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# "Chinese and Bahrain Project Management: A Comparative Study"

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**ABSTRACT**

*The main aim of this article to conduct a comparative study in the impact of project management on control of construction projects in China and Bahrain. To find how does the project management (PM) enhance the control of the construction projects To point out how does the culture impact the project management. To know what are the project management tools and techniques that are using in both countries China and Bahrain which are going to strength the control of cost and time of the projects in construction industry. To Study the organization structure system and its impacts on the control of the construction projects in both countries. To know the advantage and disadvantage for the project management in China and Bahrain.. To know the current situation of project management in China and Bahrain. Finally. To Study the tendering system and its impacts on the control system in both countries China and Bahrain. This control is going to minimize the cost, avoids the delay and produces a project in good quality that is very important to satisfy the owner of the project. In this research we are going to compare control of cost, time and quality in the field of construction in China and Bahrain, also we will make comparative study between China and Bahrain in culture, project management, tendering system and organizing structure . The research method is descriptive research. To compare the aspects of culture, project management tools and technique and tools, control system, tender process and organizing structure, two large enterprise companies have chosen as model from both countries. survey has conducted to gather the data and by E-mail as questionnaires in Bahrain.. Secondary data from a lot of articles and previous researchers, to find out the variance in time, cost and quality, data has taken from the existing project in the two large companies.*

**Keywords:** *Project, Construction, Project Management (PM), Culture, Control.*

## INTRODUCTIONS

The role of project management has become very important over the world Bahrain and China have applied project management in the construction industry since a few years ago. The project management body of knowledge (PMBOK) is good Introduction. A strong culture is crucial for successful management. A majority of construction still facing problems in delay of projects and cost overrun and projects delivered with no quality. Most of the projects don't have good planning and control because of there is no enough data, information, skills and knowledge of the PM or its techniques. The construction problem can be solved through good planning and strong control will deliver the project on budget, time and quality. The significant of this study is to encourage the engineers and project managers to practice PM in the construction sector and to know the status of PM in both countries.The project is "a unique, one-time effort with a particular start and ends of a strict budget, under normal circumstances the project is executed with limited experience, to work together as a team". [1] Project Management is "a set of principles, methods and techniques for effective planning of objective-oriented work, thereby establishing a sound basis for effective scheduling, controlling and re-planning in the management of programs and projects. Project management is the application of knowledge, skills, tools, and technique

to project activities to meet project requirements" [2]. Project control is "the ability to establish plans and targets, measuring actual performance, comparing planned performance against actual performance, and taking vital actions to correct the situation". It is also defined as "making situations behave according to set desired performance Criteria [3].Time control is always adopted with scheduling Critical Path Method (CPM) that considers the ideal method to control the time of the project. Project management's technique are (PERT) "Program evaluation and Review Technique" to assist to make of "multiple times", activities estimation, also (CPM) and (GERT) "Graphical Evaluation and Review Techniques" [4]. The control of cost is essential for all stockholders involved in a construction project; Owner, Consultant, and Contractor have a mutual interest in controlling cost. However, a contractor company would usually carry out the cost control function in a more detailed level than owner or Architect Company. The Quality control; quality is the totality of specification and characteristics of service or product that have on its capacity to convince and meet the customers' needs [5]. Successful performance is" referred as the accomplishment of task goals and target output levels" [6]."Culture is an integrated pattern of human behavior that includes thoughts, communications, languages, practices, beliefs, values, customs, courtesies, rituals, manners of interacting and roles, relationships and expected behaviors of a racial, ethnic, religious or social group; and the ability to transmit the above to succeeding generations" [7]· The main questions in this research are; (1) How does the PM impact on control of construction projects? (2) How does the culture impact on project management? (3) What are the techniques and tools that are used to control the time, cost and quality in the construction projects in China and Bahrain? (4)What are the advantages and disadvantages of PM in the construction project, in China and Bahrain?

## 1. IMPACT OF THE CULTURE IN THE CONSTRUCTION PROJECT MANAGEMENT

The impact of culture depends on differences on knowledge management practices in the construction industry. Accordingly the differences of culture can have the impact on all management practices but in different method and levels. Similarly, it effects on knowledge sharing values in project teams. Because there are some differences in gender, gender, functions and national culture establish a team of complication in cultural; they considered that cultural backgrounds differences of the members of team will affect knowledge with a negative way. This is one aspect among cultural impacts on construction project management; more will be involved in this article [8].

## 2. STATUS OF PROJECT MANAGEMENT IN CHINA AND BAHRAIN

The PMI members in China are more than 300000 members, and the PMP certificates are 80000 certificates until the end of 2014 The PMI member in Bahrain is 256 members and the PMP certificates are 152 certificates until May of 2013[9]. Figure 1and 2 show the differences between PMP members and PMPS certificate in China and Bahrain as shown.

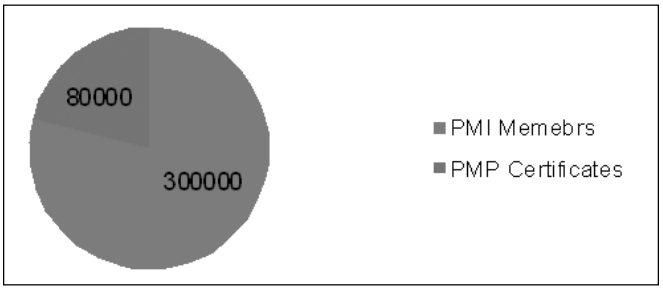


**Figure 1:** Status of PMP in China

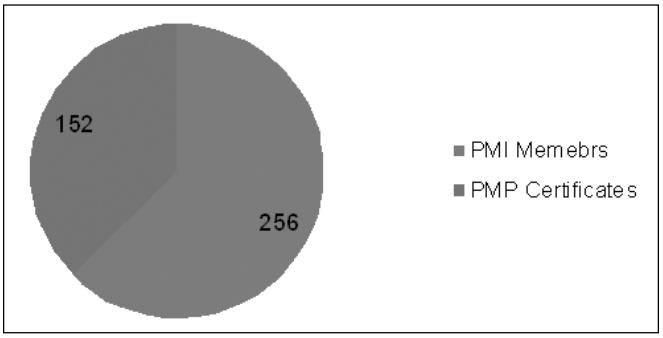


**Figure 2:** Status of PMP in Bahrain

## 3. RESEARCH METHODOLOGY

(1) The research method in this research is descriptive research. To compare the project management, aspects of culture, project management tools and technique and tools, control system, tender process and organizing structure, two large enterprise companies have chosen as model from both countries China Construction Third Engineering Bureau Co., Ltd (CCTEB) and Bahrain AL-ZAMEL International Contracting Company (ZICC). (2) Survey has conducted to gather the data and by E-mail as questionnaires in Bahrain. (3) Secondary data from a lot of articles and previous researchers, to find out the variance in time, cost and quality, data has taken from the existing project in the two large companies. The questions which have to answer in this research are (1) how does the culture impact on control of construction projects.(2) how does the culture impact on control of construction projects (3) What are the techniques and tools that are important to control the cost, time and quality of project in the construction industry in China and Bahrain? (4)What are the

advantages of PM and its disadvantages in the construction project, in China and Bahrain?

### 3.1.The Sample size design

To calculate the model of population (sample size) the statically method will be used; we can indicate the sample size as per the following formulas:

$$Sz = [1 + (Es / Pt)] \quad (1)$$

$$Es = (V^*A)/ M^2 \quad (2)$$

Where: **Es**: First estimate of size Sample

A: The deduction (1-V)

**V**: The percentage of the criteria to be considered to calculate the target population

Sz: size of sample, **M**: maximum error can be allowed

**Pt**: The population size. To let Sz maximum, V equal 0.50. The population's target Pt is twenty three

Project managers in firms (categories A) and Pt equal 23 project managers in firm's categories B

To calculate the error in reply for these questionnaires, the maximum allowed (standard error) M will be calculated at 10% Refer to Equations 1 and 2 above.

**Es** 1 = (0, 50 X0.50) / (0.10 X0.10) = 25.0

**Es** 2 = (0, 50 X0.50) / (0.10 X0.10) = 25.0. The less size sample is Sz1 = 25.0/ (1.0 + (25.0/22.0)) = 11.70 person. Less required sample is Sz2 = 25.0/ (1.0 + (25.0/23.0)) = 11.70 people. that leads to the less size sample equal 12.0 for the firms grade A and companies grade B .it have sent to respondents for categories A firms, 22.0 were (project managers) 15 of them have replied and 7 not replied, I also have sent to respondents for grade B, 23 were (project managers) 13 replied and 8 not replied. The minimum size sample (15 for categories A, 13 for B) is more than 12 people which are the number of respondents who answer the questionnaires.

## 4. COMPARATIVE STUDY OF TWO LARGE COMPANIES IN CHINA AND BAHRAIN

To compare the aspects of the culture, the tender process and organizing structure, two large enterprise companies have chosen as an example of both countries. The name of the company in china, China construction third engineering bureau Co, Ltd (CCTEB) and Bahrain the name of the company is AL Zamel International contracting company (ZICC). Table 1 shows the company name, the background of the company and the main projects.

**Table 1: Compare between the two large companies in china and Bahrain in background**

| *Description* | *China* | *Bahrain* |
|---|---|---|
| Company name | China Construction Third Engineering Bureau Co., Ltd (CCTEB) | AL Zamel International Contracting Company (ZICC) |
| Background of the company | CCTEB is a large, multi-purpose and installation of public construction companies with the style group to approve the process of the establishment of the State Council in 1965 and approved by the Ministry of Construction 1993 to be among the first batch to receive quality skills and project management and general building contractor. In March 2012, it received the Department of Housing and Urban Development of the general contractor rehabilitation of new homes range of construction, to become the first housing construction company to cover 10 major industries. | AL Zamel international contracting company (ZICC) was established in 2000 and has made a major contribution to the development of industrial and commercial buildings in Kuwait and Bahrain. The company is committed to the successful projects in almost all sectors of the economy. With nearly 14 years of experience and proven expertise in the industry of construction and civil engineering contractor AL International Zamel (ZICC) portfolio consists of industrial structures, infrastructure development, as well as luxury villas, office buildings,. AL Zamel international contracting company (ZICC) is classified as Category A according to Ministry of Works In the Kingdom of Bahrain. |
| Main Project | 1- Wuhan Tianhe Airport project | 1-Dar alezz tower at hoora & Busaiteen. |
| | 2- Wuhan infrastructure project | 2-Elegance city project |
| | 3-World trade centre in Wuhan | 3-Oil seal factory at sitra |
| | 4-Hubei Provincial Museum | 4-Durrat alareen project |

## 5. COMPARE BETWEEN CHINA AND BAHRAIN IN PROJECT MANAGEMENT

PM practices based on "the body of the project management knowledge" (PMBOK) Refer to Project Management Institute (PMI) adopted nine PM knowledge areas correspondingly; the actions identified the functions of "PM knowledge areas". The 9th PM knowledge areas practices in each PM of knowledge that can be used in both companies in China and Bahrain. Tables 2, 3 and 4 show the project management modes and practices in construction companies in both countries China and Bahrain.

**Table 2: Compare between china and Bahrain in project management modes**

| *No.* | *Project Management Modes* | *Description* | *Bahrain* | *China* |
|---|---|---|---|---|
| 1 | **PM Mode** | This PM model in the international arena is also known as traditional (Traditional) mode, It only provide construction phase of the supervision role, do not assume pre-project planning work. | Applicable | Applicable |
| 2 | **DB Moe** | Design - Construction mode (Design-Build) is commonly used in recent years in the modern international engineering PM is a turnkey project | Applicable | Applicable |
| 3 | **PMC Mode** | PM Contracting (PM Contract) refers to the owners to appoint a PM Unit as representative of the client for the specific project process management | Applicable | Applicable |
| 4 | **CM Mode** | CM mode using "Fast-Track" (fast path method) will be phased construction of the project, namely segmented design, staging tender, segmented construction, and through the various stages of design, tendering and construction. | Not applicable | Applicable |
| 5 | **DM Mode** | Design - Management Mode (Design-Management) is similar to CM mode, but it is more complex than the CM mode, it refers to the owners by the same company provides both design and construction management services to provide PM. | Not applicable | Not applicable |
| 6 | **EPC Mode** | Design - Procurement - Construction mode (Engineering-Procurement-Construction) this mode refers to the design and construction of the owners entrusted to a company to complete the PM model, which also includes the procurement of equipment and materials, by the EPC contracting are responsible | Applicable | Applicable |
| 7 | **The total control** | Total Control mode (Project Controlling) is the use of PM and the basic principles of corporate control theory to modern information and communication technologies as a means for large-scale construction projects | Not applicable | Applicable |

**Table 3: Compare between (CTTEB) China (ZICC) Bahrain in project management practices**

| PROJECT MANAGEMENT PRACTICES | | |
|---|---|---|
| *PM book* | *PMBOK,(USA),PMRC(China)* | *PMBOK Guide (USA)* |
| Education | many universities offer master degree in project management and engineering management | Bahrain university offer engineering management, there are two local universities offering master degree in PM management |
| Qualification | Has the qualification in supervising or construction | Qualification in civil engineer or project management |
| The adoption of PM practice | Mainly in large project | In government project, in private Sector only in important projects |

**Table 4: Compare between china and Bahrain in specification and methods**

| ORGANIATION SYSTEM, SUPERVISION SYETEM, CONTRACT MNAGEMENT AND SPECIFICATION | | |
|---|---|---|
| Corporate organization system | Large projects have to regulate by corporate organizations. CCTEB is the corporate organization for large scale projects The Organization in CCTEB is a matrix type which is a functional type. | Regulation about organizations depends on the cost of the project. classified is as per the ministry of works The Organization in ZICC is a matrix type which is a functional type |
| Supervision system | The projects in the construction sector have to supervise under the third party (consultant). The large project needs to supervise with the PM office. | The consultant office which is nominated by the owner of the project. for a large project the PM office also will supervise the project |
| Contract management system | The contracts for different stages the construction project has to be in accordance with the model of the contract regulated by the construction law. | For local contract, it will be local contract as per the Ministry of works (MOW), for international contract it will be as per international rules and regulation (FDIC) |
| Specification and standard | The specification and standard as per the specification and standard of the Ministry of Construction.(MOC) | The specification and standard as per the specification and standard of (MOW) and ministry of housing. |

## 6. COMPARE BETWEEN CHINA AND BAHRAIN IN CULTURE

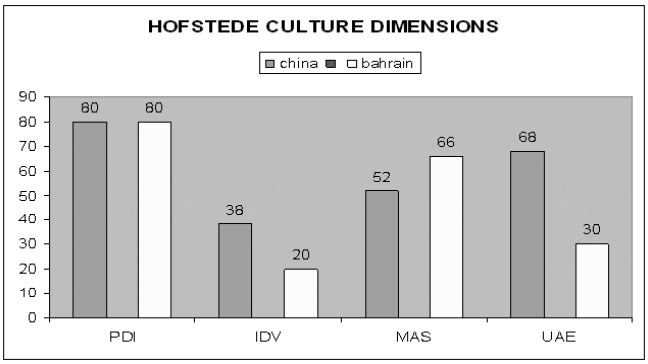


**Figure 3:** Hofstede culture dimension in two countries

**Table 5: Hofstede culture dimension in two countries**

| *Country* | *PDI* | *IDV* | *MAS* | *UAE* | *LTO* |
|---|---|---|---|---|---|
| China | 80 | 38 | 52 | 68 | 118 |
| Bahrain | 80 | 20 | 66 | 30 | 58 |
| World | 55 | 43 | 50 | 64 | - |

Power Distance Index (PDI), Individualism (IDV) Masculinity (MAS) Uncertainty Avoidance Index (UAI) Long Term Orientation (LTO) are the five culture dimensions .Compared to the Bahrain about all the indexes, China has increased higher scores in IDV and UAE, but lower ones in MAS and the same in PDI Chinese culture is more collectivistic hierarchical and high Uncertainty Avoidance. China and Bahrain have the same power distance. Bahrain is higher in Assertive and competitive. Table 5 and figure 3 are based on the study Hofstede culture dimensions [10] and [11]. Table 6 shows the differences in culture in china and Bahrain.

**Table 6: Differences in culture in China and Bahrain**

| *Chinese culture* | *Bahrain culture* |
|---|---|
| Large power distance | same power distance |
| Collectivism | More collectivism |
| Strong uncertainty avoidance | Weak uncertainty avoidance |
| Relationship | Contractual |
| Long-term orientation, | Short- term orientation |
| Hierarchical in organization | Same Hierarchical in organization |
| Assertive and competitive | Strong Assertive and competitive |

## 7. COMPARE BETWEEN CHINA AND BAHRAIN IN CONTROL SYSTEM.

**Project Control** is Control system to measure report, and forecast variation in the project schedule, budget, and scope. The aim of controlling of project is to finish the project as planned and to meet the goals by exceeding the production and the progress of the project, analysing and study the causes of the time overrun and cost overrun and the different methods of using the quality system. The three main control as viewed in this thesis are cost, schedule and quality- The main objective of most construction professional under reasonably normal circumstances is to finish the project on time, actual cost. Control of the projects is the main process of project management. Control of project always starts after monitoring of the project process the goal of the control system is to correct the deviation of the planned time, cost and quality Control keeps the project with a line with performance. Table 7 shows the theory of control system, project management techniques, project management tools, roles and responsibility, time schedule and cost control.

**Table 7: Compare between china and Bahrain in control system**

| | Control System | |
|---|---|---|
| 1-Theory of control system | Theory of PM.<br>PMI (PMBOK) and PMRC.<br>Time management (TM)<br>Cost management (CM)<br>Quality management(QM) | Theory of PM<br>PMI (PMBOK).<br>TM<br>CM<br>QM |
| 2-ProjectManagement Techniques | PERT .WBS<br>CPM and GANTT Chart | WBC, CPM<br>GANTT Chart and PERT |
| 3. Project ManagementTools | Microsoft Project<br>Primavera P3 and P6<br>Microsoft excel | Primavera planner<br>Primavera project management<br>Microsoft Project |
| 4- Roles and Responsibility | Supervisor Engineer and Project Manager | Project manager PM office or consultant |
| 5- Time (Schedule) control | Schedule Variance Analysis.<br>GANTT Chart and PERT Chart<br>Critical path(CPM)<br>Time management | GANTT Bar Chart<br>Time Management<br>Precedence Network<br>Diagram (PND) and CPM |
| 6- Cost control | PERT / cost<br>Earned value analysis (EVA)<br>Curves cost curve lines<br>Cost management | Cost Management<br>Curves analysis<br>Unit costing<br>EVA |
| 7-Quality Control | Quality Management Practice 9000:2000, ISO 001:2000, and ISO 9004: 2000<br>Specification of Ministry of construction | Quality Management System, ISO 9001:2008,<br>General Specification of Ministry of Works and Housing |

## 8. COMPARE BETWEEN CHINA AND BAHRAIN IN DOCUMENTATION SYSTEM

Archive file or documentation is very important to keep all project documents in safe place and to be easy to review all documents such as standard, specification, reports, tests laboratory test and test result at any time and also to check if there is any item missing during construction, this item can be specification or activity. Documentation system starts during the design, execution, and the closing out of the project.

### 8.1.Documentation system in china

Once the contract is signed, an archive file is made up, consisting of all key relevant transaction documents for the project. These files are archived for two years in the site then forwarded to the archive of the company. The information technology is the main role of documentation such as computerizing. .Whether the documentation is produced due to cultural practices or system of administrative regulations by Government.

### 8.2.Documentation system in Bahrain:

The archives and documentation depend on the size of the project. Large projects need more documents and small project need fewer documents when the project has finished. The documents will be archived in the site one year as one year defect period then it will be forwarded to the store of the company. Computerizing is also used for documentation as same as in CCTEB.

## 9. COMPARE BETWEEN CHINA AND BAHRAIN IN TENDERING SYSTEM

The tender system is the same in both companies as the general but the there are some differences on the process of the tendering the following table shows the differences between these process in the two companies in china and Bahrain. As general public tender in accordance with the terms of market competition for fairness and justice, in terms, if the lowest bidder's offer is reasonable, it has to be awarded to the lowest bidder, except the following conditions exist: there are condition in the tender documents, it cannot be awarded to the lowest bidder (lowest price of bidder is clearly unreasonable, such as many prices reported part of the project too low or too high); breach of the condition of the tender bid documents, such as bid bonds doesn't comply with the terms of bids, the tender offer is incomplete, equipment and materials used does not match the technical requirements of the tender, or the tender offer meets with a lot of their own terms, so that the price of losing comparability. Table 8 shows basic law and regulation, problems of the tendering system, process of the tendering system, criteria for the awarding contract, prequalification, and construction permits.

**Table 8: Summary of Comparative study between (CCTEB) China and (ZICC) Bahrain in tendering system**

Compare between China & Bahrain in tender System

| *Sl. no.* | *Subject* | *China Tendering System* | *Bahrain Tendering System* |
|---|---|---|---|
| 1. | Basic law andregulation | The Tendering and Bidding Law of PRC, published on 2013-05-28 | Government Tenders and Purchases Law No. 29 of 2010, Legislative Decree No. 36 of 2002 |
| 2. | Standards and Problemsthat facing the tendering and purchases | Less of competition because of the tender collusive and designated bidding. | The contract will be awarded to a bidder who has the lowest bid value; the terms of the agreement are always changes that will lead to cost overrun. |
| 3. | Basic system | 1-Tender Preparation<br>2- Calling for Tender and Bidder Selection.<br>3- Tender Receipt, Open, and Evaluation.<br>4- Contract Award and Record Archiving | 1- advertisement and obtain bid submission form (TB01)<br>2-the envelopes of bids will be opened with attendance of the members of Tender Board<br>3- When the bid accepted, the envelope will be stamped. The document has the submission of the suitable required documents.<br>4- Tender Evaluation and Award |
| 4 | Negotiability | Not negotiable | Not negotiable |
| 5 | Factors of awarding a contract | Lowest value of bid but a lot of factors such as quality, time, price and study plan finally the history of the company | Lowest value of bid, all contractors already has prequalified so the lowest bid price will be chosen. |
| 6 | Remarks | The technical proposal integrated evaluation system was introduced criteria and the weight should be advertised in the beginning. | The analysis shows the best value for what was a calculated assessment. Supreme factors and weight should be advertised in advance. |
| 7 | Pre-qualification | It required for contractors and suppliers if the bidders still not in the register before. | It required for contractors and suppliers in coordination with the concerned government authorities. |
| 8 | Tender Decision | CCTBA (China Tendering & Bidding Association) during thirty days of the tender submission | BTB (Bahrain Tender Board) during thirty days of the tender submission. |
| 9 | ConstructionPermission | The construction office of the Construction Committee of Municipality | Governorate Municipality |

## 10. DIFFERENCES IN CULTURE BETWEEN CHINA AND BAHRAIN

Cultural management is mainly role in project management in the construction industry, the response between PM in the construction industry and cultural will lead to impact the result of the project. The project manager has to understand the differences of culture and try to avoid any misunderstanding that will occur and jeopardy the project. The table shows the culture background, Confucian culture, and teamwork and harmony culture and core. Table 9 shows the culture background, Confucian culture, and teamwork and harmony culture and core values.

| CULTURE BACKGROUND AND TEAMWORK | | |
|---|---|---|
| **1. Culture background** | The culture of CCTEB follow the Chinese culture which is Confucianism, Taoism, and Buddhism, the three moldings have integrated to make humanism culture that makes the Chinese lifestyles different. Chinese culture enhances the scale and the need to preserve harmony, core values, and the long time cooperative for getting advantage and profit. The team of the company is 100 % Chinese people, so the control of the construction project and the members of the team will be easier due to the team members has the same culture. The traditional culture can be seen in the temple, museum and old buildings. Due to the global opening market the global culture impact little on national culture the t can be seen in new modern buildings, malls, and airports. a Chinese humanism is main important value for any organization to increase the manners and the manager leadership, such as manager practice using the skills of project management system Because of modern project different systems have different values So localization project management for refining, and the idea of traditional Chinese culture Essence implies a profound management thinking, so based project management of traditional Chinese culture needs to be further Integration into the soil of Chinese culture. | The culture of the company based on Bahrain culture is mainly Arab and Islamic Culture. The population is mostly Muslim. 50 % of the population is Bahraini and 50 % are expats. In the company 10 % only are Bahraini and 90 % are expats. Almost this ratio is the same in all construction companies. The local culture in mosque and old traditional houses. A global culture which has an impact on national culture can be seen in modern buildings, towers, and bridges. The last ten years a lot of projects have executed The company and the demand of labors has increased so these labors are from India, Pakistan and Bangladesh, so this all will effect on national culture of the organizations in kingdom of Bahrain. The team has cultural differences can give an organization a strong competitive advantage. Cultural differences have a strong effect and can impact on the outcomes and success of many construction projects. The project managers of the company have culture awareness on Understanding cultures, Religion, Ethnicity Cultural identity, and Values. The managers must know theDifferent of culture and the PM skilled that will impact on project success. |
| **Confucian culture** | Confucianism is very particular about the information communication its way in the PM of the project manager to concentrate more on communication informally before formal communication consultants and the recipient feel about the information obtained, to reach a final agreement on the form used to meet the Chinese Human resource management Confucian Reflection of the project management personnel inspect. | Not applicable. |
| **Teamwork** | The teamwork in CCTB Family – like mutual care existing long term team. Good teamwork: The team's organization is strong; the scope of work is clearer and indicated. The teamwork will be more helpful and obeyed for the project managers in china. The relationship is good with their group or team means that the project team is working work as one family. Project managers in china like to be with their unique team, and indeed the majority of team staff had been working with others in different projects for many years. Team members knew everyone in the team and maybe families also when moving the team's theories among cultures; it should have an idea of the effective culture differences for people's ideas of their theories. The communication between the team members is easier because the team is talking one language so the transfer of the information and knowledge is fast and then easy to practice the project management in the organization. The organization will increase and strength the relationship between the team members. | The communication between the team members is little difficult and the transformation of information is not easy due to the different culture and different language of the team members. The speed in development of the economy in the world, it is frequently that more and more expatriates from the many different countries work together for the same project as a different cultural team. With considering the global PM team as a typical intercultural teams' example, this team is the intercultural team and has to be managed by the international project management, due to the team members usually come from the different countries with the different culture background working in a multi-culture environment. The strong relationship and training for the skill of management will lead to increase the level of communication in the team members, and this automatically will increase and improve their performance. The project management with his leadership will keep the team working as one unit. |

| | | |
|---|---|---|
| **Harmony culture and Core values** | Value proposition and harmony and uniformity. Good coordination of a different issues by putting all in a suitable manner so that they can develop from uncoordinated to coordinated State; asymmetric and unbalanced from balanced symmetry. Modern Chinese society trying to keep the harmony between man and nature; between people and society; between people of a different set of members and between think and organism. | The harmony of project management theory involves research content is very Widespread, the need to supplement and improve the theoretical system only from the perspectives of the project to the construction contractor for the core of the organization discussed the application of the model, but there is still a Multiple research value perspectives. Loyalty to emphasize service to the motherland. |

**Table 9: Compare between china and Bahrain in culture**

| ORGANIZATION STRUCTURE | |
|---|---|
| **(CCTEB ) China** | **(ZICC) Bahrain** |

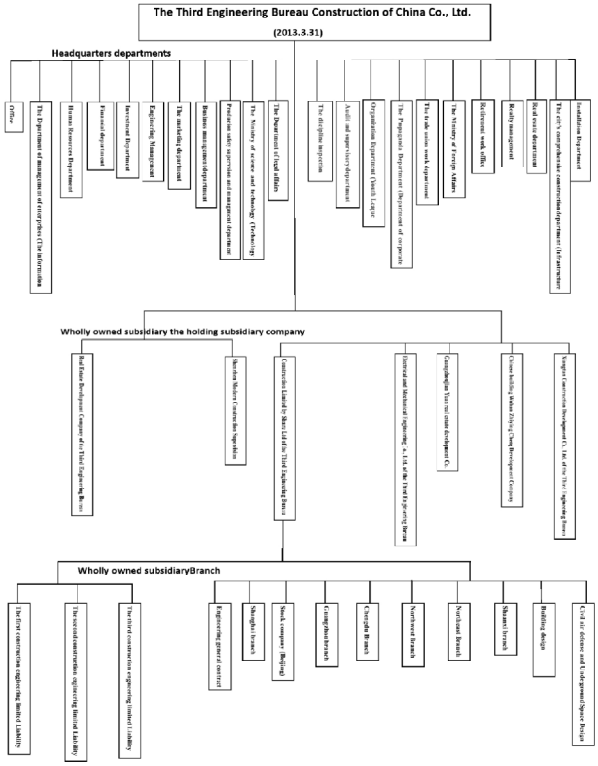


**Figure 4:** Organization structure in CCTEB company [12]

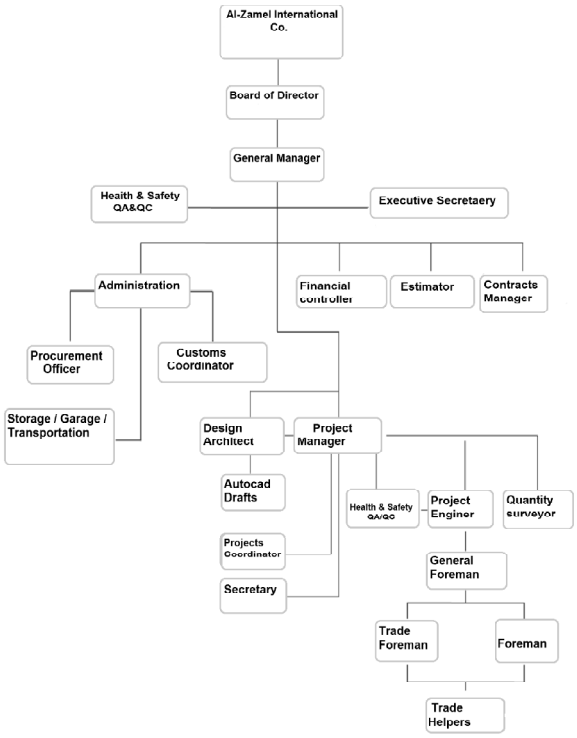


**Figure 5:** Organization structure in ZICC company

Organization structure: Disliking Western-style matrix structures. Project managers understanding of the best communication with the members of the team were correlating to know all should work as one group or team. The chart clear explain that the project manager who is in the height position of the management and directly after the owner. The project manager who always appointed from the owner has the right to order the consultant, architect, the main contractor, and subcontractor. The main problem in this chart is the function department sometimes interferes with the project manager in his work that will lead to a dispute; otherwise this chart of management will lead to project success.

Organization structure: it is using the matrix structures, which is an exceedingly admitted structural chart for company project managers. The chart shows that the position of the project manager is under the general manager direct. The project manager is for the contractor, he isn't the project manager who nominated direct from the client. The chart doesn't show the relationship between the consultant and the contractor. The project manager or the PM office will be the top of the contractor project manager. The problems in this chart there is procurement department not under the project manager, this function department will make double management and dispute.

## 11. COMPARE BETWEEN (CCTEB) CHINA AND (ZICC) BAHRAIN IN ORGANIZATION STRUCTURE

In international projects, selecting the organization is not an easy task, according to the characteristics of the project and the company's resources to choose. To this end, we need to carefully consider the nature of future projects, the characteristics of the various forms of organization, their advantages, and disadvantages, and finally by the trade-off draw program.

### 11.1. Factors affecting choice of organizational form

Criteria affecting to select the organizational are:

1) Project uncertainty factors 2) the difficulty and complexity of the technology 3) the size of the project and the length of construction period 4) the dependence of internal engineering External conditions 5) Construction, etc. table shows organization structure for the two companies in china and Bahrain.

### 11.2. Project organization

In the form of project organization structure varied, with the improvement of social productivity and the adoption of information technology, will produce a new structure. As the purpose of project organization is to realize the project goal and achieve project success. Requires a structure in the form of an entirely general application is not possible, each structure is actually a particular form are pros and cons, the parties need to be involved in the PM in construction industry should be as per the characteristics of the specific projects, construction projects contract model and contractual requirements, combined with their own situation, choose the appropriate form of project organization structure. The project organization is the associated of related infrastructure and people, relationships and declaring roles, parallel with the project life cycle stages.

## 12. SCHEDULE AND COST VARIATION IN CHINA AND BAHRAIN

There are no many differences between the control of cost in china and Bahrain. In China and Bahrain are using Gantt chart, CPM, PERT, time management, and cost management and Earned value analysis. The comparison in control of projects in china and Bahrain, time control, cost control and quality control as shown in table 4.The result of the study about 30 projects from china, the results shows that that project has got 13 % more than time and the actual cost was 94.5 % compare to the planned cost [13]. Cost management and time management which are the two of PM knowledge area can minimize the cost and keep the schedule as per the planned time."(PERT)" and " (CPM)" are the main techniques to control and deliver the projects on the cost and time the schedule and the cost variation are calculated based on 30 projects in china and many projects in Bahrain.

### 12.1. Cost variation in Bahrain

Schedule Variation (SV) = Planned time – actual time

Cost Variation (CV) = Planned cost – actual cost

Project A out of 7 projects

Schedule Variation (SV) = Planned duration – actual duration

Schedule Variation (SV) = 730 – 882 = - 92 days

Ratio of actual duration/ planned duration = 882/ 730 = 120.8 % ratio of variation = 20.8%

Average time variation (SV) for all project = 12.75%

Cost Variation (CV) = Planned cost – actual cost

CV = 7407407- 8343584 = -936177 $

Actual cost / planned cost = 8343584/ 7407407 = 112.60%

Cost Variation = 12.60%

Average cost variation = 14.17%

**Table 11: Factors effect on Projects (Cost overrun Bahrain)**

| *Project name* | *Cost Overrun* | | | |
|---|---|---|---|---|
| | *agreement value ($)* | *Variations value ($)* | *Final contract value ($)* | *Percentage (%) of variations of agreement value* |
| A | 7407407 | 936177 | 8343584 | 12.64 |
| B | 6867306 | 107989 | 6975295 | 1.57 |
| C | 582010 | 1984 | 583994 | 0.34 |
| D | 529100 | 19047 | 548147 | 3.6 |
| E | 687830 | 100423 | 788253 | 14.6 |
| F | 476190 | 127142 | 603332 | 26.7 |
| G | 462962 | 184259 | 647221 | 39.8 |

### 12.2. Cost variation in China

**Table 12: Factors effects on Projects (Time overrun Bahrain)**

| *Actual Time* | *Planned time* | *Time variation(%)* | *Actual cost ($)Millions* | *Planed cost ($)Millions* | *Cost variation (%)* |
|---|---|---|---|---|---|
| 67.5 (months) | 59.4 (months) | 13.63 | 460.33 | 460.33 | 5.41 |

The study of 30 projects out of 100 projects in china based on secondary data the result
Cost variation = 5.41, Actual cost / planned cost = 460.33/486.67 = 94.58%

**Table 13: Cost variation in China and Bahrain**

| *Description* | *(CCTEB) China* | *(ZICC) Bahrain* |
|---|---|---|
| Actual / Planned (Cost) | 94.58 % | 114.17 % |
| Cost variation (CV) | 5.41 % | 14.17 % |

## 12.3. Schedule variation in Bahrain

Schedule Variation (SV) = Planned duration – actual duration Project A out of 7 projects, Schedule Variation (SV) = Planned duration – actual duration Schedule Variation (SV) = 730 – 882 = - 92 days, ratio of actual duration/ planned duration = 882/730 = 120.8% ratio of variation = 20.8 %, Average time variation (SV) for all project = 12.75 %

**Table 14: Variables Effects on Projects Time overrun Bahrain**

| | *Time overrun days))* | | | |
|---|---|---|---|---|
| *Project* | *Original agreement duration* | *Delays as impact of variation overrun* | *agreement duration (revised)* | *Percentage (%) delays from agreement original duration* |
| **A** | 730.0 | 152.0 | 882.0 | 20.80 |
| **B** | 820.0 | 106.0 | 926.0 | 12.96 |
| **C** | 365.0 | 22.0 | 387.0 | 5.95 |
| **D** | 425.0 | 35.0 | 460.0 | 8.22 |
| **E** | 390.0 | 57.0 | 447.0 | 14.60 |
| **F** | 350.0 | 57.0 | 407.0 | 16.40 |
| **G** | 300.0 | 31.0 | 331.0 | 10.33 |

**Table 15: Schedule variation in China and Bahrain**

| *Planned time* | *Actual time* | *Time variation percentage* | *Planned cost ($) Millions* | *Actual cost ($) Millions* | *Cost variation percentage (%)* |
|---|---|---|---|---|---|
| 59.400 ((months) | 67.500(months) | 13.630 | 486.670 | 460.330 | 5.410 |

## 12.4. Schedule variation in China

The study of 30 projects out of 100 projects in china based on secondary data the result Schedule Variation (SV) = Planned duration – actual duration, Schedule Variation (SV) = 59.40 – 67.50 = - 8.10 Month Time variation = 8.10 / 59.40 = 13.60 % Description (CCTEB) China (ZICC) Bahrain

**Table 16: Schedule variation in (CCTEB) china**

| *Description* | *(CCTEB) China* | *(ZICC) Bahrain* |
|---|---|---|
| Actual / Planned (Duration) | 113.60 % | 112.75% |
| Time variation (SV) | 13.63 % | 12.75% |

## 13. DATA ANALYSIS AND RESULT

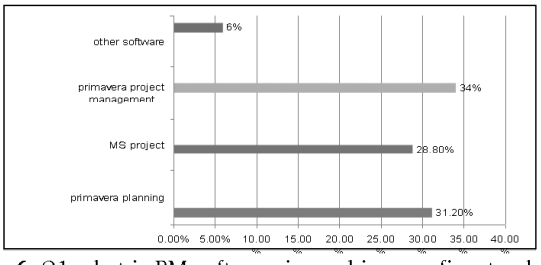


**Figure 6:** Q1 what is PM software is used in your firm to plan and control your project?

**Table 17: Data analysis Q 1**

| *No* | *Label* | *Value* | *Frequency* | *Percent %* |
|---|---|---|---|---|
| 1 | Primavera PM | 4 | 10 | 34 |
| 2 | PRIMAVERA PLANING | 3 | 9 | 31.2 |
| 3 | MS PROJECT | 2 | 7 | 28.8 |
| 4 | OTHER SOFTWARE | 1 | 2 | 6 |
| 5 | Total | | 28 | 100 |

Total respondents 46 Missing respondents 18

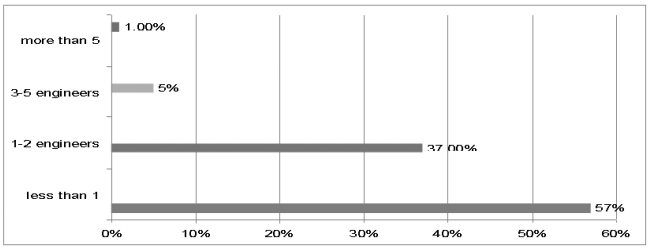


**Figure 7:** Q2 How many engineers in your company have PMP certificates?

**Table 18 data analysis Q 2**

| *No* | *Label* | *Value* | *Frequency* | *Percent %* |
|---|---|---|---|---|
| 1 | More than 5 | 4 | 0 | 1 |
| 2 | 3-5 engineers | 3 | 1 | 5 |
| 3 | 1-2 engineer | 3 | 11 | 37 |
| 4 | Less than 1 | 1 | 16 | 57 |
| 5 | Total | | 28 | 100 |

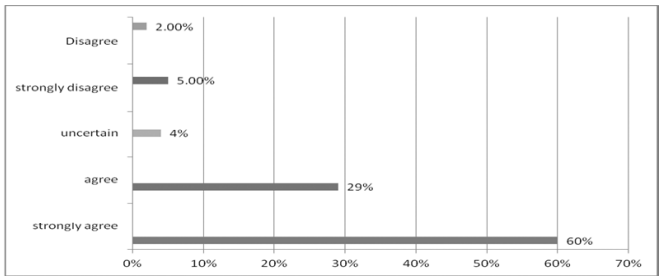


**Figure 8:** Q3 what is your opinion in this statement: PM in my firm will help to deliver the project on time?

**Table 19: Data analysis Q 3**

| *No* | *Label* | *Value* | *Frequency* | *Percent* |
|---|---|---|---|---|
| 1 | "Strongly disagree" | 1 | 1 | 2 |
| 2 | "Disagree" | 2 | 1 | 5 |
| 3 | "Uncertain" | 3 | 1 | 4 |
| 4 | Agree"" | 4 | 8 | 29 |
| 5 | "Strongly agree" | 5 | 17 | 60 |
| 6 | Total | | 28 | 100 |

Total respondents 46 Missing respondents 18

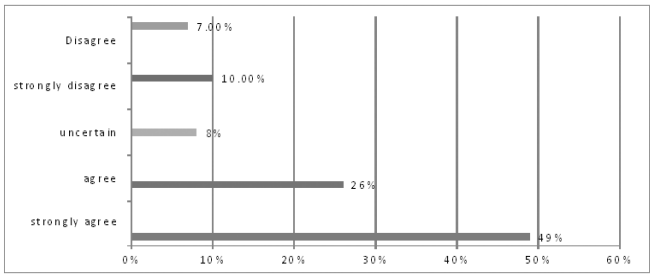


**Figure 9:** Q4 what is your opinion in this statement: PM in my firm will help to deliver the project on cost?

**Table 20: Data analysis Q 4**

| *No* | *Label* | *Value* | *Frequency* | *Percent* |
|---|---|---|---|---|
| 1 | "Strongly disagree" | 1 | 2 | 7 |
| 2 | "Disagree" | 2 | 3 | 10 |
| 3 | "Uncertain" | 3 | 2 | 8 |
| 4 | "Agree" | 4 | 7 | 26 |
| 5 | "Strongly agree" | 5 | 14 | 49 |
| 6 | Total | | 28 | 100 |

Total respondents 46 Missing respondents 18

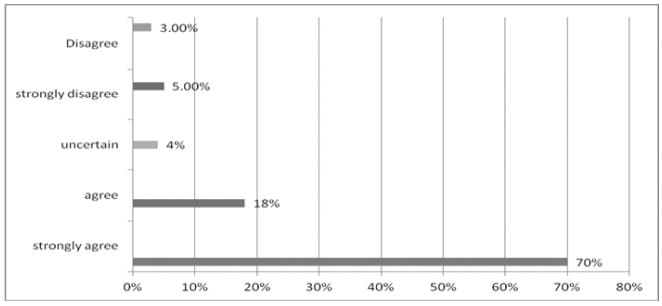


**Figure 10:** Q5 what is your opinion in this statement: the PM in my firm will help to deliver the project on a good quality?

**Table 21: Data analysis Q5**

| *No* | *Label* | *Value* | *Frequency* | *Percent* |
|---|---|---|---|---|
| 1 | "Strongly disagree" | 1 | 1 | 3 |
| 2 | "Disagree" | 2 | 1 | 5 |
| 3 | "Uncertain" | 3 | 1 | 4 |
| 4 | "Agree" | 4 | 5 | 18 |
| 5 | "Strongly agree" | 5 | 20 | 70 |
| 6 | Total | | 28 | 100 |

Total respondents 46 Missing respondents 18

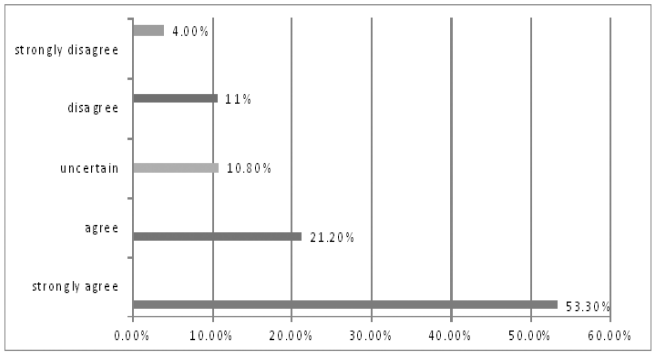


**Figure 11:** Q6 PM is positively effect on project success?

**Table 22: Data analysis Q 6**

| *No* | *Label* | *Value* | *Frequency* | *Percent %* |
|---|---|---|---|---|
| 1 | Strongly agree | 5 | 15 | 53 |
| 2 | Disagree | 4 | 6 | 21.2 |
| 3 | Uncertain | 3 | 3 | 10.8 |
| 4 | Agree | 2 | 3 | 11 |
| 5 | Strongly disagree | 1 | 1 | 4 |
| 6 | Total | | 28 | 100 |

Total respondents 46 Missing respondents 18

**Table 23: Summary of data analysis for Q 7 what are the main factors that effect of delay in construction projects?**

| *Variable* | *Mean* | *Std Dev* | *Minimum* | *Maximum* | *N* | *Label* |
|---|---|---|---|---|---|---|
| Q21-1 | 2.61 | 0.63 | 1 | 5 | 28 | |
| Q21-2 | 3.75 | 0.69 | 1 | 5 | 28 | |
| Q21-3 | 3.44 | 0.64 | 1 | 5 | 28 | |
| Q21-4 | 2.61 | 0.63 | 1 | 5 | 28 | |
| Q21-5 | 3.39 | 0.52 | 1 | 5 | 28 | |
| Q21-6 | 2.64 | 0.62 | 1 | 5 | 28 | |
| Q21-7 | 2.71 | 0.61 | 1 | 5 | 28 | |
| Q21-8 | 3.36 | 0.62 | 1 | 5 | 28 | |
| Q21-9 | 3.42 | 0.63 | 1 | 5 | 28 | |
| Q21-10 | 3.1 | 0.62 | 1 | 5 | 28 | |
| Q21-11 | 2.64 | 0.66 | 1 | 5 | 28 | |
| Q21-12 | 1.89 | 0.59 | 1 | 5 | 28 | |

**Table 24: Summary of data analysis for Q8 what are the main factors that effect of cost in construction projects?**

| *Variable* | *Mean* | *Std Dev* | *Minimum* | *Maximum* | *N* |
|---|---|---|---|---|---|
| Q22-1 | 3.92 | 0.56 | 1 | 5 | 28 |
| Q22-2 | 3.71 | 0.68 | 1 | 5 | 28 |
| Q22-3 | 2.86 | 0.61 | 1 | 5 | 28 |
| Q22-4 | 3.71 | 0.68 | 1 | 5 | 28 |
| Q22-5 | 3.36 | 0.63 | 1 | 5 | 28 |
| Q22-6 | 3.34 | 0.63 | 1 | 5 | 28 |
| Q22-7 | 3.57 | 0.66 | 1 | 5 | 28 |
| Q22-8 | 3.57 | 0.66 | 1 | 5 | 28 |
| Q22-9 | 3.03 | 0.6 | 1 | 5 | 28 |
| Q22-10 | 3.1 | 0.61 | 1 | 5 | 28 |
| Q22-11 | 3.1 | 0.61 | 1 | 5 | 28 |
| Q22-12 | 2.86 | 0.61 | 1 | 5 | 28 |

The analysis of these data has been done according of the followings

| | |
|---|---|
| "Strongly agree" | 5 |
| "Agree" | 4 |
| "Uncertain" | 3 |
| "Disagree" | 2 |
| "Strongly disagree" | 1 |

**Table 25: Data measurement Based on Likert scale**

| *Item* | *"Strongly agree"* | *"Agree"* | *"uncertain"* | *"disagree"* | *"Strongly disagree"* |
|---|---|---|---|---|---|
| scale | 5 | 4 | 3 | 2 | 1 |

The data has been analyzed based on the followings

| Item | scale |
|---|---|
| "Very low important" | 1 |
| "Low important" | 2 |
| "Medium important" | 3 |
| "High important" | 4 |
| "Very high important" | 5 |

**Table 26: Data measurement Based on Likert scale**

| *Item* | *"Very low important"* | *"Low important"* | *"Medium important"* | *"High important"* | *"Very high important"* |
|---|---|---|---|---|---|
| scale | 5 | 1 | 3 | 4 | 5 |

RII = w/ (AxN), RII (The relative importance index method), where (1) W is scale's weight of every factor given by the respondents and the rank start from one to five; (2) A is the more grades; (3) N is all respondents.

## Reliability and validity

The internal consistency is measure for reliability; Cronbach's alpha is suitable Likert scale for the result shows for reliability analysis were showed between 0.708 and 0.830 and according to Anderson and black (1998) the minimum limit for Cronbach's alpha is 0.70 so the questionnaires are reliable . To measure the validity, the content validity was used. The questionnaires have checked then corrected and appear as per as the final in this research.

## Result summary of survey

1) From the result, we can conclude that the primavera software is the main software is using as PM tools and the MS project as the second PM software.
2) For the second question indicate the following 58% of respondents said that no engineer has PMP certificates and 37 % they have one to two engineers have the PMP certificates.
3) From the results, we can conclude 60% of respondents answer strongly agrees that the project is delivered on time, 29% of respondents answer agree, 4 % answer uncertain, 5 % answer disagree and 2 % of respondents answer strongly not agree.
4) we can conclude 49% of respondents answer strongly agrees that the project is delivered on cost (budget), 26% of respondents answer agree, 8 % answer uncertain, 10 % answer disagree and 7 % of respondents answer strongly not agree .
5) From the results, we can conclude 70% of respondents answer strongly agrees that the project is delivered on quality, 18% of respondents answer agree, 4 % answer uncertain, 5 % answer disagree and 3 % of respondents answer strongly not agree.
6) To find the impact of PM on project success, 53.3 % have said strongly agrees 21.20% said agree, 10.80 % have answered uncertain, 11 % answered disagree and 4 % of respondents answered strongly not agree.
7) To find what are the main factors that effect of delay in construction projects, from the result we can make an order as followings (1) Delay in progress payment, (2) Change of design, (3) poor PM, (4) Poor site management and supervision, (5) Low productivity, (6) difficult financing on the part of contractor, (7) Not using PM software for updating schedule,(8) Change in order by the owner, (9) Unforeseen site condition, (10) Slow preparation and approval drawings, (11) Shortage of material, (12) Inclement weather.
8) To find what are the main factors which effect of cost overrun in construction projects from the result we make an order as following (1) Poor site management and supervision, (2) cutoff of work order by the project manager, (3) Unclear

**Table 27: Rank for the variables of the factors that affect delay of the project**

| *Variable* | *IR (important index) %* | *Rank* |
|---|---|---|
| Q21-9 | 72.85 | 1 |
| Q21-2 | 71.42 | 2 |
| Q21-3 | 68.57 | 3 |
| Q21-5 | 67.85 | 4 |
| Q21-8 | 67.14 | 5 |
| Q21-10 | 65.7 | 6 |
| Q21-11 | 61.14 | 7 |
| Q21-7 | 54.28 | 8 |
| Q21-6 | 52.85 | 9 |
| Q21-12 | 52.85 | 10 |
| Q21-1 | 52.1 | 11 |
| Q21-4 | 52.1 | 12 |

specification or change in specification, (4) Change of order, (5) Weak of communication between client, consultant and contractor, (6) Poor PM, (7) Unforeseen site condition, (8)increase the cost of material, (9) Change in plans and drawings,)10) Client's shortage finance, (11)Not using PM software to control the cost,(12)difficult in financing on the part of the contractor.

**Table 28: Rank for the variables of the factors that affect the cost of the project**

| *Variable* | *IR (important index) %* | *Rank* |
|---|---|---|
| Q22-5 | 74.28 | 1 |
| Q22-8 | 71.42 | 2 |
| Q22-9 | 71.42 | 3 |
| Q22-2 | 67.14 | 4 |
| Q22-7 | 67.14 | 5 |
| Q22-3 | 65.71 | 6 |
| Q22-6 | 62.85 | 7 |
| Q22-1 | 62.14 | 8 |
| Q22-4 | 62.14 | 9 |
| Q22-12 | 62.14 | 10 |
| Q22-11 | 61.42 | 11 |
| Q22-10 | 56.42 | 12 |

## 13. DISCUSSION

In this part we will discuss the objective of this research and answer the research questions. The first objective or the first question is how the culture impacts the control of construction project, refer to the index of Hofstede culture dimensions and according to the comparative study in table 5, Compared to the Bahrain about all the culture indexes, China has higher scores in (IDV), (LTO) and (UAE), but lower ones in (MAS), Bahrain is higher in Assertive and competitive (MAS) and lower in (IDV), (LTO) and (UAE). Both countries have the same (PDI). Chinese culture is collectivistic hierarchical and High Uncertainty Avoidance, we can concluded that while Bahrainis and Chinese culture are collectivistic, Chinese culture is little more individualistic compare to Bahrainis culture. According to the comparison of culture, the low (PDI) and (MAS) could contribute to the better involvement of project teams, but loose project control may cause problems of efficiency of regular routines and execution of arrangements. On the contrary, high (PDI) and (MAS) can enhance the project control of the top management but may harm the participation and involvement of subordinate groups. As per this result the culture in both countries will strength the control of the project, but Bahrain culture will enhance little more due to the higher score in (MAS). China and Bahrain have the same power distance. Bahrain is higher in Assertive and competitive .The Chinese culture Establishes well communication due to the style of value and behavior that will assist the information to transfer more easily to the team from the project manager, that going to lead to strength the control of the project .The project team in China has the same national culture which will keep the team in CCTEB (China) more effective and more commitment to finish the work on time and budget. The project team in ZICC (Bahrain) has the different culture so the communication in the team not easier same as the team in China, the control of project required more hard work and more monitoring feedback. . The second objective or the second question of this research, how the PM impacts the control of construction project, to discuss this objective in two methods; the first method is refer to the secondary data that we get from review a lot of previous researchers, all of these researchers have reached that the project management sure impact on control of the PM and is the important reason to make the project more successful. The main previous researchers as followings; the project management and its practices sure affect project performance [14], foreign companies has to adopt some of the practices of PM to assist these companies to have best project success and good performance [15], the better performance means the project has finished on time, cost and quality. "Despite all the research efforts within the project management discipline, the large variety of concepts and the lack of practical solutions are leading to disregarding especially the potential of cultural diversity among Practitioners"[16]. From the result of survey 73% from respondents said that the project management is positively effect on success project. 80% agree that the project management will assist the project manager to control the time and the cost of the project. More than 75% said that the project delivered on time, cost and

quality .from result we have concluded the important factors that impact on the time overrun is 12 factors and for the cost overrun same as time overrun, we have made the order of 12 factors as per the data analysis system .the main factors of the delay are the delay in progress of payment, change in design and poor project management. The main factors for cost overrun are Poor site management and supervision, suspension of work order by engineer and unclear specification or change in specification. Around 70 %of respondents answered that the actual cost compared to planned budget is 110 %, .With strong control only we can get a good performance of project, so the project management practices sure impact on control projects. The second method is itself the answering to the same the third question or the third objective is to know what are the techniques and tools that are used to control the time, quality and cost on the construction project. The use of recent PM and techniques and tools which have involved in construction projects such as CPM, PERT, Chart and (EVM) is strong and main important technique to look for feedback , monitor and control the time, performance and cost [17]. The general engineering, procurement and construction (EPC) model is the one of project management models commonly used for medium-sized and large construction projects at home and abroad in China [18]. China is choosing its project management methodologies and the project managers are following established best practices [19].In Bahrain the Consultant shall ensure detailed project preparation incorporating the Ministry's Project Management System requirements, value engineering analysis and the quality audit[20]. The importance of monitoring and control mechanisms for proper project completion [21]. CPM, PERT, Chart, network and EVM all these techniques are using to plan and control the construction project in both countries China and Bahrain. (EVM) is very important and more powerful tool or technique to control the project but is very limited usage in both countries. The project management tools such primavera and MS PROJECT are using for planning and control the project in China and Bahrain, so we can conclude that the project management and its techniques and tools are very important to monitor and control the project in China and Bahrain . To answer the fourth question or fourth aim of this research what is the proposal framework of the PM in two companies (CCTEB) China and (ZICC) Bahrain. The organization structure in CCTEB and ZICC as shown in figure 4 and 5 is matrices structure. The disadvantage of this organization structure that level of function departments is high, and that will increase the difficulty of control the project due to the double management from the project manager and the director of the functional department. The study proposes a framework for the organization structure for the two companies CCTEB and ZICC. The proposal of organization structure as shown in figure 6 aim to strength the main function of PM all is under the liability of the project management office that has the authority to nominate a project manager, he only works under the client or the owner. The relationship of management between the owner and contractor and the consultant only contractual relationship, but there is no link in management. The management link only between the contractor and project manager or between the two parties' consultant and the project manager. . The fifth objective or the fifth question of this research is what is the advantage and disadvantage of using the project management system in both countries China and Bahrain. The advantage of Project Management that impact positive on project performance, while applying the PM in construction study will increase the ratio of project success in both countries that is very important and benefit for both the contractor and the owner in China and Bahrain. The disadvantage of the project management, that is costing the owner because of hiring a project manager, which is approximately, is 2%-5%, and it can be neglected compared with the profit of using PM in the construction sector in both countries China and Bahrain. Refer to table 6 the summary of the advantage and disadvantage of the project management in both countries China and Bahrain. The sixth objective or the sixth question what is the status of PM in both countries China and Bahrain. Refer to a lot of previous researchers in this research, we can conclude that the ratio of increasing the project management practice in China is more than 10 % but in Bahrain, it is only 4%. The project management is optional in both countries. The PMP members in China are 80000 members, and the PMPs certificates are 40000 certificates until the end of 2011. The PMP member in Bahrain is 256 members and the PMPs certificates are 152 certificates until May of 2013. Figure 1 and 2 shows the differences between PMP members and PMPS certificate in China and Bahrain. With increasing the ratio of PMP members and PMPs certificate, this will increase the project management practices that will enhance the control of construction projects. Refer to comparative study on tender between China and Bahrain, all steps almost same except the procedures, law and regulation. In both countries tender awarded to lowest bid with consider also the standards and specification , this will lead to more competition and the contractors have to submit the bid with less profit

that will required good planning and control for the construction projects to finish these projects on time , cost and quality . Project with competitive bid required better team and strong control, so in this entire project we should apply the project management practices and its technique and tools to enhance the control of the construction projects. All summaries that are coming end of each part of this research as part of this discussion. In this study also we found although both countries are using the project management practices such the ninth knowledge areas such as cost management, schedule management and quality management, still there are variances in cost, time and quality in construction projects in both countries China and Bahrain, the ratio of the time over run is 13.6% compare to Bahrain the time overrun is 12.75%. The cost overrun in Bahrain is 14.17% compare to China there is cost underrun is 5.41%. Regarding the quality and quality management in both countries, in China Quality Management Practice 9000:2000, ISO 001:2000, and ISO 9004:2000 Specification of Ministry of construction, in Bahrain Quality Management System will lead to success of ISO certification 9001: 2008, General Specification of Ministry of Works and Housing.

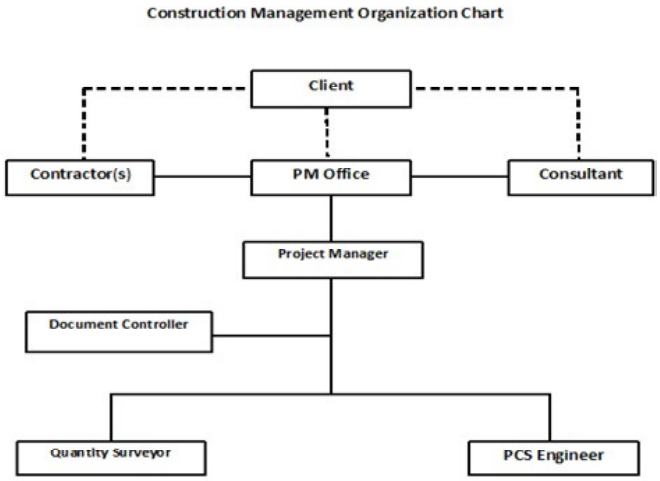


**Figure 12:** Proposal of organization structure of project management for CCTEB and ZICC

In China, the specification and standard for construction projects are following the specification and the standards of ministry of construction and in Bahrain, the specification and standard for construction (MOC) projects are following the specification and the standards of ministry of works (MOW) and almost as per British standard and specification. The tender system is almost same in both countries except the differences in procedures, Laws, and rules. Figure12 shows the proposal of framework for the organization structure for the two companies in the two countries.

## 14. CONCLUSION &RECOMMENDATION

### 14.1. Conclusion

The important of this research is to have comprehensive study project management and its impact on the control of projects in the construction industry in China and Bahrain. The study is based on survey and a comparative study between the two large companies in both countries (CCTEB) China and (ZICC) Bahrain. According to the comparison of culture, the low (PDI) and (MAS) could contribute to the better involvement of project teams, but loose project control may cause problems of efficiency of regular routines and execution of arrangements. On the contrary, high (PDI) and (MAS) can enhance the project control of the top management but may harm the participation and involvement of subordinate groups. As per this result, the culture in both countries will strength the control of the project, but Bahrain culture will enhance little more due to the higher score in (MAS). China and Bahrain have the same power distance. The Chinese culture Establishes well communication due to the style of value and behavior that will assist the information to transfer more easily to the team from the project manager, that going to lead to strength the control of the project .The project team in China has the same national culture which will keep the team in CCTEB (China) more effective and more commitment to finish the work on time and budget. The project team in ZICC (Bahrain) has the different culture so the communication in the team not easier same as the team in China, the control of project required more hard work and more monitoring feedback. The conclusion of this study indicates that the project management and its tools and techniques such as Gantt chart, CPM, PERT, network activities EVA the software of project management will lead to assist the project manager to manage and control the three important elements of project time, cost and quality. There are no differences between the tools and techniques, which are used to control the project in China and Bahrain, both countries, are using Gantt chart, CPM, PERT, network activities and EVA. The main PM software is Primavera and Microsoft project, which are used as tools of PM in China and Bahrain. Both countries china and Bahrain are following (PMBOK) Guide, but China has another Chapter that its project Management republic of China (PMRC). In China, project management is more familiar than Bahrain because PM came to China before Bahrain and also there are hundreds of universities and centers offering master degree and courses in PM. The ratio of increasing the PM practice in China is more than 10 % but in Bahrain, it is only 4%. The project management

is optional in both countries. From the result of survey we concluded that the project management is positively effect on success project. We concluded also that the PM will assist the project manager of the project to monitor, control and manage for each of important elements of project, cost, time and quality. In Bahrain More than 75 % of the projects delivered on time, cost and quality. The important factors that impact of time overrun are 12 factors and same as for the cost overrun in Bahrain. The main factors of the delay are; the delay in the progress of payment, change in design and poor project management. The main factors for cost overrun are; Poor site management and supervision, suspension of work order by engineer and unclear specification or change in specification. From the result of survey, we can conclude the actual cost compared to planned budget is 110 %, The advantage of Project Management that impact positive on project performance, while applying the PM in construction study will increase the ratio of project success in both countries that is very important and benefit for both the contractor and the owner in China and Bahrain. The disadvantage of the project management, that is costing the owner because of hiring a project manager, which is approximately, is 2%-5%, and it can be neglected compared with the profit of using PM in the construction sector in China and Bahrain. The average schedule variation SV in China is 13.63 % Higher than SV in Bahrain is 12.75 %. The cost variation CV in Bahrain is 14.17 cost overrun % higher than CV in China is 5.41 % under run this means the control of time in Bahrain is more than China, and the control of cost in China more than Bahrain. the quality and quality management in both countries , in China Quality Management Practice 9000:2000, ISO 001:2000, and ISO 9004:2000, in Bahrain the system of Quality Management will lead to success the certificate of ISO (9001:2008) , In China, the specification and standard for construction projects are following the specification and the standards of ministry of construction (MOW) and in Bahrain, the specification and standard for construction projects are following the specification and the standards of ministry of works (MOW) and it is almost as per British standard and specification. The tender system process is almost same in both countries except the differences in procedures, laws, and rules. Culture differences can have major impacts on the success of the project management in China and Bahrain. The research proposes a framework for the organization structure for the two companies CCTEB and ZICC.The proposal of the framework will lead to more control in construction projects in both countries.

## 14.2. Recommendations

### *14.2.1. Recommendation in China*

(1) The MOC should always provide programs and training in PM for all engineers in the public sector to increase knowledge of project management.
(2) Firms should be familiar with multinational project management to be easy to make business with foreign companies as joining venture to be aware with the impact of culture differences.
(3) The MOC should issue the rules of the Qualification of Project Managers, for the public sector and private sector; project manager should have a qualification in project management.
(4) Project managers have to make strategies to avoid the uncertainty to reduce the impact of risk.

### *14.2.2. Recommendation in Bahrain*

(1) Offering training to the firms to enhance the PM practices and increase its knowledge.
(2) Advise the firms to have ISO standard that will lead to improve the project management.
(3) Government acting by Municipality for private projects and Ministry of works for public projects should issue rules to make the PM compulsory such as the supervision of the project that will increase the project management practices in Bahrain.
(4) Firms have to make planes to eschew the impact of risk.

### *14.2.3. Recommendations for future studies*

This research recommends the followings for future studies:

(1) Conduct research to develop or improve the list of practices under each PM Knowledge areas for the construction industry.
(2) Causes of failure in construction projects in Bahrain and china.

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