



Project-Based Organization Structure and Procurement

المنظمة القائمة على هيكل يعتمد على المشاريع و المشتريات

By

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Dissertation submitted in partial fulfillment of

MSc Project Management

Faculty of Business

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May 2011

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ACKNOWLEDGMENT

I would like to express my special and warm thanks to **Professor Ashly H. Pinnington** (my supervisor) for his continues support during the progress of completing my dissertation. I also would like to thank him for his guidance, encouragement and motivation in encouraging me to submit the dissertation in May in time for graduation in 2011.

DEDICATION

I dedicate this dissertation to:

My **Father** and **Mother** who raised and educated me on proper manner and for their support in making me continue my higher education.

My **Brother, Wife** and **Daughter** for their continues support and love during my studies and their patience at the time when I was busy with the dissertation.

Thank you all

Abstract

The main purpose of this dissertation is to examine and understand the impact of the non-availability of project-based structure and the existing procurement method implemented in a semi-governmental company. Specifically, it addresses the resourcing and progress of an in-house accommodation building and ablution block construction project. First different academic studies on organizational structure, project-based structure and alternative structures are reviewed to gain an in-depth understanding of organizational structure and identifying alternatives means of developing a structure and system for the company's in-house project.

In order to understand the actual impact of the above problems on the overall progress of the in-house construction project, a project diary was completed by the researcher who is a civil engineer and was involved from the early stages of the project. The data collected was analyzed and it was noted that there was miscommunication internally between the team members and externally with other departments particularly in the process of purchasing materials and appointing sub-contractors. These tasks typically have taken between 2 weeks to 6 weeks resulting in late delivery of the project by 8 months from the original plan.

Based on the analysis of the data and with the action research objective to overcome the problem of miscommunication it is recommended to develop a mini project-based structure that can be assembled when required by grouping employees from different departments and disbanding them after the project is completed. However for the procurement problem a detailed 'Hard System Model of Change' was developed to be recommended to senior management to avoid in future unnecessary problems created by processes failures in in-house projects.

الخلاصة

الهدف الأساسي من أطروحة البحث هو التعرف على وفهم أثر عدم توافر هيكل يعتمد على المشروع ومنهج المشتريات الحالي الذي يتم تطبيقه في شركة شبه حكومية. وتخاطب الأطروحة على نحو خاص طرق توفير الموارد و مراحل تقدم إنشاء مبنى سكني و مبنى مرابض و الإستحمام يتم بناءه عن طريق الشركة. في البداية، تتم مراجعة دراسات أكاديمية مختلفة، عن الهياكل المؤسسية، وعلى الهياكل التي تعتمد على المشاريع، وعن الهياكل البديلة للحصول على فهم عميق للهياكل المؤسسية والتعرف على السبل البديلة المعتمدة في تطوير الهيكل والنظام لمشروع الشركة الداخلي.

وفي سبيل فهم التأثير الحقيقي للمشكلات سألنا الذكر على التطور العام لمشروع الإنشاء الداخلي، تم الانتهاء من وضع مفكرة المشروع من قبل الباحث وهو مهندس مدني وشارك منذ المراحل الأولى للمشروع. وتم تحليل البيانات التي تم جمعها ولوحظ عدم إمكانية التواصل الفعال ما بين أعضاء الفريق في الداخل و مع الإدارات الخارجية الأخرى وخاصة في عملية شراء المواد وتعيين مقاولي الباطن. فلقد استغرقت هذه المهام ما بين أسبوعين إلى ستة أسابيع وهو ما أدى إلى تأخير تسليم المشروع 8 أشهر عن الخطة الأصلية الموضوعية.

وبناء على تحليل البيانات، وإذا ما حددنا هدف الأبحاث بأنه التغلب على مشكلة سوء التواصل، يوصى بتطوير هيكل صغير يعتمد على المشروع يمكن جمعه عند اللازم، من خلال وضع العاملين في مجموعات من مختلف الإدارات وفك المجموعات عقب الانتهاء من المشروع. وعلى الرغم من ذلك، ففيما يتعلق بمشكلة المشتريات تم تطوير نموذج تغيير قوي يوصى بتطبيقه من جانب الإدارة العليا لتجنب المشكلات غير اللازمة التي تنتج عن فشل العمليات في المشاريع الداخلية .

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Chapter 1 - Introduction to the Research Problem

1.1 Background:

Every organization has its own suitable organizational structure developed and specific rules and procedures created that are expected to be followed. Combining both factors and adhering to them properly enables organizations to run their work operations and be able to achieve their goals. But at certain periods in their development some organizations have to reconsider their implemented structures, processes and procedures based on the market situation. This is essential if the organization is to keep pace with global change, be continuously developing and be able to compete with other competitors in the regional and global markets.

Taking the Construction field in the UAE during the period between 2005 and 2009 at the time of the economic boom and onset of world financial crises as an example, it is noticeable that many construction companies were founded during the growth phase in year 2005. Unfortunately, many of these construction companies ended up closing without any advanced notice and even simply announced their bankruptcy due to them not having a proper system to manage their companies be it structure wise or in contingency management processes and procedures. Even so, at the same time many other construction companies were willing to continue in the market and have survived by attending to their structures and processes. These survivors have applied either complete or partial organizational restructuring, redeveloping their processes and reconsidering their actual situation such as EMAAR, Dubai Holding and Dubai World which are the three major companies in Dubai.

In this dissertation a single research based case study is implemented in one of the semi-government companies “The Company” as it will be known is based in the UAE. The project in this case was the construction of three accommodation buildings with their own ablution blocks

scheduled to be completed within a period of 12 months, and in order to utilize the accommodation as soon as possible it was decided to divide the project into three phases (4 months per phase). The plan was to execute the project in-house by utilizing the company's own resources. Unfortunately, due to a lack of adequate communication between the different parties and non-availability of project-based structures combined with the company's slow existing procurement processes and procedures the first phase of the project became delayed by 8 months.

This basically occurred as a consequence of The Company not having a proper structure to control the construction and utilize the resources properly and because the procurement required completion of complicated processes that cause unnecessary delays in term of material purchasing and sub-contractor appointment.

1.2 Aim and Objectives:

The aim of this case is to investigate in-depth how the lack of project-based structure and procurement methods in a company influences the progress of the project and then examine how these problems can be overcome.

To make the aim achievable, five objectives were developed for primary and secondary research in order to gain relevant information and accordingly suggest a solution for the future phases as below:

1. Learn about organizations and project-based structure based on research reported in the literature on business management and project management.
2. Study, explore and implement the Hard Systems Model of Change using action research methods.
3. Describe and evaluate the company's structures as a secondary data case study.

4. Explain the procurement's processes and procedures used in the company for material purchasing and sub-contractor appointment.
5. Analyze the project-based organization and procurement in the case study and make recommendations for appropriate changes toward project management methods and organization.

1.3 Scope

Explore the main problems that lead to late delivery of phase one of the company's in-house project by examining how project-based structure and procurement processes caused unnecessary delays.

1.4 Research Approach (case study and action research):

In order to achieve the aim of this research the objectives were followed and achieved. A single case study and action research methodology was selected. This involved the researcher, a civil engineer, in requesting and gathering necessary data related to the project in terms of the construction progress, material purchasing and sub-contractors appointment and recording the project activities and events. The project was recorded using participant observation methods and subsequently reflected upon further by writing up notes using a project diary method which in turn provided reliable information relating to the case study method and facilitated analysis and interpretation during the phases of action research.

1.5 Overview of chapters and contents:

The dissertation consists of eight chapters. Their contents are summarized below:

Chapter 1: Provides a brief background to the case study and states the aim and objectives that need to be achieved in the dissertation in order to overcome such project delay problems in the future.

Chapter 2: Defines organizational structures and plans the size elements of the organizational structure. Presents project-based structures and alternatives of organization and makes an appraisal of the development of the field of project structure through comparison between the ‘old’ and ‘new’ approaches to project structure.

Chapter 3: Presents ‘The Company’ in term of its history and business operations. Defines the purpose of the specific project being studied and explains the current organizational processes and procedures being implemented by the relevant departments.

Chapter 4: The methodology chapter describes the data collection through keeping a project diary, reflective practice and researcher participant observations. The chapter also describes the action research agenda and explains the Hard Systems Model of Change. Then, it states some research limitations of the study evaluating how the case study involved specific organizational and resource constraints.

Chapter 5: Presents facts and information gathered from the project using the project diary method and, based on the provided information, demonstrates how the lack of project-based structure and inadequate procurement process negatively impacted on construction project progress.

Chapter 6: Explains the Hard Systems Model of Change and presents a developed HSMC to be implemented for the future phases of the project.

Chapter 7: Further analyses the actual situation of the company and provides a general discussion, comparison and synthesis between the information presented in Literature Review Chapter 2 and Case Study Implementation described in Chapter 6.

Chapter 8: Gives recommendations for the different parties involved in the project so that these problems can be avoided and overcome. The intention is that these shortcomings should not be repeated during other phases of the project and in future in-house projects. This chapter concludes on the most viable project-based structure that can be assembled at any time to be followed and implemented as and when required.

Chapter 2 - Literature Review: Organizational Structure and Project Forms

2.1 The need for transformational change

At certain time any organization should review its current organizational structure according to its ongoing situation. Where it might be necessary to add changes, re-design the structure as a whole or create a sub structure in order to keep pace with the world development and in order to pursuit other organization in term of competition and quality.

Organizational structure is the organized sequence of relationships between various functional departments or wings of an organization. It outlines and describes the flow of communication, hierarchy of control and authority. It separates and recognizes individual functionalities and helps in understanding the relationship among them. Stacy (2003, p.62) in Burnes (2004, p.79) defines organization structure as ‘the formal way of identifying that is to take responsibility for what; who is to exercise authority over whom; and who is to be answerable to whom. The structure is a hierarchy of managers and is the source of authority, as well as the legitimacy of decisions and actions’. However Tetrick et al (2004, p.747) ‘refers organizational strcuture to the processes by which individuals within an organization itneract with one another and with indiciduals outside the organiation’.

Relating the pervious definitions with the process of development of a new structure, it is important to consider the six elements of organizational structure development. Robbins et al (2008, p.553) state that ‘there are six key elements that managers need to address when they design their organization’s structure: work specialization, departmentalization, chain of command, span of control, centralization and decentralization and formalization’. The followings are brief of the key elements:

2.1.1 Specialization:

The work should be divided into different majors in order to achieve efficient and effective outcomes. That can be achieved by dividing the work into different components which improves the performance of the work. 'Specialization refers to the diversity of operations performed within an organization. The organization may group similar areas of specialization into functional groups such as production, sales and finance' (Tetrick et al, 2004, p.749).

In addition Anderson (1988: in Asopa et al 1997 p.15) illustrate that 'work can be performed much better if it is divided into components and people are encouraged to specialize by components'. Moreover specialization helps the workforce to apply the knowledge gained so that it betters the quality of work and leads to efficient organizational performance. Along with this it improves and develops positive attitude, openness to communication and relationships among the members and staff. Asopa et al (1997, p.16) says 'specialization enables application of specialized knowledge which betters the quality of work and improves organizational efficiency. At the same time, it can also influence fundamental work attitudes, relationships and communication'.

2.1.2 Departmentalization:

Departmentalization refers to the grouping of similar activities. It includes molding of different types of tasks present at the same hierarchical level. Luthans (1986: in Asopa et al 1997, p.17) states 'departmentalization is a process of horizontal clustering of different types of functions and activities on any one level of the hierarchy. It is closely related to the classical bureaucratic principle of specialization'. In addition departmentalization can be based on different categories such as purpose or function or place or product. Departmentalization will basically help one to work with his/her own domain related persons, improve their knowledge and increase productivity.

2.1.3 Chain of command:

Chain of command helps in achieving coordination among the staff of the organization. It also helps in knowing the level of authority and reporting line of employees within each department of an organization. Chain of command helps the lower level of authority to refer to the upper level when they reach to a situation that doesn't allow them to take an action.

There are two principles of chain of command; the first principle is (authority) which refers to the power and responsibilities that a certain position has in order to give orders and expects to be done. The second principle is (unity of command) which refers to the rule that every person in the organization must hold responsibility to only one person superior to. The employees should receive commands and orders from that person only to avoid any disturbances and achieve easy work flow within the department which further leads to the organizations' success. In addition Fayol (1949: in Asopa et al 1997, p.16) considered that 'principle of unity of command to be the most important principle for efficient working and increased productivity in an organization'

2.1.4 Span of control:

Span of control shows number of employees that are reporting to one superior or boss. Ouchi et al (1974, p.357) defines span of control as 'the total number of subordinates over whom he has some authority, responsibility or control'. Moreover Garvin et al (2008, p.113) says that 'an important multiunit design choice is the span of control – that is, the number of field managers reporting up to each level'. Span of control is varying from an organization to another, in some organizations the span of control can be wide with several managerial levels and results into sufficient work productivity but increases cost. In other organizations the span of control can be tight with fewer managerial levels but reduces cost of managers and give less productivity due to the decrease in the supervisory level. It is important to review span of control from time to time

to make sure that the current span is taking employee's attention and is delivery work effectively. 'Multiunit enterprises frequently reset spans of control to keep within limits the number of managers reporting to each level, thereby guaranteeing that every employee receives sufficient attention' (Garvin et al, 2008, p.117)

2.1.5 Centralization and decentralization:

Centralization and decentralization are related to the process of decision making within the company. Hunber (1985, p.495) says 'decentralization/centralization are 'fundamental principles of organizational structuring'' of an institution dealing with the fundamental organizational problem of balancing work distribution and coordination, which can only be solved through simultaneous centralization and decentralization'. Centralization refers to the process that the approvals should go through different approvers in starting from the requester to the department's manager and in some organizations to the CEO. Decentralization refers to the process where the lower level employees are allowed to make decisions based the level of authority they have and on the criticality of the issue. 'The term centralized indicates that authority to make important decisions lied toward the "head" or centre of an organization, while conversely decentralization implies more autonomy, whereby authority is vested in those further removed from the centre' (Cummings, 1995, p.103).

All organizational structures have both centralized a decentralized decision making powers but they vary in the nature of degree. This degree depends on the top level permission in making decision for the lower levels. 'Every organizational structure contains both centralization and de-centralization, but to varying degrees. The extent of this can be determined by identifying how much of the decision making is concentrated at the top and how much is delegated to lower levels. Modern organizational structures show a strong tendency towards de-centralization'. (Asopa et al 1997, p.18)

2.1.6 Formalization:

Formalization refers to the process where it verifies the extent to which tasks or roles in an organization are varying or specialized. It depends on the diversification of the organizational process and products. It varies amongst the organizations depending on the type of industry or business into which it is prominent. Tetrcik et al (2004, p.748) states ‘formalization refers to the extent to which there are formal rules, regulations, and policies in an organization. These formal rules and regulations control the behavior of employees, institutionalizing practices and procedures that have been successful in the past’. While James et al (1976, p.80) defines formalization as ‘the extent to which rules, procedures, instruction, and communication are written and the degree to which roles are defined’.

In addition to the above when the formalization is high the job behavior will be well programmed and employees will be having a minor deal of freedom in their work. However the level of formalization is vary in every organization and it can also vary within the same organization between the different departments or type of works.

2.2 Bureaucracy organizational structure

In general there are many key models of organizational structure such as the bureaucratic structure, matrix structure, virtual structure, boundaryless structure, networks structure etc. The bureaucratic structure is the most common structure being used in many organizations where it is also known as the traditional organizational structure. ‘The German sociologist Max Weber is the one who defined and expanded its meaning and indeed maintained that it was the only effective way to organize work’ (Burnes, 2004, p.80). In addition the bureaucracy structure is divided into three main functional areas (Marketing, Production and Finance) and this type of structure can be tall in nature and flat and has the senior management at the top level.

Nevertheless Max Weber introduced the concept of bureaucratic organization and illustrated that it is the best suitable model for an organization's establishment, as the Sage publication (2007, p.81) illustrates 'in delineating the key features of bureaucracy, it is useful to begin with what the German sociologist Max Weber (1864–1920) referred to as an ideal type'. However with advance of technology and enhancement of innovative products, this traditional structure is being revised to many other structures. Still, bureaucratic structure acts as a base for all the other organizational structures.

It is common that the bureaucratic structures are most effective at major organizations where it helps in reducing the task performed by the members and staff and in some situations it converts the work to routine. Adler and Borys (1996: in Ruab 2008, p.181) illustrates 'conceptual work on bureaucracy has suggested that bureaucratic organization structures have a tendency to undermine organizational commitment, limit innovation and restrict employee's motivation to engage in entrepreneurial "non-routine" tasks". In addition the routine work will not require or allow major creativity and innovation but it will require work force which follows the set and established process and procedure and work according to these rules sincerely and honestly. As centralization and formalization are two concepts of the bureaucratic structure they negatively impact on the innovation, where Aiken & Hage, (1971) and Pierce and Delbecq (1977: in Damanpour 1996, p.151) say 'centralization inhibits innovation because a less participatory work environment reduces organizational member's awareness involvement and commitment by limiting information available to them' (see: Pierce & Delbecq, 1977). Thompson (1965: in Damanpour 1996, p.151) continues 'formalization negatively affects innovation because emphasis on rigid rules, job description and formal authority inhibits creative problem solving and discourages the generation of new ideas'. However this can be specially found in large and complex public sector organizations and government firms. Though it is a routine kind of task, the established processes and procedures make the work flow very easy and simple.

Explaining the pervious paragraph and taking one of the major authorities' process and procedure in the UAE such as Building Authority we can take the process of obtaining a building permit as an example of pure routine work. As first step a consultant should submit the drawings to the authority, and then the document's controller within the authority separates the drawings into electrical, mechanical, structural and architectural drawings. These drawings get forwarded to each of the pervious mentioned department's manager by turn the managers assign an engineer to review and comment. Then the managers review the engineers comments and then approves or rejections the submission accordingly. After that the comments are forwarded to the department's director to issue the approval or rejection letter. In case of rejection the consultant will have to submit the drawings and to go through the same process.

In case of approval, the contractor will submit the approval letter along with other documents to the authority. The document controller forwards these documents to the civil department's manager and in turn the manager assigns a civil engineer, building inspector and HSE inspector to review the submitted documents. If all documents are provided and approved the manager issues a building permit and send it to the department's director for signature. In case of rejection the contractor will have to resubmit the submission. This process is a routine that follows a work flow and has got a line of authority and control. On the other hand to ensure quality and on time completion, the whole process is protected by a time frame from the date of submission to the date of follow up by the submitted party (consultant or contractor).

In the above discussion, the department's director controls the managers who control in turn the engineers. In this way, bureaucratic structure establishes a clear cut line of control and authority with well defined roles and responsibilities for each member involved in the structure. In other words this type of structures is well centralized and controlled.

In addition to the above, there are two types of bureaucracies. Standard bureaucracy which has efficient productivity based on regular standard set routine and professional bureaucracy which has efficient productivity but in complex works. Moreover it has been

identified that the first type requires high technical employees since it is based on the functional aspects and it requires large number of mid level managers. In contrast, the second type requires high specialized well skilled employees with few middle managers (Mintzberg 1981: in Asopa al et, 1997).

In general bureaucratic organizational structures helps the organizations in various ways by establishing a clear way to understand the actual business function of each individual involved in the organization.

2.3 Project-based organization forms / Project-based structure

In addition to the common functional organizational structures such as the bureaucratic organizational structure and other organizational structure types mentioned earlier, organizational structure also depends on the products and service that the organization is producing or developing. One of these structures is the project based structures which is mainly used in project-based organizations. Thiery (2007, p.649) refers project-based organizations (FBO) 'to a variety of organizational forms that involve the creation of temporary system for the performance of project tasks'. Moreover Defillippi and Arthur (1998: in Thiery 2007, p.650) 'identified project-based enterprises as organizations that manage production functions within a temporary project organizations setting'. Hence we can understand that the project-based structure is a structure that is developed for organizations that are managing production, this production can be called a project which requires a delivery within certain time, cost and at specific level of quality.

On the other hand many organizations have changed its core structure and transformed to project-based organizations. Soderlund (2008, p.42) mentioned that 'research has pointed out two important reasons why these forms of organizing have become the core of many modern firms and industries'. The first reasons is 'character of growth industries' Mintzberg (1979: in Abdulla Mohamed Abdulla Bahroozyan - 80131

Soderlund 2008, p.42) and the second reason is ‘the transformation of mature industries’. Soderlund (2008, p.42) continues ‘the most evident advantage of project-based forms of organizing includes the possibilities of local cross-disciplinary problem solving and learning across disciplinary domains’. This statement illustrates the important of this type of structure to a project in term of problem solving where the problems can be solved through the team members rather than depending and hiring outsourced people and expertise.

In addition, project-based structure doesn’t necessarily need to be the organization’s core structure as many organizations has no products to products but from time to time they handle certain projects that requires them to supervise and look after. Bredin (2008, p.567) says ‘in project-based organizations, people spend a large part of their time working in various types of temporary project constellations. However, that does not necessarily mean that more permanent structures and processes in the organization are downplayed or non-existed’. Therefore a project based structure can be developed as a temporary sub structure that meets the standards and be used during the lifecycle of the project based on the project’s requirement.

In general there are two types of project organizations have been identified: project led organization and project based organization. In the project led organization the need of project is more important than the functional influence on decision making and coordination across project lines occurs while in the project based organization the project represents that core business of the organization with no formal functional coordination across project lines Hobday, (2000: in Thiery,2007). Blindebach-Driessen (2006, p.546) also agrees on the pervious statement and he mentioned that ‘the project led organization has characteristics of a functional firm, since there is some coordination of functionally equivalent’, on the other hand Blindebach-Driessen (2006, p.546) also mentioned that ‘the project-based organization is an organization in which the functional organization has become completely obsolete, without formal functional coordination of activities’.

The project based structures consists of project teams which are autonomous and independent in nature. According to the requirement of the project, different employees from different departments assemble together; dedicate their knowledge, skills, efforts, time and work together in order to reach the scope and objective. This team acts and report to one superior where in many cases is called the Project Director. The project director is responsible of completing the project and selecting his project manager/managers based on the complexity of the project and accordingly each manager is responsible for the recommendation of his members and holds responsibility for the selector of the team. The process of project structure development and member selection helps in reducing uncertainty and confusion that occur at the beginning for every project. Therefore this structure helps in defining the relationships between the employees between each other and with the external environment (ReliefWeb, 2007). In addition the structure can be dedicated toward a single project for estimated project duration and then and the team will be broken when the project is completed.

Linking project-based structure to the construction field it is observed that project scope is the essential function of project management and this scope in the construction field can be the completion of the project. However it is suggested that time, cost and quality of performance to be treated as constraints which influenced by the relationships (Kelley, 2002). This relationship can be the relation between the different employees within the project team as their effort will mainly affect on these constraints.

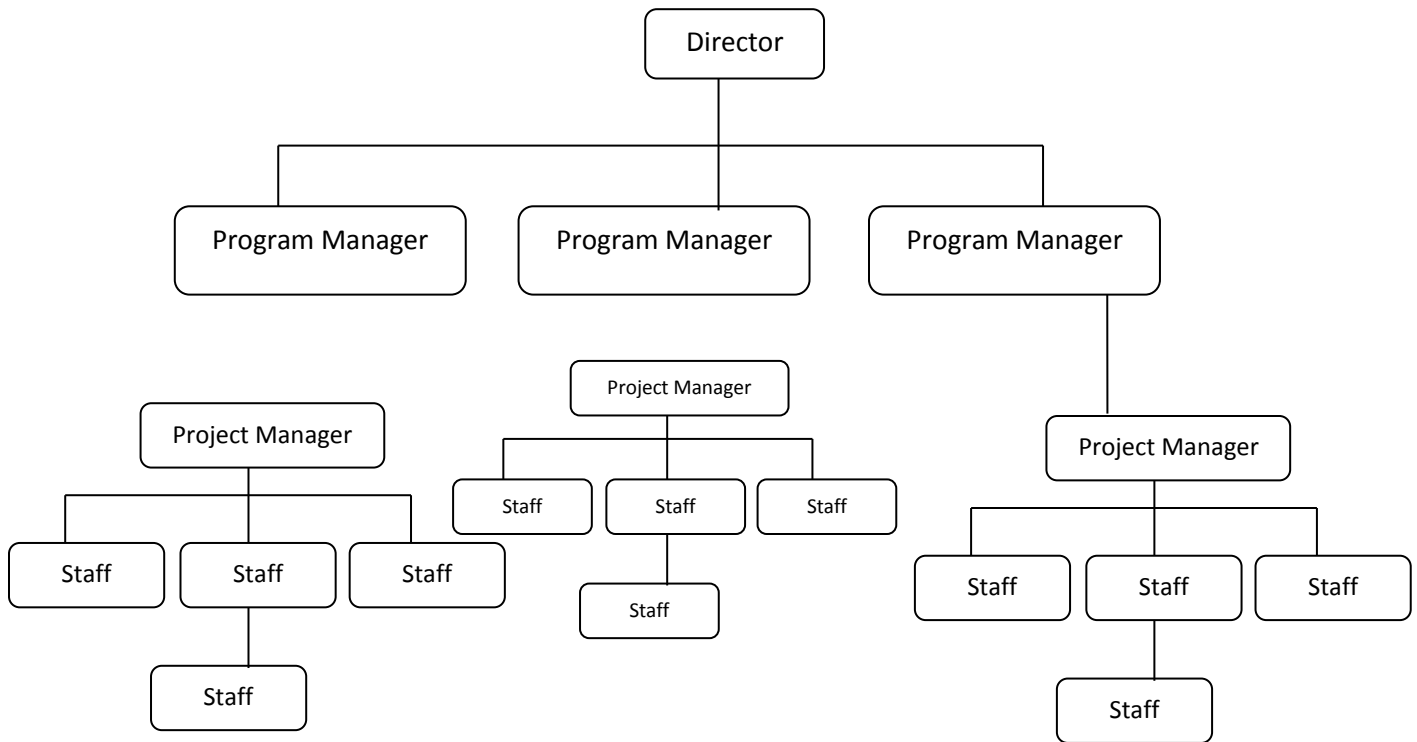


Fig: A sample project based organizational structure

(ReliefWeb, 2007)

The project-based organizational structure doesn't defer from the other type of structures. This structure also includes the six elements of organization structure development such as the specialization, departmentalization, chain of command, span of control, centralization and decentralization and formalization but it defer in the level of this factors such as level of authority and hierarchy based on the size of project and project requirements.

Designing project-based structure must be done in a way that makes it easy to be implemented. Effective implementation included clear line of communication and information flow both ways upward and downward. The structure's development should be in way that the phase needs and project needs can be easily met, executed and dealt with.

2.4 Alternative structures for the corporation

Along with the pervious mentioned bureaucratic and project based organizational structure, there are other alternatives available for organizations to follow based on nature organization, type of business, number of employees and nature of the relationship between these employees. Ellis et al, (1988, p.12) says ‘organizations have at least three structures: the one on paper, the one people believe exists, and the one actually in place’. The below are some of these alternatives:

2.4.1 Matrix organizational structure:

The matrix organizational structure is one of the structures that are useful for projects. ‘It is ‘a well-known organizational structure which relies on multiple reporting relationships that can lead to confusion, divided loyalties and lack of a unified sense of direction’ (Ellis et al, 1988, p.12). The structure combines of two types of departmentalization, the functional departmentalization and it contains employees with similar specialization which reduces the number of employees but it allows resource sharing which result into project delay and cost increase. On the hand there is the product departmentalization which aim on time delivery and within cost, provide clear responsibility for employees but it duplicates the activities (Robbins et al, 2008).

In functional departmentalization of the matrix structures there can be more than one project manager that depend on a shared resource pool, and therefore they don’t have permanent access to the required resources at any period of time during the life cycle of their project. This pool is usually controlled by a resource or functional manager. Accordingly having access to these resources represents a challenge to these project managers hence they must prepare a proper preplanned resource utilization schedule and submit it to the resource pool manager so that they book these resources for each project at the required time. However if a sudden change

applied to the project schedule might cause resource unavailability as they might be utilized in other projects.

In addition benefit of the structure is that same resources can be utilized for different projects therefore it doesn't require to add cost of resources on each single project which as consequence will result into saving and increase profit. On the other hand it will shared resources can result into on time project delivery as project managers will have to stick to their plans and schedules as minor changes will cause major delays.

In general the advantages of the matrix structure is its ability to facilitate coordination in multi-projects organizations, the level of communication is strong, facilitates the efficient allocation of specialist and it allows maximum utilization of resources. On the other hand its disadvantage is that it create confusion atmosphere and places stress on the employees (Robbins et al, 2008)

2.4.2 Virtual organizational structure

The virtual organizational structure is one of the structures that are being developed at large scale, it is also known as network or modular structures. In term of structure form it is very well centralized with minimal departmentalization, it allows each project to staff its own talent required employees instead of selecting employees available within the organization. On that other hand the virtual structure has maximum number of outsourced resources be is employees or other organizations that provides services which requires a good relationship network and strong communication skills. The core of the structure contains of several employees and some cases can be only one, the responsibilities of these employees are to looks after and supervise the work progress and coordinates between the different outsources resources in order to deliver the project (Robbins et al, 2008).

Based on the above it is obvious that the virtual structure allows employees and concerned parties to work from different locations for the project purposes with assistance of IT advancement such as emails and video conference calls. This means that the different resources from different locations work individually but represent a team that work toward a common goal. Overall this type of structures are currently being used in Boeing company where it can be found that the main body of the airplanes are being constructed in USA, while wings are being constructed in Japan and many other parts of the plane are being manufactured in different locations but at the end they all work together to assemble a full plane in one location. This step will basically help reduce cost where it is obvious that manpower cost in Japan is less than USA which results in cost reduction and profit increase.

This structure is being used in many organizations and taking construction companies as an example, we can find that there are many contractor companies that have the company, engineer and a foreman but they execute many projects (G + 1) villas at the same time by hiring laborers from different sub-contractors. But unfortunately these contractors are not always successful as they don't coordinate successfully, have weak communication, weak planning and bad relationships with their resources; however most of these companies don't recognize that they are following the virtual structure and they just use the structure unknowingly. In contrast there are many contractors who have succeeded due to using the same structure but in a proper manner with well coordination and strict planning.

In general the advantages of the virtual structure is that it doesn't require a huge amount of capital, doesn't require a big number of employees, is flexible in nature and encourages innovation. There are many organizations that started with zero amount of cash and succeeded to gain hundreds of thousand dirham in few months based on strong relationships and good communication such as supplying digital cards for major organizations. On the other hand the disadvantage is that bad relationships and poor level of communication in delivering the information will result in project delay, poor quality and increase cost.

2.5 Project Management: Combining ‘old’ and ‘new’ ideas on project organization and structure.

In this section two articles will be presented and discussed, these articles are basically talking about the different types of project organization structures that are being used and role of project managers in these structures. One of these articles is old and was published in the year 1990 while the other article is new and was published in the 2010. However both articles have been written based on a study made at different organizations in different countries related to the type of structure being used and level of authority and responsibilities given to the management.

2.5.1 International comparison of project organization structures: use and effectiveness (Article from 1990)

The aim of this article was to understand and evaluate the feasibility of the project organization structure used in different countries from different areas such as Asia, America and Europe and to understand whether the current project organization structure being used are useful or not and what is managers opinion regarding their structures. The study basically was made to cover two fields’ construction field and development field using questionnaire method and most of the responses were from project managers whom were representing the middle level of the organizations.

However as the case study in this report is related to the construction field we will consider the result gained from the construction field. The results show that there were 5 types of project organization being used in these companies.

➤ *Functional organizations (A):*

The results showed that in this structure there was no project manager and the projects were being coordinated between functional manager and upper management which show that the functional manager has no authority and is basically a coordinator.

➤ *Functional matrix (B):*

The results showed that in the functional matrix the role of the project manager is to coordinate between different departments involved in the project with a very limited level of authority.

➤ *Balanced Matrix (C):*

In the balanced matrix the result showed that project manager oversees the projects but he/she shares the level of responsibility and authority with other functional managers for the completion of the project.

➤ *Project Matrix (D):*

In this type of project structures the results illustrates that the project manager oversees the project and has primary responsibilities and level of authority in term of decision making to things related to the project.

➤ *Project Team (E):*

The results show that the project team structure is the structure that puts the project manager in charge of the project team with high level of responsibilities and authority and comparing to the above structures in this structure the project manager is independent and doesn't have to coordinate with functional managers.

In addition to the above the results shows that the majority of the organizations which are located in Europe and America are using type A, B and C structures while others are using D type and minority are using the E type. In addition referring to the project managers it was obvious that majority of the project manager prefer using D and E type of structures in their project in which they can have more control, authority and decision making choices. Nevertheless the study showed that the E type structure is being widely used in Japan which can be one of the reasons of why this small country in size and poor in term of resources is very successful in term of construction as well as development and competing major economies (Gray et al, 1990).

2.5.2 An Alternative Taxonomy of Project Management Structures: Linking Project Management Structures and Project Success (Article from 2010)

The aim of this article was to understand how the different type of project structures and the level of authority and responsibilities given to project managers affect the success of a project. The study was made based on data collected from 600 companies in United States and Germany that used different type of structures such as project coordinator, supervised project coordinator, autonomous project manager, supervised functional project manager and autonomous functional project manager in different type of organizations (functional , product and matrix organization). However the article included different hypotheses where two of them are related to our case study. The first hypothesis included multidimensional approaches related to project manager's level of authority (the authority delegated in the project matters and in project-related personnel issues) and project manager's level of responsibility (responsibilities related to project matters and outcomes and responsibilities in functional matters) and steering committee while the other hypothesis included the relationship between the project structure and project success.

The questionnaire was distributed to project managers in different companies in the previously mentioned countries and they were requested to fill this questionnaire for one successful project and another failed project that has been completed already and values 500,000\$ and above. The results showed that most of the project managers had no failed projects

due to their experience, and these results were analyzed using computer software to get the correlation between the level of authority and responsibilities with success of a project and the type of structure used and the success of the project.

The results supported the first hypothesis that is related to project manager's level of authority and responsibilities and showed that there was a significant correlation with the project success. The results have also illustrated that in the project coordinator and supervised project coordinator structures the project managers have very low level of authorities and responsibilities and their role is tend to be mostly coordination. On the other hand the results showed that the autonomous project managers have high level of authority and responsibilities over the project and people and therefore they tend to be more successful in their projects. Finally the results suggests to avoid the project coordinator structures as it represents the worst as there are not specific personal with a level of authority to make critical and important decision related to the project.

The articles concludes that high level of authority and responsibilities gives the project manager heavyweight within the project and advices that the choice of project structure is important decision as the structure type affect the project performance and success (Lechler et al, 2010).

2.5.3 Comparing 'old' and 'new' ideas about the project structures and role of project manager & recommending the best structure for the company's context

Comparing both studies made in the 'old' and 'new' articles we can notice that the study made in the in the 1990 was shallow and was about knowing the type of project organizations being used in the organizations and role of project managers and their involvement in these structures. It is

also noticed that in the past the project managers didn't have huge level of authority and responsibility in their projects which might be because there were less projects than these days and the top management had more time to be involved in every single project and force their decisions and authorities on the project managers.

On the other hand it is obvious that recently there was more focus on the role of project managers and their involvement in their projects where in the new article it is clear that the study was mostly focusing on the level of authority and responsibilities given these managers in the projects. Moreover from the results it is well understood that nowadays project managers are more involved in the projects and having a certain level of authority and responsibilities based on size and nature of the projects and in return this resulted into a successful project delivery.

Based on the information provided in this chapter, studies analyzed from the 'old' and 'new' articles and our case study, it is recommended to develop a mini project based organizational structure that includes autonomous project manager with high level of authority and responsibility over the project and the personnel involved in the projects that occurs from time to time. However this recommendation will be explained and described in detail in the recommendation and conclusion chapter.

Chapter 3 - Case Study Overview: The Company and The Problem

3.1 The Company

The ABC Company which will be named as 'THE COMPANY' is a major public joint company. It is owned by one of the major holding companies that is owned by the Government of one of the Gulf Countries which holds a 70% interest and another company that owns the remaining 30%. 'The Company' was established early 1970's to provide facilities and services related to fabrication of steel structures required for major oil and gas companies in the world. At the beginning of its establishment 'The Company' was working under the umbrella of a mother company and used to service the different sister companies within the same group.

In the early 2000's after years of experience and admirable reputation within the mother company, the management decided to transform the company from a member within a group to a leading company in the Middle East and the world after being completely independent. However from early 2000's up-to-date 'The Company' grew significantly through considerable development by producing its own coated pipes, pressure vessels and by providing successful offshore services in term of pipe laying, installation and hook-up works. This basically allowed 'The Company' enter international markets and be globally active. As a result of this unique decision making 'The Company' was transformed into major international petroleum contractor that is able to provide onshore and offshore services to major oil and gas companies by having its own complete engineering department.

As a consequence 'The Company' got awarded many major international projects in different countries in the Middle East region as well as North Africa and it is currently in the process of opening a regional branch in North Africa. At the same time due to the increase in the number of the major projects; the number of management employees increased to more than

2,500 while the number of labouring employees reached up to 7,000, however this number is various based on the number of ongoing projects and projects requirement.

Unfortunately, with the company's high speed expansion and major projects, the management focused on the development of its construction and fabrication rather than focusing on the entire company as the development of the yard will mean ability of getting major project and as these projects represent the company's core business.

Moreover the overall processes and procedures of the departments in term of communication and purchasing purpose didn't change which might be because the current processes and procedures are still valid and useful for the company's projects which represents the core business. But these procedures cause delay to company's internal in-house projects that takes place from time to time for expansion purpose such as construction of new accommodations, upgrading the offices and other electromechanical works which represent our paper's problem.

3.2 Purpose of project

Few years after 'The Company's' independency and entering global markets, it got awarded many mega projects in many regions of the Middle East, North Africa and South Asia. As a result there was a need to increase the number of employees within the company to be cable of delivering these projects on time. Accordingly the number of labourers who are working on the projects increased to more than 7,000. However this number is always variable to more or less depending on the number of ongoing projects

In order to reduce the expenditure and increase the profit 'The Company' is having its own accommodation located within the company's boundary and these accommodations are various between 'Portakabins' (porta cabins) and permanent buildings. But at the present the available permanent accommodation are not enough and there are shortages in the number of bed spaces by approximately 800 during the peak timing, where the camp admin can serve up to up to approximately 6,500 juniors during the peak.

Therefore and in order to increase the number of bed spaces. A study was made by the camp admin section which is a part of Administration department with coordination of other departments and recommendation was given to provide additional 1000 bed spaces to serve 'The Company' for the next 5 years. Accordingly the management approved the recommendation and instructed start the construction after making further studies related to cost estimation and time required for further approvals. As an immediate action 4 mega porta cabins (accommodation type) that can accommodate up to 960 beds were brought from pervious construction sites and were completely renovated to meet the authorities' and HSE's standards to be suitable for living. However this action has been taken as renting outsource accommodations will cost approximately AED 1350 per person per day and in case of 960 beds, it will cost the company AED 1,296,000 per month during the peak times excluding transportation charges.

3.3 The Project

The project is construction of 3 (G+1) residential accommodation blocks with three (G+1) Ablution (toilet) blocks, where every accommodation block has its own ablution. The project is located within the company's boundary and the total built up area of each accommodation block is (3072 square meters) while the total built up area of each toilet block is (1250 square meters) with a total built up area of (129600 square meters).

According to the initial cost and time estimation made by the different departments (Yard for fabrication for steel structure, Plant for electromechanical and Administration for civil and camp requirement) a budget of AED 6.6 million was allocated by the management. This number is increasable based on clear and convincible evidence. A period of 12 months was estimated for the complete project to be delivered.

The management decided to construct the project internally by the company's resources as the buildings were designed to be steel structure which is specialty of the company and because the cost and time estimation given by the yard manager who will be known as the 'Project Manager' was much less than the other tenders prices. This is supported by Kini et al (1999, p.30) where he mentioned that 'in the current business environment, money is tight and clients are looking for engineering companies that can provide the best product at the lowest cost'. Out of the different proposal submitted by sub contractors, one of estimations was AED 9.8 million with 24 months construction period while another contractor estimated the project for AED 14 million with a total construction period of 18 months. As the given prices by the different contractors was exceeding the budgeted amount and the set construction period, the management decided to construct the project internally led by the Project Manager.

Accordingly in order to facilitate the construction process the Project Manager decided to divide the project into three equal phases (each phase consisted of one accommodation and one ablution) rather than constructing the full project and open a big front and enter the unknown of construction world. In addition a budget AED 2.2 million was allocated for each phase with a time frame of 4 months for the completion of each phase. This step was done in order to determine whether the first phase is going to be completed within the allocated budget and set time considering company's available resources and procedure for material purchasing and manpower supply.

3.4 Current situation & the problem

The problems that are going to be presented and discussed in this paper are divided into two areas the first area is structure of the project team and the second area is material purchasing and contractor appointment processes. The below is a detailed description of the current situation and the problem of both areas.

3.4.1 Structure of project team

Currently when there is a project that is related to company's core business and exceed a certain value in (million dollars) it is being handled by the Project's Department where a Project Director is assigned to handle the project. While when it comes to construct in house project that is small in value and doesn't reach the amount that allows the Project Department to assign a Project Director, then the project is being handled by different departments which results into different problems starting from communication to execution.

➤ Project Team in the in-house projects:

As the accommodation construction is the first major in house project within the company, it requires involvement of different departments as below:

- ✓ **Yard:** for building construction, and following the overall progress of construction.
- ✓ **Plant:** for electrical works.
- ✓ **Procurement & Commercial:** for material purchasing and sub contractor appointment.

- ✓ **Administration:** for providing inputs in term of number of people, room etc., following civil works, and coordination between the different departments in term of electrical works, sub-contractor appointments and material purchasing.

According to the above and in order to complete the project successfully four departments must be involved and must be always coordinating positively. The challenge in this case would be the positive communication, coordination, actions and response between the different departments. This is basically because all of these departments are either overloaded or assigned and involved in other projects that make it difficult to assign a member for the accommodation project which represents a problem. Hence this problem can be solved or minimized by developing a project based structure and appointing a focal point from each department to be involved in the project.

3.4.2 Material purchasing and sub-contractors appointment

When it comes to purchase material or appoint a sub-contractor appointment for any project a requisition must be submitted through Material Management System (MMS). Based on the requisition type (material purchasing or sub-contractor appointment) the submission is forwarded to the concerned department. In our case these departments are Commercial and Procurement as below:

➤ Appointment of Sub-contractors:

When it comes to appoint a sub-contractor for a particular work, a service requisition must be submitted through the intranet system with full description of the required work and the deadline set for the work to be completed. Accordingly the sub-contractors section which is a section of Commercial department provides the drawings and work description (if any) to the sub-

contractors that are listed and invites them to visit the site and give their prices within a particular time (the timing is set based on the requestor). By the end of the given time, the sub-contracts section forwards the contractor's response to the requestor for technical evaluation and approval.

The above is a very well controlled procedure to be followed, but the process of appointment of a sub-contractor will take a minimum period of one month. This is due to the long process starting from the several approvals required from the requestor to the VP and due to the confusion between the sub-contracts department and the sub-contractor because of lack of experience to explain the required works. At the same time the requestor is not allowed to be involved in this stage but only to evaluate and approve the contractor. However the final decision of appointing the sub-contractor is in the hand of the sub contracts where they choose the lowest price from the approved list by the requestor.

➤ Material Purchasing:

On the other hand, when it comes to material purchasing, a Service Demand Voucher (SDV) form must be filled and submitted to the store in order to check the availability of these material. If not, then a requisition must be submitted through the MMS with a full description of the requested items and the needed dates. Accordingly the procurement opens tendering with minimum period of 7 days to get registered suppliers response. Then these responses are forwarded to the requestor for technical evaluation and approval based on the description and delivery period. Accordingly the procurement selects the lowest given prices by the different suppliers. Nevertheless if samples are required or are requested by the requestor then the approval duration will be delayed until the supplier provides the sample and gets the requestors approval.

Basically both of the above procedures are developed because they are very useful for the company's main activity, especially when there are a clear project time-line and requirement. Kini et al (1999, p.32) says 'the best way to procure equipments and materials is through a competitive bidding process that culminates in a negotiated price to meet all specified requirements. The price might not be the low bid, but would be the best price that included the cost of such factors as maintenance and operating costs'. Moreover in these projects the requestor knows when to submit these requisitions, while the developed procedures helps in saving money and avoid random unprofessional contractor appointment and material purchasing.

But the above mentioned procedures are not useful for the construction of the accommodation as most of the listed companies are related to company's main activities specialization and most of the listed suppliers are those whom deliver material related to company's main business but not building construction. Therefore the project team prefers to directly appoint their sub-contractors and have direct deal with the suppliers as their registration process take additional separate period due to the requirements such as interviews and visits.

In additional both of the above procedures don't guarantee lowest prices as both departments contact only the registered suppliers and sub-contractors. This will provide prices from suppliers within a tight circular while there are better prices provided by other companies. But these companies are not registered either because they not professional and not as per the company's standard or because they don't like the company's process in term of payment which takes minimum 30 days to release the payments.

In brief the problem in this case is centered about two areas. The first area is the challenge of making a successful coordination between the different departments and creating a strong project based organizational structure for a healthy communication and project delivery. The second area is about the long processes and procedures of the procurements and commercial departments starting from the long approvals required to the appointments.

Chapter 4 - Methodology

4.1 Single case study: “Construction of three accommodation and three ablution buildings”

The construction field can be considered as one of the most important fields for human beings especially when constructing residential buildings, accommodation buildings or even private villas as these types of buildings must always contain a specific level of standards and specifications that allow a human to live in them. One of the important things that should be noticed in the construction of accommodation is that they should be designed so that they comply with the legal framework of the surrounding region. In addition, these days and especially in the twenty first century, construction is defined as the transformation of designs that are turned into actual properties and buildings.

The problem discussed in this report is a single project case study; the project involves the construction of three accommodation buildings with their own private ablution blocks. These buildings are being constructed through the company’s own resources and managed internally by the different departments, and the participant is deeply involved in the project. Following completion of the project the accommodation is designed to serve up to approximately 1,000 people.

As discussed earlier, a construction project requires proper and disciplined design across different aspects such as building design, construction plan design, financial design and legal framework. These aspects then have to be translated and transformed into a successful project delivery of buildings and infrastructure that can be occupied by human beings. Moreover all of these design aspects and construction activities are translated into money and if any of them are

misestimated then the total value of the project will be changed which in return may result in project failure be it time, quality or financial parameters.

4.2 Reflective observation: ‘Diary Method’

When an engineer or an employee is in charge or involved in a particular project be it in the construction field or any other field that are facing problems or any specific problem it is important that they note and document the major activities and the observations that are seen or dealt with during the life cycle of that particular project. The observations made must be recorded in a way that it includes the data with dates. These data can be collection of activities, occurrences, events, instructions and observations that occurs during the progress of the project. These recorded observations will help other employees and research initiatives during the life cycle of the project or later on to assess the progress of the project and evaluated the performed works. Nevertheless recorded observations can be presented, analyzed and be used to show how the implemented processes and procedures affect the project’s progress and what the consequences were.

In this project, a civil engineer was personally involved in the project from the early stages and has been aware of the difficulties of material purchasing and manpower appointment. Therefore the civil engineer decided to engage in action research on the project which involved recording the data and making observation that are noted whenever major activities take place. Accordingly he decided to use a diary method of research, however the diary was not written on daily basis but when important things were happening such as requisition issuance, service order issuance, material delivery dates, activities start dates and activities completion dates.

The project diary is classified as a qualitative data collecting method. Qualitative data usually deals with the complete and detailed report of a project. Therefore in the diary method

the researcher which in our case is the civil engineer is the data gathering unit, the data can include writings in words, pictures or even objects (Silverman, 2002). Moreover in this type of approach the individual's work-based understanding of the project and the researcher's depth of knowledge on the topic are both important tools of analysis and evaluation, where the diary helps in analyzing and indentifying the project's progress in a qualitative manner (Silverman, 2002).

In addition to the above if a project diary is well detailed it will help with phases of project review and in recording the actual and environmental condition of a project by identifying the day-to-day situation, determining clear details of material and manpower status. A detailed diary can also contain a report of important minutes of meetings, conversations and decisions made for issues related to the project. This can happen when a project manager or the team members are involved in the project and able to state all the aspects of the project using the diary and reflect on the observations made during the progress of the project (Plowman, 2010). Accordingly, these facts once clearly known and understood, then the project diary can play an important role in the execution and review of a project due to the valuable information it provides. Diary methods of research can help project members in taking actions by analyzing the information in order to understand the main reasons and factors that lead to unwanted complications and difficulties in a project.

4.3 Participant's observation

The purpose of construction is to deliver a building for a specific use be it commercial, residential or malls. When constructing a project a participant observes that there are certain things that must be available, some of these must be available prior to the start, and some of them must be available while construction is in progress with the balance to be there at the completion stage.

One of these requirements that must be available from the start of the project is the building design which is prepared by a consultant or an engineering department. The design must be completely detailed according to the standards and contain all requirements in term of civil works and mechanical, electrical and plumbing (MEP). If the design is available then it allows the contractor or a project team to move on to the next stage which is estimation. Based on the provided drawings a quantity surveyor checks the requirements and makes the estimation accordingly. After than is it observed that the management or a client then approve a budget in order to execute the work.

Next material and manpower requirements are specified which must be available during the construction stage of the project. Any engineer involved in a project must observe whether or not his team has the resources that are needed to construct a project. These resources can be tools and machinery like shovels, JCBs, excavators and cranes, as well as building materials like cements, blocks, PVC pipes, steel, manpower to execute the construction like supervisors, masons, plumbers, carpenters, painters, electricians and helpers. However, if any of these resources are not available then the project can face obstacles and lead to delays and extra cost and sometimes lead to a low quality project.

Finally, the resources that are required after completion of the project and the building type will determine the types of resources required during construction and for maintenance post-completion. As the project in this case is an accommodation building then the observed requirements are building cleaning equipment, manpower for housekeeping purposes and continuing maintenance and operational cost to support these requirements on daily basis.

4.4 Action research

From the information provided in the ‘introduction to the problem section’, it is observed that the organizational and project problems we are dealing with having a degree of complexity as they have been applied for a decade and cannot simply be changed in a day. Therefore, in order to implement the changes it requires a Hard System Model of Change (HSMC) which in turn needs a major commitment to the proposed change by the involved parties. However, in both hard and soft systems, people are an essential component of all human activity systems and it is important to involve them as employers, employees, customers and stakeholders (Kirk, 1995). Moreover, Kirk (1995, p.14) illustrates that hard systems ‘can be used to predict the response of the system to changes in the environment, the model produces a convergent solution to any change’.

The (HSMC) is designed to be applied in situations that are described as hard, comparatively well-defined and complicated. The system describes a systematic method for determining problems and setting goals to deal with them in the best possible ways. Overall, the (HSMC) is considered as a method of dealing with situations that have high complexity. Hence when dealing with these kinds of complications and situations it is important to break the major problems down in to smaller ones, which will assist in understanding and analyzing the problem carefully, Accordingly, HSMC involves designing suitable options, evaluating them and ensuring that these options get implemented in a proper manner by determining performance measures to refer to when evaluating the results (Senior, 2002).

Explaining and exploring the (HSMC) in more detail, we can find that the system consists of three major phases. The first phase is called descriptive, in this phase a detailed diagnosing of the situation is made to describe the problem, understand what who are involved in the problem and setting objectives for the change. The second phase is options, in this phase different options are presented for the problem in order to have the choice of choosing the most appropriate option that can be followed. Finally the third phase which is the implementation

phase, in this phase the selected options are transferred into feasible plans that can be practiced and implemented, in addition in this phase measures are identified to evaluate the implementation results with the set plans (Senior et al, 2006).

In general and from the above it is obvious that the (HSMC) is used when difficulties are faced and hard situations are determined. It is also obvious that the system helps in developing a suitable solution to the hard obstacles that occur during the project lifecycle. In addition the created model of change must be valid to be applied, however a unique and different (HSMC) must be developed for every case based on nature and complexity of the problem.

4.5 Limitations of the research design

The reflection and observation used in this case study is limited to one type of information gathering which is the project diary method. However, there is only one person that has been requested to write this diary which means that the number of people involved in gathering information is limited to one employee only who is the civil engineer. Moreover, in the project diary method there can be margin of error if there were more than one participant as in the project diary every person writes the information based on what he/she has seen and if the diary is not filled on a daily basis or regularly enough at the time when action is taken then the participant might forget information related to these issues be it the date or other fact or observation.

Therefore in order to avoid the above problem, researchers can use other methods that enable gathering more information and avoid sample size limitations to a small number of employees. One of these methods is the questionnaire survey. In order to maximize the benefit of the questionnaire survey it is important to develop it in a way that it contains relevant information related to the case study's problem and provide the suitable options that can be

selected by the participants. In addition, the questionnaire survey helps to involve the maximum number of employees that are included in a project, and it allows the participants to fill the questionnaire responding without fear that their names are known since the purpose of a questionnaire is to gain information not to punish employees. Finally, the questionnaire approach allows gaining information in less time and within a specific period of time based on the request. On the other hand one of the disadvantages of the questionnaire is that it cannot give qualitative details of the answers and if rich details are required then another method should be followed for the same.

Another way of gathering information is the interview method. Again and similarly to the previous method the interview must contain valid questions that can be presented to the participants. These questions must be designed in way that the interviewer gets information related to the project's problems rather than just finding another problem or moving unintentionally on to another subject outside of the scope of the research aim and objectives. It is preferable that interviews are held with key people involved in the project or a problem as interviews take longer time to get the answers from the time of request for a meeting to the interview event. Moreover, interviews assist with gathering more information than the questionnaire in term of variation and details and as most of the key people often will have privileged access to information that other employees do not.

In addition to the above, Mitchell et al (2007, p.254) illustrates 'to conduct a successful survey, you must meet three objectives. First you must know what your research hypotheses are so that you know what you want to measure. Second, your questionnaire, test, or interview must accurately measure the thoughts, feelings, or behaviors that you want to measure. Thus, you must be able to generalize your results to a certain specific group. This group is called a population'. This demonstrates the above discussion that the generated questions in all types of data collecting must be always selected in a way the it allows to gather answers related to the project, however, the population mentioned means the participants where in this case can be the project team member and other department's employees.

Chapter 5 - Results: Project Diary

5.1 Facts from the project diary:

By reading and comprehending the project diary it is seen and well understood that the project diary has recorded many activities from day one including major activities that shows the path of the project, however this diary was not written on daily basis but when activities were taking place and decisions. Considering the facts from the diary and referring to the dates many valuable information are noticed to be analyzed and presented. This will help in showing how the processes and procedures of the company as well as lack of communication between the different departments have affected the project delivery. The below are some facts presented from the diary, these facts are categorized into different categories related to designing stage, contractor appointment, material purchasing and construction progress.

5.1.1 Designing stage:

From the project diary it is known that the detailed foundation drawings of the accommodation building were submitted by the Engineering to the Administration on 5/5/2010. This means that the actual communication between the different parties for the in-house project was started before the start date of the diary (civil engineer joined the company in May 2010). Then on 24/5/2010 the project team received the steel cut list details from the Engineering which allows the Yard to start cutting the required steel for the accommodation's structure. Finally on 9/6/2010 the Engineering submitted the complete drawings for the accommodation including the layout to the project team, and from the diary it is understood that there was miscommunication between Engineering and the project team, where the Engineering people were saying that they

have submitted the drawings before 9/6/2011 while there were no official records that this was actually done.

In addition, from the diary information, it is understood that the ablution block's foundation drawings were submitted on 19/5/2011 and the ablutions layout was submitted along with the accommodation drawing on 9/6/2011. However the ablution's layout didn't contain slope and drain detail and these details were sent on 30/8/2010.

5.1.2 Construction progress:

According to the information provided in the diary, the foundation works for the accommodation started on 21/5/2010. Then on 7/6/2010 the steel cutting works started and on 1/7/2010 the building's main structure works took place. A civil contractor was appointed on 2/10/2010 to start block works and plastering for the accommodation building but on 21/11/2010 the project team face technical problems with the civil contractor where the quality of the plaster work as poor and during the same period another civil sub-contractor was appointed to continue the work in parallel with the current civil sub-contractor.

Moreover the diary shows that the plastering was completed on 18/12/2010 and on 29/12/2010 painting sub-contractor was appointed to start stucco and painting works. In parallel the yard employees were completing the structure works and on 19/12/2010 the structure works was completely finished after completing the roof structure. In addition it is understood that in the duration between 2/1/2011 to 3/5/2011 finishing works were ongoing such as installation of wooden doors, aluminum windows, electrical works, painting works, tiling works and ceiling works. Finally on 4/5/2011 the accommodation building only without the ablution block was handed over to the camp department for cleaning and furnishing purpose.

5.1.3 Contractor appointment:

The diary shows that the project construction progress started by utilizing company's own resources and on 23/6/2010 a meeting was held between the procurement, commercial, administration and some the focal points in the project to discuss issues related to the project such as material and manpower requirement and in order to find a way the shortcut the processes and procedures for this particular project. Then on 28/6/2010 a memo was send to the department's vice president with an attachment including type of material required, quantity with a detailed time frame and a similar attachment was submitted for the manpower requirements. Taking an example for sub-contractor (manpower) appointment we can see that a memo was sent on 21/9/2010 to sub-contractor's department VP requesting to appoint 2 civil sub-contractors for the accommodation and as a result a service order was issues for the first contractor on 28/9/2010 while for the second one was on 28/11/2010.

5.1.4 Material purchasing:

Although the actual construction on earth started on 21/5/2010, the diary shows that the first material ordered for the accommodation is flooring tiles on 15/1/2011 and the cheque for the supplier was issued by the finance department on 13/2/2011 while the delivery was on 20/2/2011. On the other hand the diary shows that plumbing materials were purchased for the ablution unit using regularization method where the materials were ordered on 11/4/2011 and delivery after week on 17/4/2011. In general the diary doesn't include much information about material purchasing as these materials might be purchased by different department and the civil engineer was not involved in.

5.1.5 Data analysis:

Analyzing the previously given data from the project diary, it is comprehended that although the project is in-house and the design team were in-house engineers from the engineering department, the design stage for both the accommodation and ablution took approximately 3 months to be completely submitted to the project team. However in order to overcome obstacles and problems the project team worked in parallel based on the available information starting from the foundation to the finishing works.

In addition, it is noticed that at the early stages of the project, the project team was following the normal process of appointing sub-contractors but at the later stages they started appointing sub-contractors that they are familiar with (for wooden doors and aluminum windows) using regularization method as by following the processes it will take not less than a month to appoint a sub-contractor. In the regularization method the after completing the works the contractor submits a bill and waits minimum 2 months to get their payment, however these contractors didn't mind as they have been with the company for long time but in very minor works and they trusted that their rights will not be lost.

Moreover there was missing information about material purchasing during the construction progress which is because of ordering materials by different departments and not having a person in charge for this specific purpose (secretary or budget controller). But the diary shows that ordering material through procurement takes not less than one month to be delivered but through regularization not more than a week. This basically proves why not basic material such as blocks, cements, glue and electrical material are not mentioned in the project diary. As a result this lead into having lack of information related to the project's overall history as well as financial status of the project team.

At most of the time regularization method raises a question of ‘‘WHY’’ to two parties, the requestor and the finance department. The requestor will basically ask ‘‘why not always purchasing by regularization method and ignore the normal processes and procedures?’’ while the management will ask ‘‘why did used regularization?’’. Therefore the answer is that regularization is made for urgent cases only and when the amount is not high unless the management supports a specific case.

Overall, information provided in the project diary proves our case’s problems where there was lack of communication between the project team and the engineering department and between the project team members themselves. The diary also support that the company’s processes and procedures lead to project delay as the actual plan was to complete phase 1 in four months while on reality the accommodation building only took 1 year to be completed while the ablution unit is still under construction up to date and is expected to be handed over by end of June 2011.

Chapter 6 - Results: A Hard Systems Change Intervention

6.1 Hard systems model of change - project level

The main problem in this case is about procurement and coordination between departments. The delivery of the first phase faced many difficulties due to implementing the followed processes and procedures being applied for any project without exceptions or shortcuts. Hence a detailed Hard Systems Model of Change (HSMC) is developed and proposed to be implemented in the second phase of the project in order to avoid unnecessary delays and complications and to ensure on time delivery. In addition if the system is found to be useful and practical, the management to approve it as a permanent system for similar projects in the future.

In order to implement this system successfully, the management has to give the project team the authority of controlling the budget, freedom of negotiating and reaching to agreements with the sub-contractors and the freedom of purchasing material from non listed suppliers with the support of the procurement and commercial departments. ‘Successful completion of a project is likely to be associated with management support, independently of its budget performance. In addition to the commitment of resources, active senior management support includes clarifying and communicating project objectives’ (Yetton et al, 2000, p.267). In addition the HSMC will provide the management a decision making guide for the project in term of material purchasing and manpower appointment options and will allow them to compare the objectives with the actual work with relation to the performance measure. Accordingly they will be able to decide whether to give the full authority to the project team and apply the HSMC system or not.

In short the HSMC 'has been developed for designing and managing change and it provides a rigorous and systematic way of determining objectives for change; this is followed by the generation of a range of options for action and a step to test those options against a set of explicit criteria.' (Senior et al, 2006, p.312). The system consists of three phases– description, options and implementation–and each phase consist of different stages as explained below.

6.2 Detailed description of the HSMC developed for the construction of the second phase of the project:

6.2.1 Description

✓ Situation Summary:

Material and man power costs have a got a significant impact on the construction projects. Productivity can be increased by a significant amount by exercising just in time management of supply of material and manpower. However the labor cost has got a significant impact on the overall productivity since they play a key role in carrying out smooth production (Levy, 2006).

In order to guarantee project success, it is essential to ensure availability of the material and qualified manpower on time and within budget. Clark (2008, p.44) says 'after the project manager has developed a detailed schedule for a new project, one nagging question typically remains: will the resources required to execute the project according to schedule be available when they're needed?'. In this case material purchasing and contractor appointment through the procurement and commercial resulted into 250% slip from the original plan set by the project team (4 months to 12 months) as evidenced in the project diary. This basically occurred due to unavailability of the required resources on time because of the long processes in the related

departments as many approvals are required starting from the requestor to the department's VP and due to the time required to open tendering till the evaluation and appointment stage.

As consequence a confusion atmosphere was created within the management as the full project had to be completed within one year while with the current situation it is obvious that the project will be completed in not less than 2 years. Therefore and in order to get back to the track and complete the project with minimum possible delays, certain points have been developed for the management and the project team to commit in order to deliver the project successfully as below:

1. A commitment by the management to put 25% of the second phase cost under the control of the project director with full authority.
2. A commitment to allow the project team members to purchase material from non listed suppliers.
3. A commitment to allow the project team members to negotiate and reach to an agreement with sufficient sub-contractors that are capable to deliver the required job legally and according to company's Health Safety and Environment (HSE) rules and regulations.
4. A commitment to give the project team authority of decision making related to engineering issues.
5. A commitment to give the project team the choice of changing the design at any stage of the project if required as long as the total cost of the project does not exceeds the budget.
6. A commitment by the project team to provide detailed options for hiring resources (material and manpower) to the management.
7. A commitment by the project team to provide ahead construction schedule program and ahead detailed purchasing and procurement list.

A true commitment to the above by both parties (project team and management) without creating complications will represent the first step to the success of the project as it will shortcut the process and will result into on time delivery within the budget and required quality.

✓ *Identify objectives and constraints:*

Objectives provide the ways and directions of achieving goals. Objectives make all parties involved in the project know their roles and tasks that they have to contribute within the project in order to succeed. More specific and clearer are the objectives more specified would be its outcomes or results which would lead to a productive achievement on the completion of the project (Hendrickson, 2000). Thus it is obvious that identifying clear objectives in any project will result into a successful project delivery. In addition ‘Objectives must be measurable -- that is, time-boxed and quantifiable’ however ‘without objectives, a business lacks a way of achieving its potential. Stakeholders need to know how cash is flowing, how assets are building, and be able to attribute progress to the right efforts and right individuals’ (Business 2010, p.10). This proves how clear objectives will help the management and the project team who are considered to be the stakeholders to compare the actual construction progress in term of construction progress and budget with the allocated budget and planned schedule.

Moreover in most projects the main objective contains of different sub objectives and sub-sub objectives but determination of these objectives depends on the size of the project. Usually the main objective is assigned to the project manager while the sub objectives are assigned to the different parties such as the project manager, project engineer and other engineers. Miller (2008, p.1) status ‘while there may be one major project objective, in pursuing it there may be interim project objectives. In lots of instances, project teams are tasked with achieving a series of objectives in pursuit of the final objective. In many cases, teams can only proceed in a stair step fashion to achieve the desired outcome’.

Nevertheless to ensure a successful objective achievement it is important to determine the constraints that might occur for the project. A clear identification of the constraints will result into avoiding failure and developing a strict plan that allows work execution on a proper manner from the early stages of the project construction.

Therefore based on the above theory the below objectives have been developed for the project team to achieve and as a guide for the management to refer to compare the construction progress.

Main objective

Sub objectives

Phase Completion

Foundation works

Building structure

Finishing works

Sub-sub objectives

Excavation

The sub-sub objective of building structure depends on the type of building design that is going to be selected by the project team.

Plumbing works

Foundation shuttering

Plastering

Steel bar preparations

Electrical works

Painting

Concrete Pouring

Wooden and Aluminum works

Tile works

Fixing sanitary items

In addition to the constraints for the above objectives represents the challenge of on time availability of the construction material and manpower. Therefore the project team need's the

managements support to avoid these constraints. Many articles have described that the main reasons of project delay are because of ‘low user involvement, poor stakeholder communication and management, lack of top management support and poor requirements definition’ (Blackstone et al, 2009, p.7030).

✓ *Identify performance measures:*

Performance measures are defined as ‘indicators of progress toward meeting prescribed objectives. Common measures for evaluating performance include outputs, outcomes, and efficiency’(PEW 2010, p.4). This part of the HSMC presents the performance measures developed to be used to measure the team’s performance, project progress, achievements and to compare the actual progress with the set program Burylo (2006, p.1) says ‘performance measure are universally to assess how well someone or something has done against set objectives or peers’.

As the project is related to construction field, the performance measure for the achievements and objectives developed is basically related to the three important factors of the construction field which are time, cost and quality. It is known that following the common area of these factors result into a perfect project delivery. The below are the measures in detail with a clear definition:

Measure	Definition
Time	Is considered to identify the total duration that each activity is going to take to be carried out and completed.
Cost	Is considered to calculate the total cost of each activity that is that is going to be carried out and completed.
Quality	In this case the quality is not a priority and the quality measures can be divided

	into two sections. Camp services such as room size and facilities and construction quality such as building standards and basic finishing. In addition after completion of the project a survey can be developed for the accommodation's residence to measure the quality.
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Based on the previous measures both the project team and the management will be able to evaluate the overall progress of the construction and will allow both teams to take decision based on clear information.

6.2.2 Options

✓ *Generate options:*

Generating options helps in drawing a clear construction map for a project. Usually when it comes to in house projects, options help in taking a clear decision making related to the different aspects of the project from the early stages in order to reduce cost and increase productivity such as material purchasing ways, hiring of manpower and selecting the right building design. In the construction field the options are usually developed by the contractor or the executer for internal references. But as this project is going to be executed in house, the options are developed for both the project team as well as the management as a guide.

The options developed for the project are related to three categories that help in delivering the objectives set in the previous section. These categories are building design, manpower and material. These options will help the project team in selecting the right option for each category in order to have a successful project delivery.

In addition selecting any of the below options will help the project team know where they are from the performance measure as selecting the below options will impact on the performance measures mentioned in the previous section.

The tables below show the different options of the category and execution:

<i>Building structure design:</i>		
	Option1	Option2
Steel structure	By Company	Sub Contractor
Pre cast	-	Sub Contractor
Concrete building	By Company	Sub Contractor

<i>Manpower:</i>		
Type of manpower	Option1	Option 3
Masons	Company's Resources	Sub-contractor / hired personnel
Electricians		
Plumbers		
Carpenters		
Welders		
Helpers		

<i>Material:</i>		
Type of material	Option1	Option2
Masonry	By the company through procurement or Cash	To be supplied by the appointed sub contractors
Electrical		
Plumbing		
Carpentry		
Finishing		

In addition, options can be developed for the project with relation to the set objectives as below:

Main objective

Phase Completion

By the company

Sub objectives

Foundation works

Building structure

Finishing works

By the company

By the company

By the company

By sub-contractor

By sub-contractor

By sub-contractor

Sub-sub objectives

Excavation

The sub-sub objective of building structure depends on the type of building design that is going to be selected by the project team.

Plumbing works

Foundation shuttering

Plastering

Steel bar preparations

Electrical works

Concrete Pouring

Painting

Wooden and Aluminum works

By the company

By the company

Tile works

By sub-contractor

By sub-contractor

Fixing sanitary items

By the company

By sub-contractor

✓ *Edit options and detail selected options:*

This part of the HSMC illustrated deeper details of three categories. The below details can be considered as the basic points that can be used in drawings the construction map. Selecting the right details will result into selecting the shortest completion path. In addition the options are sorted in term of the most likely to be considered, the less likely to be considered and thus.

Design type:		
Structure options:	Details of options	
	Option 1	Option 2
Steel structure	<ul style="list-style-type: none"> • Design to be prepared by the company's engineering department. • Can be constructed by the company as steel structure is the company's specialization. • Surplus material from other project can be unutilized which will reduce the cost. • Steel cutting and welding can be done by fabrication and yard department which will result into cost reduction. • Overall cost can be decreased to less than the budgeted amount by 	<ul style="list-style-type: none"> • Design to be prepared by the company's engineering department or by a hired consultant. • To be constructed by a sub-contractor. • Material to be delivered by the sub-contractor or to be provided by the company. • Steel cutting and welding to be done by sub-contractor. • Overall cost will remain within budget with no savings.

	maximum 20%.	
Pre cast	<ul style="list-style-type: none"> • Design must be prepared by company's engineering department. 	<ul style="list-style-type: none"> • Design to be prepared by the company's engineering department or by a hired consultant. • The slabs to be casted and assembled by the sub-contractor. • Can be executed quicker than steel structure by maximum 50% of total time. • Overall cost will increase by 25 to 40%.
Reinforced concrete building	<ul style="list-style-type: none"> • Design to be prepared by company's engineering department. • Design and build package can be applicable. • Can be executed by the company's resources but the project will be delayed by minimum 6 months in each package. • Overall cost can be controlled to remain within budget. 	<ul style="list-style-type: none"> • Design to be prepared by company's engineering department or a hired consultant. • Sub-contractor to execute the work and can be executed within the set schedule. • Preferred to be executed by one company as complete construction package. • Overall cost will be increased between 20 to 40%.

Manpower:		
Type of manpower	Details of Options	
	Option 1	Option 2
Masons	<ul style="list-style-type: none"> Manpower can be arranged from different departments based on the project requirement and subject to their availability. 10 to 12 hours productivity and 7 days a week. Cheaper than sub-contractors by 30%. Can be supervised by project engineer. 	<ul style="list-style-type: none"> Manpower to be hired from outside. Sub-contractor's manpower to be appointment. 8 hours productivity and 6 days a week. Supervisor is required. 20 to 30% increase in the cost.
Electricians		
Plumbers		
Carpenters		
Welders		
Helpers		

Material:		
Type of material	Details	
Masonry	<ul style="list-style-type: none"> Surplus material can be arranged from different departments without cost or cheaper. Surplus material can be limited to certain material. Through procurement cost will increase and will take longer delivery period. Through petty cash, material can be cheaper 	<ul style="list-style-type: none"> Material to be supplied by the sub-contractor. In case none availability of the material and project delay, penalty can be applied on the sub-contractor. One year guarantee is applicable. Cost of material will increase by 20%.
Electrical		
Plumbing		
Carpentry		
Finishing		

	<p>and faster delivery.</p> <ul style="list-style-type: none"> • Purchasing supervision and cost controller to be allocated. 	
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Nevertheless, it is recommended to appoint a sub-contractor in the project to carry out some of the constructional works be it a full package or partial. However it is not always guaranteed that the sub-contractor is able to execute the work within the set time, budget and according to standard quality.

Moreover when it comes to material purchasing and manpower appointment, based on the project structure the concerned personnel within the project team such as project coordinator will be in charge of looking after these resources be it material or manpower.

✓ *Evaluate options against measures:*

Evaluating the options against the measures will help in choosing the right options in each category. Therefore in this section, tables have been developed to provide the choices of options to be made against the performance measures developed in stage three.

1. Building structure design: (Can be evaluated against cost and time)

○ Objectives against cost:

Objectives and related measures of performance	Options	
	The company	Sub-contractor
Steel structure (Cost)	Low cost, 20% saving	Cost within budget

Pre cast structure (Cost)	Not applicable	High cost, 25 to 40% extra cost.
Reinforced concrete (Cost)	Cost within budget	High cost, 20 to 40% extra cost.

- Objectives against time:

Objectives and related measures of performance	Options	
	The company	Sub-contractor
Steel structure (Time)	Cut in required time by 20%.	Within set schedule
Pre cast structure (Time)	Not applicable	Cut in required time by 50%.
Reinforced concrete (Time)	Delay in project delivery by 50%.	Within set schedule

Brief about the different building structure designs:

- Steel Structure:

Theoretically and as it is company's specialist it is the most suitable design for the project as material can be arranged within the company and the structure can be made by the company's resources which will result into less cost and quick completion.

- Pre-Cast:

Technically pre-cast system is much quicker than steel structure design in term of installation as the slabs gets casted in the factory and gets assembled at site. It requires informing the supplier about the design by sufficient time for preparation purpose. This system saves time by

approximately 50%. In contrast the system increases the cost between 20 to 40% than the steel structure while it allows saving in masonry and paint works.

- Reinforced Concrete design:

Reinforced concrete is the most common structure design being used in the country. This type of design requires a lot of resources in term of material and manpower which means more cost. Its completion period depends on the amount of utilized resources. The more resources utilized the quicker the project gets completed but will result into additional cost by 20 to 40% than the steel structure.

2. Manpower: (Can be evaluated against cost and time and quality)

- Objectives against cost

Objectives and related measures of performance	Options	
	The company	Sub-contractor
Masons, electricians, plumbers, carpenters, welders and helps (Cost).	Less cost	More cost

- Objectives against time

Objectives and related measures of performance	Options	
	The company	Sub-contractor
Masons, electricians, plumbers, carpenters, welders and helps (Time).	10 to 12 hours productivity	8 hours productivity

- Objectives against quality

Objectives and related measures of performance	Options	
	The company	Sub-contractor
Masons, electricians, plumbers, carpenters, welders and helps (Quality).	High quality, controlled with a proper supervision	Risky quality, no supervisor

3. Material: (Can be evaluated against cost and time and quality)

- Objectives against cost

Objectives and related measures of performance	Options	
	The company	Sub-contractor
Masonry, electrical, plumbing, carpentry and finishing (Cost).	Higher cost through procurement, lower cost by petty cash	High cost

- Objectives against time

Objectives and related measures of performance	Options	
	The company	Sub-contractor
Masonry, electrical, plumbing, carpentry and finishing (Time)	More time through procurement, immediately by petty cash	Immediately

- Objectives against quality

Objectives and related measures of performance	Options	
	The company	Sub-contractor
Masonry, electrical, plumbing, carpentry and finishing (Quality)	According to standard quality	Risky quality, need supervision

6.2.3 Implementation

Implementation strategies can be developed based on the detailed options, evaluation of the options against the performance measure and experience gained from previous projects. Although health and construction sectors has nothing to do with each other, there a common concept when it comes to choose the right option. McDwell (2007, p.43) the vice president of clinical affairs, Inviro Medical Devices developed some question to consider when selecting an option to develop syringes ‘Will this design help reduce needlestick injuries? Are designs available with low dead space? What is the cost?’.

To make the above questions valid for construction field, they were modified to ‘‘will this design help reduce cost and time? Are designs available within company or sub-contractor? What is the cost and total duration?’’. In addition similar questions related to material and manpower has been added to be considered such as ‘Will resources be available on time? And Will resources be available within budget?’. McDwell (2007, p.43) continues ‘‘All together, these factors will influence your decision and help drive you to selecting the safety syringe that offers the ideal combination of benefits’’. This means that using these questions will help in selecting the right criteria to deliver a successful project.

- ✓ Develop implementation strategies

As pointed out earlier, this system has been developed for the second phase of the project as the first has started and about to be completed. Therefore and according to the experience gained in the first phase in term of building structure design, material purchasing and manpower the below implementation strategy has been developed to be followed in order to avoid problems and obstacles.

- Design:

In the first phase steel structure was found to be the most suitable option to meet the cost and time as material were arranged from other project's surplus and the structure was cut, fabricated, welded and assembled the company's resources. But the overall construction duration was delayed due to unavailability of other construction material and manpower.

Therefore and based on stage 6, it is suggested to use pre-cast structure system for the second phase. It is true that it will increase the cost of structure up to 40% but the overall cost can be controlled as the slabs are already casted, plastered and externally painted. On the other hand in term of duration it will save time up to 50% in as the structure will only have to be assembled at site where no masonry and less painting works are required. However in order to ensure meeting the measures, close monitoring is mandatory with tight cost control.

- Material:

In the first phase the building structure material was arranged from other project's surplus material. Electrical material was supplier by plant department while other materials were purchased through procurement department. However some of the materials purchased through procurement department were being supplied late due to the procurement system earlier explained or with higher cost as it they payment takes minimum 60 days to be proceeded. As a result the construction progress was slower and resulted into late completion. Moreover all

required material was supplied through the company, and sub-contractors were only executing the works.

Therefore for the second phase, and in order to save time and reduce cost it is recommended to apply the first commitment suggested in stage 1 and give the project team the authority of using certain percentage of phase's budget in cash in order to be able to purchase material directly from the suppliers and by petty cash.

It is also recommended to reach to certain agreement with the procurement department to make the purchasing process easy and smooth by reaching to an agreement with the suppliers by the project team and the procurement department to handover the payment method and other official issues. Nevertheless as avoid unnecessary delays, construction materials can ordered through different options in parallel to ensure its availability on time based on the below categories:

1. Priority:

High prioritized material to be purchased directly from the suppliers by the project team, or the appointed sub-contractor to deliver the material (if applicable).

2. Quantity:

Materials that are required in huge quantities to be purchased through the procurement department as the quantity will result into high prices.

3. Price:

High price material to be purchased through company's procurement as heavy deals required strong agreement and penalty clause.

In addition some materials are listed to be in different categories e.g. priority and quantity. In these cases it is recommended to follow different purchasing options in parallel to ensure on time availability of material if one option fails to deliver.

○ Manpower:

In the first phase electrical works and minor paint works were executed by company's resources while all other works were executed by sub-contractors. Out the approximately 7 appointed sub-contractors, one of the plastering sub-contractor was below company's standard and causing delay to the project, while other were well productive.

In general it is recommended to be utilized the company's manpower due to their experience and work knowledge. But for the second phase and due to unavailability of company's manpower it is recommended to continue according to phase one's in term of manpower as the work load will be reduced in certain areas as mentioned in the building design part. Overall the total manpower charges were calculated and found within the allocated budget for the manpower.

✓ Carry out the planned changes

In order to carry out the planned changes it is necessary to involve all concerned parties, allocate responsibilities and monitor progress. Basically these steps have been included in pervious stages of the HSMC. But to ensure that the proposed changes takes place it is necessary to apply the followings:

1. Involve all concerned:

All key parties must be involved during the implementation of the planned and ensure that the proposed changes are being actually applied. The concerned parties are divided into two groups as below:

➤ The management and includes:

- ✓ CEO
- ✓ Supply Vice President
- ✓ Administration Assistant Vice President
- ✓ Head of Sub-contracts
- ✓ Head of Commercial

➤ The project team and includes:

- ✓ Project Director
- ✓ Project Manager
- ✓ Project Engineer
- ✓ Project Coordinator
- ✓ Budget Controller

2. Allocate responsibilities:

Responsibilities must be defined and categorized and explained in detail. However these responsibilities must be allocated to each of the above involved concerned parties. The below are examples for some of the allocated responsibilities within the project team.

➤ Budget Controller

- ✓ ‘Manage, plan, organize, direct, and coordinate the activities of the project’. (chicagojobs 2007, p.1)
- ✓ ‘Direct and coordinate project’s financial planning and budget.
- ✓ Monitor and analyze material purchasing and manpower appointment results against budget.
- ✓ Direct and coordinate project’s financing and services payments with sub-contractors and suppliers
- ✓ Work with other project team members for proper expenditure registration, record and documentation’. (hrVillage 2011, p.2)

➤ Project Coordinator

- ✓ ‘Assist the Project Engineer, in the day to day duties of a project’s administration.
- ✓ Working closely under the guidance and direction of the Project Engineer.
- ✓ Maintain and update the Shop Drawing Log, review Shop Drawings and submittals.
- ✓ Prepare drawings and sketches to support construction work as required
- ✓ Perform additional assignments and responsibilities as assumed or requested by supervision’. (Ellisdon 2010, p.2)

➤ Project Engineer

- ✓ ‘Responsible for planning, scheduling, conducting and coordinating the technical aspects of projects.
- ✓ Accountable for the successful completion of the project’s engineering
- ✓ Assist in the preparation of engineering project proposals
- ✓ Participating in stakeholder’s meetings and resolving engineering and management project issues’. (Eichleay 2011, p.1)

➤ Project Manager

- ✓ 'Direct and manage project development from the beginning to end of the project.
- ✓ Define project scope, goals and deliverables that support business goals in collaboration with senior management and stakeholders.
- ✓ Effectively communicate project expectations to team members and stakeholders in a timely and clear fashion.
- ✓ Estimate the resources and participants needed to achieve project goals.
- ✓ Where required, negotiate with other department managers for the acquisition of required personnel from within the company.
- ✓ Draft and submit budget proposals, and recommend subsequent budget changes where necessary.
- ✓ Delegate tasks and responsibilities to appropriate personnel'. (Realcomm 2011, p.1)

➤ Project Director

- ✓ 'Reviews high-level deliverables across practice.
- ✓ Develops project objectives and ensure the implementation of the strategic objectives of the project.
- ✓ Ensures engagement reviews and quality assurance procedures take place for all practice engagements.
- ✓ Manages the strategic aspects of large engagements and mitigates any risk.
- ✓ Reports profit and loss figures'. (Mariosalexandrou 2011, p.1)

3. Monitor progress:

In order to organize the planned changes and implement the proposals it is important to monitor the implementation's progress on regular basis. Ashley (2010, p.2) states 'it is important to monitor the progress based on the goals for both timeliness and finished tasks. To monitor the progress of a project large or small, you will need to learn how to schedule and list goals, as well as how to track them'. This statement illustrated that proper progress monitoring can be applied

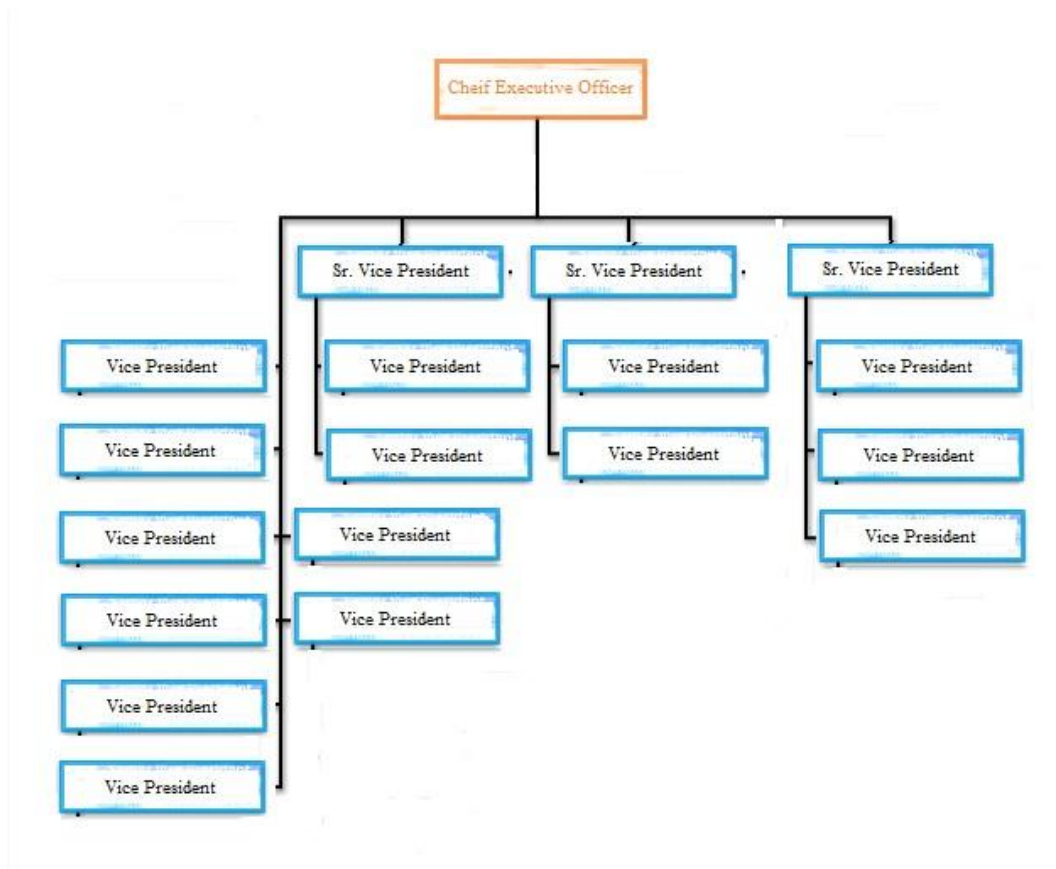
when schedules are clear and goals are known. As these two points have been already included it is easy to monitor the planned changes progress by issuing regular reports including certain points as below:

- ✓ Preparing progress report regarding the planned changes to the management including actions taken, major completed points and project milestones status.
- ✓ Weekly and monthly report related to construction in term of construction progress and material required.

Chapter 7 - Discussion

7.1 The Company's implemented structure

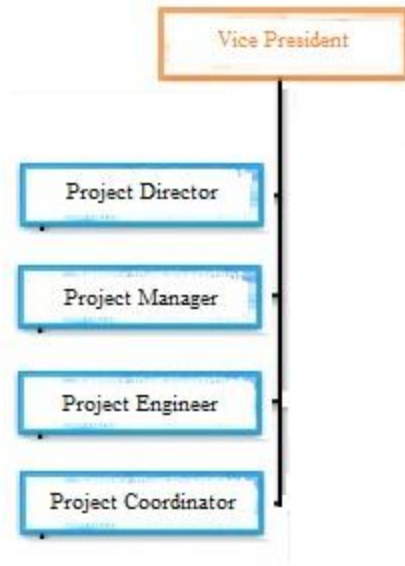
From the below structure it is obvious that the company's structure is a common bureaucratic organizational structure with different levels of hierarchical levels. In the general in the top management there are three hierarchical levels where the CEO comes first then three Senior Vice Presidents as the second level and finally 18 Vice Presidents in the third level before moving to the middle management. In addition if the below structure is explored in more detail we can notice that there is another structure is included in the company's main structure.



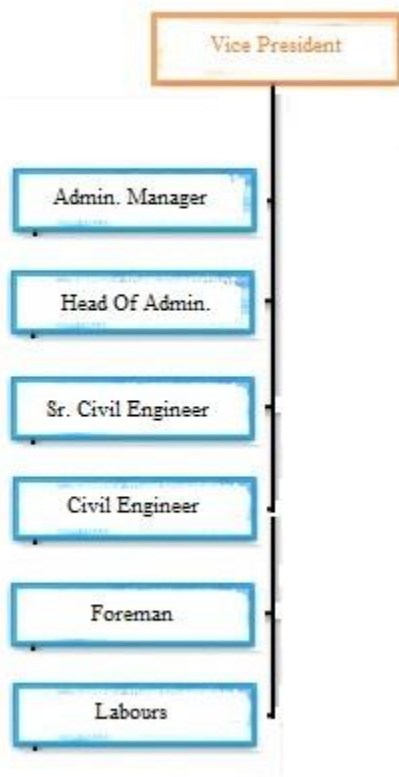
The company's Structure sample

7.1.1 Project's Department:

Viewing the middle management structure within the company's main structure we can notice that the structure in the project's department is a common project-based organizational structure where there is a Project's Vice president, Project Director, Project Manager, Project Engineer and Project coordinator. The below is the project's department structure.



7.1.2 Administration Department:



Taking another department's that is involved in the case an example. We can notice that the Administration's department structure is different than Project's department. In the Administration there is a Vice President, Administration Manager, Head of Administration, Senior Civil Engineer, Civil Engineer, Foreman and then the labours that are divided into different specialties such as Electricians, Carpenters, Masons, Plumbers, Painters and Helpers.

Discussing the previously presented organizational and departmental structure with the facts mentioned in the literature review chapter, it is understood the bureaucratic structure used in the company is wide and tall in nature which is due to the large number of employees that are involved in the company. In general the structure has high level of specialization where there are different Vice Presidents that are controlling different department which have been founded to carry the works based on major such as Yard, Fabrications, Engineering, Projects, etc. Moreover the structure is seems to be rigid in term of departmentalization where similar employees are grouped to work together in the same department.

In addition to the above, the structure has a clear chain of command in which an employee within a department has a clear direction, job description and a specific level of authority which allows him/her to execute the work in a good manner. However this level of authority differs from a different to another which a civil engineer in the Projects Department doesn't have the same level of authority of the civil engineer in the Administration Department. In term of span of control and as mentioned before the number of employees within the company is relatively large there is high span of control within the department and in order to reduce this span we can find that in the projects department there are more than Project Director so that these employees get divided on different projects.

The implemented structure is very well centralized where most of decisions should move through the hierarchy. Taking an example of requesting material in the Administration department the foreman prepares a list of required material, then it goes to the civil engineer for review after than the senior civil engineer prepares an electronic requisition on the system. This requisition must be approved by Head of Administration, Administration Manager, Administration Vice President and finally by the CEO.

Overall, since the company is a productive company that deals with technical issues, the employees are tend to be high technical employees, therefore the implemented structure can be considered as a standard bureaucracy structure that is effective. Moreover what support the assumption that the structure is standard bureaucracy is nature of work where it is tend to be routine work and the structure contains of large number of middle managers such as Head of Departments, Managers and Directors.

Referring to the project diary results and comparing the data analyzed with the company's structure, it is true that there is a clear chain of command within the department, but the reason why there was lack of communication in the project is basically because this chain of command is clear between the team members of each department but not when these members are involved with team members from other department and accordingly a confusion is created related to whom should do what and whom should approved what. This fact supports the reason why a mini project-based structure is needed to be developed when there is in-house project and different departments should work together.

7.2 Material purchasing and Sub-contractor appointment:

As explained earlier in the introduction to the problem section regarding the material purchasing process, and taking Administration as a department as an example again, when consumable material is needed the foreman fills a Maintenance Unit Required Items Form mentioning type of item and the quantity required. Then the form is forwarded to the civil engineer for review and approval. After that the maintenance clerk issues a SDV (Service Demand Voucher) and forwards it to the stores. If the items are available the foreman is called to collect the items. In case of unavailability of the required items the maintenance clerk issues a Purchasing Requisition electronically for the items and forwards it to the civil engineer for approval then the process continue as explained previously in this chapter. The approved requisition is then

forwarded to the procurement department for further process. By following this process of material purchasing it will take between 3 to 6 weeks for the material to be delivered and if things goes well otherwise it can take to 3 months.

Similarly when it is required to appoint a sub-contractor for manpower purpose the process taking not less than a month in case the sub-contractor is registered other will the process will take much longer than that. Therefore and with reference to construction of the three accommodation buildings and ablution blocks, and in order to deliver the project within time, budget and cost. It is important to look for alternatives ways that allows on time availability of material and sub-contractor's which can be done by implementation of the Hard System Model of Change (HSMC).

Discussing the facts of the process being followed in the company and the detailed Hard System Model of Change in chapter 6, by implementing the company's existing process in term of material purchasing and sub-contractor appointment, and in order to finish the project on time, the project team will have to order every single material required accurately before even the project gets started which doesn't make sense. Even if this idea was approved it will mean that minimum 50 to 70% of the project budget will be spent before even starting the project and the project team will require a huge area to store these materials.

In addition if the sub-contractors are appointed from day one, it will represent a high risk to the project team where in case anything goes wrong during the construction and an activity has to start earlier or later, then the sub-contractor might not be able to show up at that particular date as they might be having other commitments in other projects. Moreover canceling any activity will force the company to pay penalty to the sub-contractor as they have been appointed for the work and prepared themselves but at the end they were asked not to execute any work.

By implementation of the (HSMC) with support of the management and different departments, the project team will be able to make a big short cut in term of material purchasing and sub-contractor appointment and will be able to in ordering materials when required and from any supplier that has it. But of course there must be a control over the project teams themselves to make sure that they also stick with the system and don't go out of control financially.

Nevertheless from the data analysis of the project diary we can find that because there was no (HSMC) implemented many of the material were delivered late and a lot of sub-contractors were appointed later as well. Therefore the project team turned to purchasing material through regularization system which is in fact to allowed for everything huge amounts. This basically proves that the actual processes and procedure used within the company caused delays and complications to the project.

At the end I am hereby ensuring that although the procurement processes and procedures being used in the company caused delays to the project, these procedures are very important for the company's core business as they are dealing with materials that are valuing in millions or dollar and sub-contractor's contractors that are having similar values and especially on hourly basis.

Chapter 8 - Recommendations and Conclusion

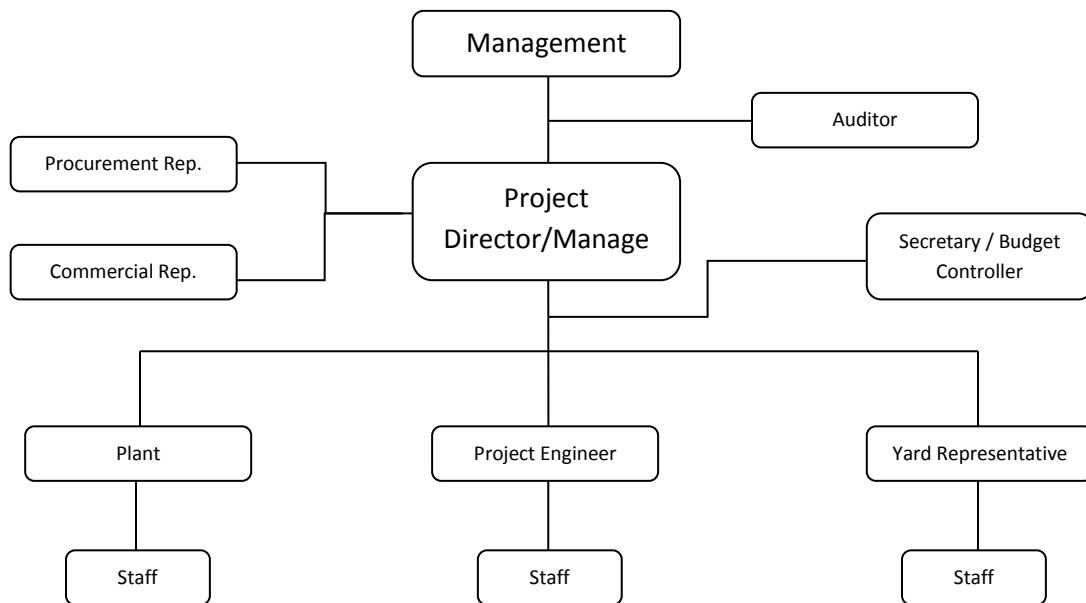
8.1 Recommendation

Every case study is unique and different from another, therefore each case must be studied separately and solutions generated that are appropriate. However, sometimes we can find common recommendations and solutions that can be applied in many of these case studies and hence can be generalized to a large sample of organizations. In this section of the report, recommendations are developed and proposed for different stakeholders involved in the project and these recommendations are proposed based on facts presented in the case study, literature review, data collected from the methodology as well as employees involved in the project. The recommendations focus on areas related to the project structure, project team and simplifying purchasing and manpower appointment methods.

8.1.1 Recommendations to the management and project team:

Developing a project-based structure:

As a first step toward the necessary reforms, it is recommended that the relevant management members from related departments, project senior level employees and with the support of the HR department collaborate to develop a suitable project based structure that gives the top of the hierarchy a certain level of authority and responsibility towards the project issues and personnel involved. However the structure is to be developed and designed taking into consideration Senior's definition of organizational structure and below is a proposed project based structure for the accommodation project.



Although the organization project-based structured developed and proposed above looks very simple and basic, nevertheless it provides a position for all of the concerned parties that need to be involved in order to complete the project successfully. Implementation of this structure will contribute significantly in the process of organizing and completing the project within the set budget, time and quality and overcoming the problems discussed in this case study research in terms of project structure, material purchasing and manpower appointment.

The proposed structure is designed to be flexible and be assembled whenever required by grouping employees from the different related departments in order to share their knowledge, skills, and efforts and use their influence within the company for the benefit of the project. This structure can be simply dismantled after completing the project. In general, the structure contains different posts as it is shown and the post of Project Director or Project Manager is identified based on size and nature of the project. Many of the posts that are included in the structure do not necessarily have to be filled with an employee that is holding the same job title. For example if top of the hierarchy is a Project Manager, then the employee who is going to hold this position should necessarily be a Project Manager in the company but might be the Head of Department or

a Sr. Engineer with sufficient experience to run the project. The most important consideration is that the most appropriate employees are allocated to the right positions in the structure.

Reporting chain & responsibilities:

The developed project-based structure is designed to be implemented by the project team and be reported to the management. Below, is a list of the proposed responsibilities for the team members and their reporting chain within the structure:

✓ The Management:

The Management to include CEO (optional), Finance VP, Commercial and Procurement VP, and Administration VP.

✓ Auditor:

The Auditor is an optional position in the structure. To be appointed by the management and reported to the management in order to ensure that everything is going through the company official process and procedure.

✓ Project Director/Manager:

The Project Director/Manager is responsible of managing the project, selecting his/her team members and completing the project within time, budget and quality. The Project Director/Manager is reported directly to the Management and is obliged to cooperate with Auditor if requested. In addition the Project Director/Manager is responsible of coordinating with Commercial and Procurement departments in order to facilitate the

process of material purchasing and manpower appointment. In this case top the hierarchy will be called Project Manager.

✓ Secretary/Budget controller:

Based on size and value of the project it will be decided whether to have one employee handling both position's responsibilities, or two employees separately. However the Secretary is responsible for official communication and documentation whiles the Budget Controller to record and the expenditures and ensure that the project is within budget. Secretary/Budget Controller to be directly reported to the Project Manager.

✓ Commercial Representative:

The commercial department to dedicate an employee to handle issues related to the project in parallel with his/her current responsibilities in order to avoid communication with a new employee within the department every time and to speed up the process of manpower appointment. Commercial's dedicated employees to be coordinating with the project team members and updating the Project Manager on issues related to the requisitions.

✓ Procurement Repetitive:

The commercial department to dedicate an employee to handle issues related to the project in parallel with his/her current responsibilities in order to avoid communication with a new employee within the department every time and to speed up the process of material purchasing. Procurement's dedicated employees to be coordinating with the project team members and updating the Project Manager on issues related to the requisitions.

✓ Plant Representative:

The Plant department to dedicate an Engineer to handle issues related to electrical works, fire fighting, fire alarm installation, material estimation and look into other issues related to the project that is being handled by the plant department. Plant Engineer to coordinate with the Project Engineer or be reported to the Project Manager based on nature of the project.

✓ Project Engineer:

It is preferred to appoint a Civil Engineer as the Project Engineer, however the civil engineer must be responsible of following up the project, raising the necessary requisitions, coordinate between the different departments involved, ensure that the project is being construction according to the set plan and take care of any other issues related to the project. The Project Engineer to be reported directly to the Project Manager.

✓ Yard Representative:

The yard to dedicate an Engineer to support the project with the material required for the structure of the buildings such as beams, columns and roof steel sheets. However the yard should be responsible of casting the foundation and structure installation. Yard Engineer to coordinate with the Project Engineer be reported directly to the Project Manager.

✓ Staff:

The staff are categorized to project coordinator, electricians, plumbers, carpenters, masons, painters, masons, welders and helpers. Each department has its own skilled staff and they are reported to their department's representative.

Support the project team:

In order to solve the problem of material purchasing and manpower recruitment and selection, the following proposals are recommended to the different stakeholders:

1. The Management to allow the project team to be autonomous and give the Project Manager adequate level of authority and responsibilities toward the project and his team members.
2. The Management to convert an agreed percentage of the total budget (not less than 10%) from the cost code into cash to be under control of the Project Manager and his team and to evaluate the project team's performance accordingly through the appointed auditor and by following the overall progress of the project.
3. By instruction of the upper management the Commercial and Procurement Departments to support the project team by shortcutting the process and procedure of material purchasing and manpower appointment in order to reduce the required time to the minimum and allow the Project Manager to negotiate with the sub-contractors and suppliers.
4. In case of obtaining cheaper material or sub-contractors by the project team, the project team to submit justification and the Commercial and Procurement Departments to support project team's choice as long as being complied with the process and procedure of the company.
5. The project team to document all issues related to the project, submit list of materials and manpower requirements before a sufficient period and submit progress report on a weekly basis comparing the planned and actual progress of the project.

Recommendations for further studies and follow up:

In this study a diary method was used to inquire and reflect on where the project is going and to use it as a proven method to show how the current system used is causing delays to the project from the implementers' point of view (engineers). Therefore it is recommended that further studies be made within the company using quantitative questionnaire survey methods to identify the exact level of satisfaction with the current processes and procedures used by other personnel involved in different projects. It is also recommended to arrange interviews with the key employees from the commercial and procurement departments in order to understand the purpose of the current long processes and procedures being used and understand and know the advantages that they bring to the company and disadvantages, if any, identified from their point of view.

In addition to the above if the proposed project based structure is used then it is recommended to evaluate the structure and ensure that it is being used effectively and add the necessary changes when required even if it is necessary to apply a complete re-structure to the existing arrangements so long as it gets the project back on track.

Overall, applying the proposed project-based structure will support in-house problem solving related to the project, helps in overcoming problems and difficulties that might occur during the construction lifecycle and will help in managing and organizing the project. However with the support of the management, and especially commercial and procurement departments, the cost of the building might be reduced and the project can be completed within the set time and will result in a better quality.

8.2 Conclusion:

The presented single case study has raised three major problems that are delaying and interfering with the construction progress of the accommodation buildings and their ablution blocks which are being constructed and supervised by the company's resources. The purpose of investigating more in this case organization was to discover the problems in detail, analyze them and identify solutions in order to overcome these obstacles in the future and complete the project successfully.

First, a critical problem was found to be the lack of communication between the different parties involved which required designing a project-based structure. Second and third problems were difficulties in obtaining approvals in order to purchase materials and appoint sub-contractors through the project team or, in another word, the person in charge of the project which required designing a Hard Systems Model of Change (HSMC) with the support of the senior management. Although the case study is related to 'The Company' in particular, similar problems occurs in other companies be is related to construction or production.

It is hoped that this report helps with overcoming similar problems in the company in future in-house projects and in other companies that face similar problems. In addition to the problems discussed and proposals made the dissertation raises several questions such as whether the current processes and procedures being used are appropriate since more than a decade has passed by in commercial and procurement professional practices? Do they need to be adopted or changed? Can we develop different processes and procedures for different types of project based on their size and nature? These questions are left to be investigated and discussed further in the future to continue the discussion beyond the company's problem and in other studies within and in different companies that are dealing with similar issues and difficulties.

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Appendix

Project Dairy:

Date	Issue	Note
5/5/2010	Drawings Requested	New accommodation foundation details and sections received from the engineering department, however the main layout of the building is still missing and request to be re-send
19/5/2010		New accommodation toilet block foundation details and sections received and both accommodation and toilet layouts are still not sent!
21/5/2010	Foundation works	Foundation work preparation started
24/5/2010		Finally received new accommodation and toilet block layout and steel cut details requested
2/6/2010		Staircase and roof details drawings prepared and received
7/6/2010		Steel cut details received and started cutting steel immediately
8/6/2010		Electrical cable routing drawings received
9/6/2010	Accommodation Drawings Completed	Accommodation and toilet layout re-sent ! and toilet drain detailed drawings requested
23/6/2010	Communication with procurement regarding material purchasing	A meeting was held between Administration manager, Yard manager, Civil engineer and supply vice president to facilitate material purchasing and hiring sub-contractor as an exception for this particular project
28/6/2010		Email was sent to the vice president supply with list of material and man power required for the material; however a requisition was raised for some of these materials which are required for the foundation preparation and room partitioning.
1/7/2010	Structure works	Steel structure works started

25/8/2010		Toilet drain detailed drawings prepared and received and requested to revise the drawings as the manholes are located on the other side of the building
30/8/2010	Ablution Drawing Completed	Revised copy of the drawings received
21/9/2010		Memo sent to the Sub-contract's VP for sub-contractors appointment (2 civil and 1 painting) sub-contractors.
28/9/2010	First Sub-contractor Appointed Officially	LPO issued to appoint the civil sub-contractor
2/10/2010		Sub-contractor started to work and committed to completed block and internal and external plaster works within 60 days
15/10/2010	Second Sub-contractor appointed Officially	LPO issued to appoint a plumbing sub-contractor for the toilet works
30/10/2010		Plumbing sub-contractor completed ground level works and left the site to be called for the 1 st floor after completing the ablution block's structure
21/11/2010	Problem with Sub-contractor	New civil sub-contractor appointed to work in parallel with the first sub-contractor due to their delay and continues complaints about the material
25/11/2010		Plumbing sub-contractor completed the first floor works.
28/11/2010	Third Contractor	Negotiating with paint sub-contractor
1/12/2010		1 st floor's plaster sub-contractor stopped due to low quality work.
4/12/2010		Negotiating with 1 st floor plaster contractor regarding to work quality and site cleaning
11/12/2010		1 st floor plaster sub-contractor resumed works

12/12/2010		Ground floor plaster sub-contractor completed ground floor plastering works
18/12/2010		1 st floor plaster sub-contractor completed plastering works
19/12/2010		Negotiating with Wooden door sub-contractors and aluminum sub-contractors
29/12/2010	Third contractor appointment	Paint contractor appointed
2/1/2011	Structure completely finished	Roof structure completed
3/1/2011	Regularization and estimation methods	Wooden doors and aluminum sub-contractors appointed.
3/1/2011	Regularization method	Painting works started
9/1/2011		Aluminum sub-contractor fixed a sample
13/1/2011		Wooden door sub-contractor fixed all door frames
16/1/2011		False ceiling material delivered
16/1/2011		Toilet ground floor block works started
19/1/2011		50% of paint work completed
20/1/2011		Aluminum sub-contractor started fixing windows
25/1/2011		Toilet first floor block works started
15/1/2011	Accommodation floor tiles	Negotiation to select flooring tiles
26/1/2011		Flooring tiles selected
13/2/2011		Cheque issued for the flooring tiles
20/2/2011	Payment for the supplier	Tile works started

25/2/2011		Ceiling works completed
1/3/2011		External paint work completed and internal first quote finished
2/3/2011	Payment request	Sub-contractor requested payments for the works completed
10/3/2011		Wooden door delivered to site
15/3/2011		Ablution block works completed
3/4/2011		Ablution electrical works started
3/4/2011		Second floors tiles work completed
4/4/2011	Payment done	Paint work payment done
6/4/2011	Tile for ablution	Ablution tiles ordered
7/4/2011		Ablution accessories list received
10/4/2011		Ground floor wooden doors painted and fixed
10/4/2011		Tile contractor submitted a bill for work completed
11/4/2011		Quotation received from 3 different suppliers
17/4/2011		Ablution unit material delivered
17/4/2011		Accommodation wooden doors fixed completely
20/4/2011		Ablution balance work started
3/5/2011	Tiles for Ablution	Tile for ablution blocks delivered
4/5/2011	Accommodation Building Handed over	Accommodation building completed
5/5/2011		Plumbing works completed