in service industry and other industry.

Kano's quality classification and meaning as below: (Yang Jing-Chou, 2002) [10]:

1. Attractive quality: When the quality is lacked, customers will be dissatisfied. However; if the quality is possessed, customers will be satisfied then.
2. One dimensional quality: The customers' satisfaction will be differed by the quality. The better the quality is, the higher satisfaction customers get; and vice versa.
3. Must-be quality: When the quality is lacked, customers will be dissatisfied. However, if the quality exists, it won't lead customers to higher satisfaction because it is considered as a must.
4. Indifferent quality: No matter how the quality is, it will not affect customers' satisfaction or dissatisfaction.
5. Reverse quality: When the product is qualified, it will lead to customers' dissatisfaction. However, when the quality is lacked, customers will be satisfied (**Figure 3**).

The horizontal axis of the figure represents the quality factor: the more on the right side, the higher the degrees; the more on the left side, the lower the degrees. Longitudinal axis indicates the degrees of satisfaction: going upper means the higher satisfaction and dissatisfaction in downward. Therefore, the slope of one dimensional quality is 1 straight line; slope of reverse quality is -1 straight line which reverses to one dimensional quality. The slope of attractive and must-be quality are both curve lines. Attractive line which allocates on the upside of the horizontal axis indicates no matter the degrees of quality is, it will not affect the satisfaction. However, must-be quality is on the downside of the horizontal axis, indicating no matter the degrees of quality is, it will not affects the dissatisfaction. Indifferent quality indicates that no matter how the quality is, it will not affect customer's satisfaction or dissatisfaction.

In Kano's classification, there are five quality elements. Must-be quality is the must element, or the dissatisfaction appears when it is lacked. Attractive quality can be considered as a strategy to enhance the competitiveness and better service. One dimensional quality should be the more the better in order to maintain the satisfaction which will turn to dissatisfaction when it is lacked. Thus, the dissatisfaction should be always prevented. The three elements mentioned above are crucial for positive satisfaction, which should be in the first priority to be considered. Yet, the reverse quality should always be prevented. It will lead to customer's dissatisfaction instead of dissatisfaction. For the indifferent quality, it won't influence too much on result but it can be considered to cut off for lower cost.

3. Research Design

3.1. Research Structure

Variables Design

In this research, the variable is designed as following: through the Nine Knowledge Areas promoted by PMP: integration, scope, time, cost, quality, human resources, communication, risk, procurement, and with a basis of

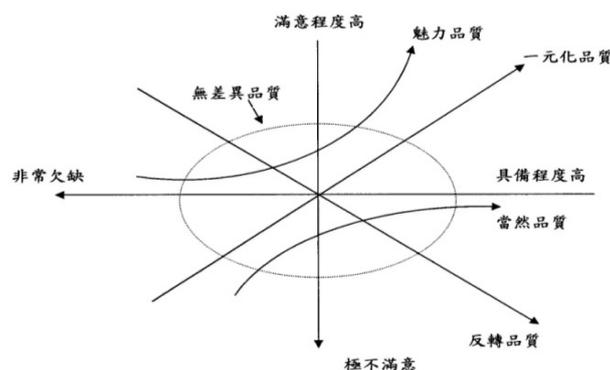


Figure 3. Kano's model (Yang Jing-Chou; 2002).

1) two-dimensional quality model “existence”; 2) two-dimensional quality model “non-existence”; 3) two-dimensional quality model “appropriateness”-for verification; 4) the order of importance.

3.2. Experts’ Interview and Questionnaire

The research discusses about “Key Aspects in Project Management in Construction Industry” which requires professional knowledge. Therefore, the interviewees are limited in experts, scholars, and workers in related industry. There were total 16 interviewees have been conducted by interview and questionnaires, which includes 3 high-level managers (in construction out industry), 3 scholars from construction and related field (professional analysts), 4 architects and related mechanists (construction planning and overseeing), and 6 businessmen in construction industry.

3.3. Kano’s Two-Dimensional Quality Model

Following the suggestions given by Yang Jing-Chou (1993) [11] to the research of two-dimensional quality model, quality can be categorized by the interviewees’ feelings toward “exist” or “not exist” of the quality of the object and the answers given by interviewees toward the quality. And the quality is categorized by a pair question of positive and negative (refer to **Tables 1-3**).

Table 1. Kano’s two-dimensional satisfaction chart.

Not enough Enough	Like	Must-have	No-comment	Bearable	Dislike	Others
Like	No value	No value	Attractive	Attractive	Straighten	Others
Must-have	No value	No value	No comment	No comment	Positive	Others
No comment	Negative	Negative	No comment	No comment	Positive	Others
Bearable	Negative	Negative	Negative	No value	No value	Others
Dislike	Negative	Negative	Negative	No value	No value	Others
Others	Others	Others	Others	Others	Others	Others

(Kano, N., Seraku, N., Takahashi, F. & Tsuji, S., 1984) [11].

Table 2. Matzler & Hinterhuber two-dimensional quality model sort out chart.

Not enough Enough	Like	Must-have	No-comment	Bearable	Dislike
Like	No value	Attractive	Attractive	Attractive	Straighten
Must-have	Negative	No comment	No comment	No comment	Positive
No comment	Negative	No comment	No comment	No comment	Positive
Bearable	Negative	No comment	No comment	No comment	Positive
Dislike	Negative	Negative	Negative	Negative	No value

(Matzler, k. & Hinterhuber, H.H., 1998) [12].

Table 3. Two-dimensional quality model sort out standard chart.

Feedback Aspects	Category				
	Attractive quality	One-dimensional quality	Must-be quality	Indifferent quality	Reverse quality
Existence or enough	1	1	2, 3, 4	2, 3, 4	5
Non-Existence or not enough	2, 3, 4	5	5	2, 3, 4	1

(Yang Jing-Chou, 2002 customer need and satisfied investigate).

4. Verification of Research

Kano's Two-Dimensional Quality Model Verification

In order to verify the object of this research “time, quality and cost are the three key cores the project management in construction industry should pursue”, questionnaires design, experts’ feedbacks, and categorization, and analysis were conducted with the basis of Kano’s two-dimensional quality model. Then it is categorized as **Table 4**. After collecting the 16 interviewees’ feedback, it is discovered that the Nine knowledge areas are reflecting its nature and it’s order of importance as **Table 5**.

1. Scope (43.75%) and human resources (56.25%) are considered as must-be quality.
2. The rest: integration (68.75%), time schedule (81.25%), costs (75%), quality (75%), communication (75%), risk (56.25%), procurement (68.75%) are all considered as one-dimensional quality.
3. The order of importance: time schedule (100%) and quality (100%) are equally listed on the top, costs (93.75%) as the second, integration (62.5%) as the third, procurement (56.25%) as the fourth, communication (50%) as the fifth, risk (43.75%) as the sixth, scope (37.5%) as the seventh, human resources (31.25%) as the eighth.

5. Conclusions and Suggestions

5.1. Conclusions

From the questionnaires in this research, indifferent quality and reverse quality were two non-checked items while attractive quality was rarely checked. It results that the three qualities are not playing the crucial roles in project management. Scope and human resources are must-be quality, which is considered necessary.

Scope is categorized in must-be quality, which expresses that it is adjustable during the project (be added or deducted with the content or items) though it is crucial. Therefore, the scope is only as rule in consideration. Human resources are also categorized in must-be quality. It might because the plan and education in human resources haven’t been emphasized though its importance is recognized.

Table 4. Two-dimensional quality model questionnaire sort out chart.

Not enough Enough	(1) Approvable	(2) Acceptable	(3) No comment	(4) Not appropriate	(5) Not agree
(1) Approvable	Non value	Attractive quality	Attractive quality	Attractive quality	One dimensional quality
(2) Acceptable	Reverse quality	Indifferent quality	Indifferent quality	Indifferent quality	Must-be quality
(3) No comment	Reverse quality	Indifferent quality	Indifferent quality	Indifferent quality	Must-be quality
(4) Not appropriate	Reverse quality	Indifferent quality	Indifferent quality	Indifferent quality	Must-be quality
(5) Not agree	Reverse quality	Reverse quality	Reverse quality	Reverse quality	Non value

Table 5. Professional questionnaire statistics chart.

Aspects Item	Attractive quality	One-dimensional Quality	Must-be Quality	Indifferent Quality	Reverse Quality	Order of Importance
Integration	--	68.75%	31.25%	--	--	62.5% (3)
Scope	37.50%	18.75%		--	--	37.5% (7)
Time	12.50%	81.25%	6.25%	--	--	
Costs	12.50%	75.00%	12.50%	--	--	
Quality	6.25%	75.00%	18.75%	--	--	
Human Resources	18.75%	25.00%		--	--	31.25% (8)
Communication	18.75%		6.25%	--	--	50.00% (5)
Risk	18.75%		25.00%	--	--	43.75% (6)
Procurement	6.25%		25.00%	--	--	56.25% (4)

Integration, time schedule, cost, quality, communication, risk, and procurement are all considered as one-dimensional quality. However, the top three on the list are time, costs, and quality, according to the analysis. The characteristic of one-dimensional quality is the more the better and more satisfaction, which means that they are crucial in project management. However, when ordered by the importance, it reveals that there is a slight difference (6.25%) between time and quality (both equally listed in first) and costs. Plus, these three are (31.25%) differentiated from the rest. Thus, it is verified that the assumption of key cores in project management which are time, costs and quality is true.

5.2. Suggestions

1. The scope in management is not respected enough in construction industry. The main scope is not usually adjusted, yet the content is somehow adjusted for design and budgets. That affects the efficiency of the project execution. Therefore, the prior appropriateness of the content and the budget control and modification during the project should be examined carefully in order to avoid the change of the expected scope.
2. Out-sourcing is highly conducted in construction industry, which becomes the reason for educating and developing the talents are not taken seriously. It also influences the execution of Human resources. The only way to change is to modify entirely the whole construction team and the way of running.
3. Time, costs, and quality are the key cores in project management. Thus, the executors should consider all the aspects in knowledge areas, and control these three aspects precisely to reach the expected plan.
4. Finally, one discovery in this research: a PMP scholar has pointed out during the interview that the quality is categorized in scope during the PMP evaluation. However, it is revealed that scope belongs to attractive quality. Then, it should be the next issue for the further research.

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