CRITICAL REQUIREMENTS OF INTEGRATED QUALITY MANAGEMENT SYSTEM FOR PROJECT MANAGER IN CONSTRUCTION

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A project report submitted in fulfillment of the requirements for the award of the degree of Master of Asset and Facilities Management

Faculty of Geoinformation and Real Estate
Universiti Teknologi Malaysia

2015

To my beloved parents

ACKNOWLEDGEMENT

Many people have contributed greatly to the completion of this master project, without them that would not have been possible. First at all, I would like to thank to my master project's supervisor, Dr. Mat Naim Bin Abdullah @ Mohd Asmoni who desert my particular gratitude here. I sincere appreciate his kindness, patience, full support and confidence in me, on-going guidance, feedback, and encouragement in the master project.

Secondly, through this opportunity would like to thanks my dear friends and coursemates who share their opinion and information helped deepen my understanding on my master project and built my confidence in the study. Their views and advices are useful indeed. Unfortunately, it is not possible to list all of them in this limited space.

Last but not least, I wish to express my special thanks to members of my family, especially my parents, who have a special place in my heart, for their unswerving support and spiritual guidance. Thanks for their support, encouragement and entertainment during my study program in UTM.

ABSTRACT

ISO 9001-based quality management systems (QMS) have been widely adopted in the global construction arena. Construction industry is a project-based industry where different parties work together. However, different parties work towards individual objective and separate the construction design, information, documents and data during the integrated works. These issues make cost and time overruns, more resources and materials are used and project can't complete within the agreed budget, time and specifications. The objectives of this study are (1) to identify the requirements of integrated QMS for project manager in the construction project and (2) to determine the critical requirements of integrated QMS for project manager in the construction project. This study has taken a construction company named China Railway Group Limited (CREC). A total of 15 experts in China Railway Group Limited (CREC) were randomly selected to be the respondents of the study. Generally, the research design applied in this research consists of five stages which are preliminary stage, literature review, research methodology, data analysis and findings, as well as conclusion and recommendation. Ten requirements of project manager in construction had found out which were 1.Management Leadership, 2.Customer Relationship Management, 3.Resources Management, 4.Measurement and Feedback, 5.Systems and Process, 6.Continuous Improvement System, 7.Supplier Quality Management, 8.Improvement Techniques, 9.Education and Training, 10.Working Environment and Culture. Analytic hierarchy process (AHP) were used in this study. Pairwise Comparisons Matrix, Standardized Matrix and Consistency Test were used to analyze the data. For the result, the study finds that the critical requirements for project manager in integrated quality management system are Resource Management (14.67%), Continuous Improvement System(14%) and Management Leadership (13.4%).

ABSTRAK

Sistem Pengurusan Kualiti ISO 9001 (QMS) telah diterima pakai secara meluas dalam arena pembinaan secara global. Industri pembinaan adalah industri yang berasaskan projek dimana ianya melibatkan pihak yang berbeza dan saling bekerjasama. Walaubagaimanapun, pihak-pihak yang berbeza ini akan bekerja ke arah objektif yang berbeza termasuklah reka bentuk pembinaan, maklumat, dokumen dan data semasa kerja-kerja dijalankan. Isu-isu ini menjadikan lebihan terhadap kos dan masa pembinaan, lebih banyak sumber dan bahan-bahan yang digunakan dan projek tidak dapat diselesaikan mengikut bajet, masa dan spesifikasi yang dipersetujui. Objektif kajian ini adalah untuk mengenalpasti keperluan QMS terhadap pengurus projek dalam projek pembinaan dan untuk menentukan keperluan kritikal QMS untuk pengurus projek dalam projek pembinaan. Kajian ini telah dijalankan di sebuah syarikat pembinaan yang dinamakan China Railway Group Limited (CREC). Seramai 15 orang pakar-pakar di China Railway Group Limited (CREC) telah dipilih secara rawak untuk menjadi responden kajian. Secara umumnya, reka bentuk kajian yang digunakan dalam kajian ini adalah terdiri daripada lima peringkat iaitu peringkat awal, kajian literatur, kaedah penyelidikan, analisis data dan penemuan kajian serta kesimpulan dan cadangan. Sepuluh keperluan pengurus projek dalam pembinaan yang telah dikenalpasti ialah Pengurusan Kepimpinan, Pengurusan Perhubungan Pelanggan, Pengurusan Sumber, Penanda Aras dan Maklum Balas, Sistem dan Proses, Sistem Peningkatan Berterusan, Pengurusan Kualiti Pembekal, Teknik Penambahbaikkan, Pendidikan dan Latihan, dan Budaya serta Suasana Pekerjaan. Proses hierarki analisis (AHP) telah digunakan dalam kajian ini. Perbandingan dari segi pasangan Matrix, Standardized Matrix dan Checking the Consistency telah digunakan untuk menganalisis data. Hasil analisis kajian, didapati bahawa keperluan penting bagi pengurus projek dalam sistem pengurusan kualiti bersepadu adalah Pengurusan Sumber (14.67%), Sistem Peningkatan Berterusan (14%) dan Pengurusan Kepimpinan (13.4%).

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CHAPTER 1

INTRODUCTION

1.1 Background

Facilities Management can be defined as practice to coordinating the people, process, place and technology with the work and people of a business organization to support core business of the business organization. Atkin (2013) defined Facilities management as an integration of architecture, business administration, engineering technology, science and behavioral to managing the building and facilities of an business organization so that can strongly supports the core business objectives of the organization.

Facilities management is one of the fastest growing professions and the main cost cutting initiative as outsourcing of service become more and more popular

(BIFM, 2014). Nowadays, many companies and business organizations recognize the importance and necessity of facility management as it can manage the expensive and elaborate support facilities properly. They realised that facilities management act more and more important role in business activities to achieve the core business objectives.The International Facility Management Association (IFMA) defined 11 core principles of facility management during the Global Job Task Analysis in 2009. The 11 principles are:

1) Project Management
2) Maintenance
3) Quality Management
4) Communication
5) Finance and Business Continuity
6) Emergency Preparedness
7) Property Management
8) Environmental Sustainability
9) Leadership and Technology
10) Human Factors
11) Strategy

ISO 9001-based quality management systems (QMS) have been widely implemented in construction project (Watson, 2014). Today, well implemented quality management system is a key factor of the success in construction project. Many researchers found that it necessary to implementing quality management system well in construction so that can ensure the effectiveness of quality management (Ahmed 2013; Farooqui 2013; Cachadinha 2011;Ganjian 2012).

Construction industry is engaged in preparation of land, maintenance, construction projects, real estate and property, structures and repair of buildings. It is also a sector of national economy. The products of construction industry are all kinds of factories like buildings, roads, housing, railways, mines, railways, bridges and some other public facilities. Construction industry is a integration with different teams work together in order to achieve the objectives of the construction work with good quality. Normally the project teams from different business organization matched withe contract agreement. Among them, the project manager act on clients' behalf as clients' representative to coordinate all project activities.A typical structure for a project team in construction is shown in Figure 1.1.

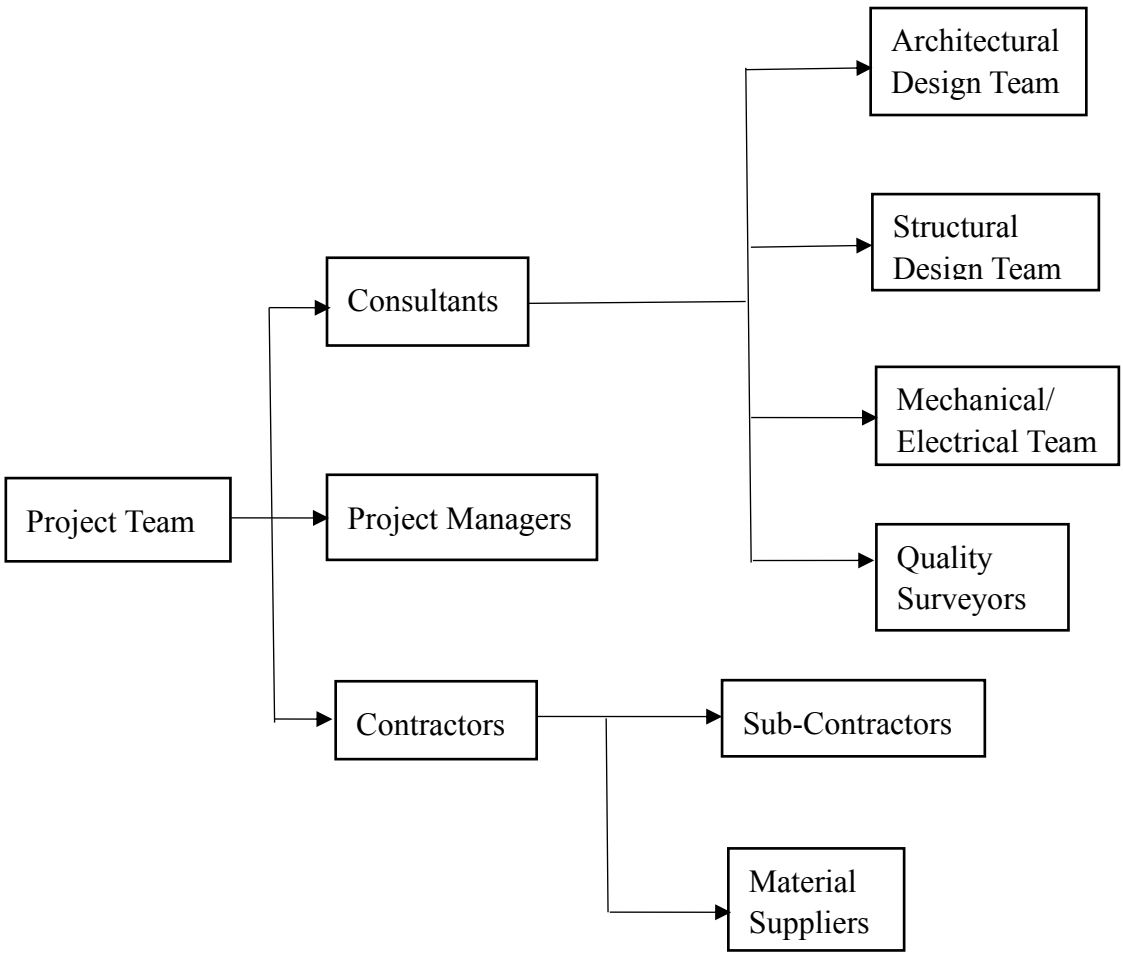

Figure 1.1: Typical Team Structure (Khalfan and Anumba, 2011)

As the construction industry is an integration with different construction teams work together, the construction teams must be able to cooperate and coordinate the whole construction activities by using their knowledge, technology and experience so that the data, documents and information could be transferred and shared effectively. However, there are problems of managing the relationship and interfacing activities between the different construction teams. This is also a problem in implementation of quality management system. Each construction team involved in the construction project have their own individual quality management system. The process of integration of each party in construction project may be hindered by various issues like inadequate participation from different team members, lack of communication, poor collaboration and inconsistent shared vision. So implementing integrated quality management system is important in providing adequate services as construction industry is also a service industry. This is the basic current situation of quality management system implementation in construction industry.

1.2 Problem Statement

Integration is used to describe the working procedure,methods, behaviors and practices in construction that create an effective and efficient collaboration by individual so that information can be exchanged freely among the different construction teams. The integrated work in construction has been focused on improving product delivery and procurement process (Baiden, 2013). Designed to encourage team formation, teamwork and retention design, build strategic partnerships and staff arrangements have been used to integrate construction teams in construction project.

Integration demand that individual parties work together to achieve the common objectives of construction project by sharing of data, documents and information. Goodwin(2011) defined integration in construction project as process to fit all elements together, like project task, components, information, subsystem, documents, people and organizational units according to the project plan. However, there are some issues in integration of construction project. Some researchers had identified the issues in integration. The issues can be described by previous research as below:

a) The project team is made up of multiple organizations, on site staff owe primary responsibilities to their bosses, not the project (Teresa Scott, 2012).

b) Cost and time overruns, more resources and materials are used. Project didn't complete within the agreed budget, time and specifications (Ejan, 2014).

c) Different parties work focus on individually objectives in their own organizations. All parties should working towards similar goals in construction work (Thomas Telford, 2009).

d) The design phase of architect usually treated as a separate activity in the construction project (Anumba CJ, 2012).

e) Different construction teams separate the construction design, information, documents and data in construction project (Loo , 2013).

f) Poor communication, understanding, mistrust and transparency often results in a 'blame culture' (Jefferies MC, 2014).

g) Consultants and contractors join the team when they have tasks to perform, after that they leave it (Peter Barda, 2015).

Normally managing the different construction teams through the contract agreement is the traditional way to managing and matching the relationship between them. Normally the contract agreement in construction project is based on the working responsibility, ability and the traditional roles of different construction teams. That means different parties involved usually matched by a contract agreement. That is also a problem cause the integration problem in construction. An integrated quality management system is needed as the result will improve the working performance and quality of products, increase value and reduce resource waste for a good construction project.

As the construction project is integration where different construction teams work together to achieve the common objectives, the responsibility of teamwork and communication is more important during the construction stage. Each party should work together not only focus on their own working objectives, traditional role and responsibility, but also focus the integrated work, common objective, teamwork and information sharing towards improving the working performance and quality of products in the construction project. So how to manage and match relationship and the interfacing activities between the different construction teams? This is also a problem for implementation of integrated quality management system. Each party involved in the construction project have their own individual quality management system. To build integrated quality management system is necessary to improve the working performance and quality of products, increase value and reduce resource waste for a good construction project. It is also important for providing adequate services as construction industry is also a service industry.

Among all parties involved in construction project, project managers are very important role to coordinating all the construction activities and managing the relationship between different parties. Project managers are also a critical to the success of project (Meiren, 2013). Different projects require different capabilities and skills for project manager. So to find the good project manager for a major and very important task in construction project as project manager is the person who coordinate all project activities and initiate the preparation of a project quality plan. However, many previous research identified the important role of project manager in construction and how to implement quality management system in construction. But how to build integrated quality management? what project managers should do to coordinate the integrated activities? They didn't focus on the role of project manager and integration and it is the current issue need to be solved.

Based on the current issues in integration and the important role of integration quality management system in construction. It is necessary for project manager to understand the importance of integration and how to coordinate all the activities in integration. This study focus on the role of project management level in an integrated quality management system implementation. To find out the functions of project manager in integrated quality management system and what are the requirements for project manager to implementing integrated quality management system in construction project. This study also determine the critical requirements of integrated quality management system for project manager in the construction project.

1.3 Research Questions

Based on the current issues in integrated QMS implementation and the problem statement, two research questions of this study are shown as follows:

1. What are the requirements of integrated QMS for project manager in the construction project?

2. What are the critical requirements of integrated QMS for project manager in the construction project?

1.4 Research Objectives

1. To identify the requirements of integrated QMS for project manager in the construction project.

2. To determine the critical requirements of integrated QMS for project manager in the construction project

1.5 Scope of Research

As China's economy continues to grow in recent years, many cities in China are becoming more and more prosperous, modern and comfortable. The construction industry in China is one of the fastest growing industry and has significant effect on the economy of China for around 7% of the country's GDP (LI, 2010). However more and more companies focus on the economy growth rather than the quality of construction project (Biz, 2010). As a result, poor quality management system implementation and lacking of integrated work make the construction industry fall behind on quality in construction project.

Yue LI, Shuzo , Takashi , Takashi,Yoshimasa and Hyeong Geun had done the research on quality management through construction process in China in 2012. In this research, they found that there was poor integrated quality management system in china and identified the issues which are:

1) Insufficient awareness of quality management
2) Insufficient production-information
3) Insufficient sense of responsibility of designers
4) Ineffective cooperation between contractors and designers
5) Un-share in design information
6) Bad communication among construction team
7) Design changes

8) Poor quality management systems

Based on the current situation and issues in China, this research focus on the construction industry in China. To find out the critical requirements of project manager in China so that can build good integrated quality management system and improve the quality of construction project. In order to achieve the objectives of this research, experts' opinions are need during data collection and data analysis phase.China Railway Group Limited (CREC) is choose for this research as it is the largest company for construction and have a long history in China. CREC also have many knowledgeable and experienced experts so that can collect and analysis data successfully.

CREC participates in many large scale construction projects in china like building construction, railway and highway. CREC also have many construction project overseas especially in Africa and Southeast Asia.The details of CREC is shown in table 1.1.

Table 1.1 Details of CREC

Company	China Railway Group Limited (CREC)
Type	Public
Industry	construction
Location	Beijing, the capital of China.
Headquarters	Beijing, China
Area served	China
Products	Construction,Railway, Highway, Investment, Finance
Service	Railway Infrastructure Surveying and Designing

	Technical Consulting Capital Management Manufacturing Trade Activities

There are three main parties involved in integrated quality management system implementation in construction in this research, the project manager, the consultants(architectural design team, structural design team, mechanical/ electrical team,quality surveyors) and the contractor (sub-contractors, material suppliers). This research will focus on project manager level，to interview the experts in this company. Try to find out what are the critical requirements in integrated quality management system.

1.6 Significance of the research

If an integrated quality management system is implemented successfully, it will improve the performance of integrated work and have positive effect on information sharing, communication, understanding and all the activities in construction project. This research will help the project manager discover the main elements of integrated QMS, the critical requirements for a project manager in implementation of integrated QMS to assist the project managers in initiating, developing and implementing an integrated QMS. This research can also help project managers how to coordinate the construction activities and manager the relationship among different construction

teams. Thus they can continuous improve the quality and performance of all the integrated works in construction project.

1.7 Organization of Research

Chapter 1： Introduction

This chapter is the basis of this research. It introduced the background of this research. It contains problem statement of this research, two research questions and objectives of research need to be achieved. The scope of this research, the significance of this research and chapter organization also included in this chapter..

Chapter 2: Literature Review

All key words and elements related to this research will be discussed and defined and in this chapter. The literature review based on reading resources and various related references such as previous research, newspapers, articles, journals, book and some online resources. This chapter contains the theoretical study of facility management, quality management, integrated quality management system and the role of project manager in construction. For facility management aspect, the definition of facility management, scope of facility management industry and facilities manager will be reviewed. For quality management aspect, it involves the definition, purpose, importance and knowledge about quality management system in construction. The role of project manager in construction project and the

requirements of integrated QMS for project manager also be discussed in this chapter.

Chapter 3: Research Methodology

This chapter discussed the methodology to determine critical requirements for project manager in construction. The steps are as follows, literature review, identify elements, analytic hierarchy process (AHP) study, interview planning, develop interview questions, conduct interview and collect data. For data collection phase, experts' opinions are necessary. The primary data in this research was collected through interview with 15 knowledgeable and experienced experts in CREC. The secondary data were collected through previous research articles, books, journals, newspapers and some other online resources. AHP method is used in this research as data analysis methods including Pairwise Comparisons Matrix, Standardized Matrix, Checking the Consistency with CR.

Chapter 4: Data Analysis and Findings

This chapter discuss the data analysis and findings according to the objectives of this research. Pairwise Comparisons Matrix, Standardized Matrix, Checking the Consistency with CR are used in this chapter for data analysis. Analysed results were presented in the Decision Matrix Besides and the findings of this research had been discussed in this chapter.

Chapter 5: Conclusion and Recommendation

This chapter discussed the main conclusion and limitations of this research based on findings of this research.. Some suggestions for project manager to build integrated quality management system and recommendations for future research also be given in this chapter.

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