

TO REVIEW THE EFFECTIVENESS OF PROJECT
MANAGEMENT IN CONSTRUCTION PROCESS

NOOR HAFIZATUL ASHIKIN BT ROZALI

B.ENG (HONS.) CIVIL ENGINEERING
UNIVERSITI MALAYSIA PAHANG

ABSTRACT

Now days, our construction industry is facing a lot of problems that mainly associated with its ineffectiveness work process. This phenomenon has been manifested by frequent news and critics about how lack of our construction industry and the impact of that, it cause of project delay and inferior quality. Therefore, there is an urgent need for construction industry to improved and overcomes this problems. Many efforts that have been done to improved and overcome performance of the construction industry reputation such as using alternative procurement system, adoption of tools and management philosophy from other industry and using to new technological advancement such as the used of modular construction in Malaysia. In view, the problems that face by the industry, this study has been undertaken with the aim to determine the strategies to improve the effectiveness of project management in construction process. The methodologies adopted for this study are the distribution of questionnaire survey. The findings from this study confirmed that the construction industry particularly in Malaysia need to be improved with regards of its effectiveness. There are also a lot of problems associated due to construction process, such as poor communication, poor site management, and poor site coordinator, lack of close monitor and control, and lack of focus to customer / end users expectation. The studies also determine that the strategies currently promoted to achieve the improvement are by using Industrialized Building System (IBS). Many organizational also integrate the quality management system such as ISO9001 and Total Quality Management System (TQM) in their process. The used of management tools and philosophy from other industry is not much popular strategies

ABSTRAK

Pada masa kini, industri pembinaan menghadapi banyak masalah terutamanya berkaitan dengan ketidakberkesanan proses kerja. Fenomena ini seringkali dikhabarkan dalam berita dan kerap kali dikritik mengenai bagaimana industri pembinaan meninggalkan kesan menyebabkan kelewatan projek dan masalah kualiti. Oleh itu, terdapat keperluan segera bagi industri pembinaan untuk memperbaiki dan mengatasi masalah ini. Banyak usaha yang telah dilakukan untuk meningkatkan prestasi dan reputasi industri pembinaan seperti menggunakan sistem perolehan alternatif, penggunaan alat dan falsafah pengurusan daripada industri lain dan gunakan untuk kemajuan teknologi baru seperti yang digunakan dalam pembinaan modular di Malaysia. Kajian ini telah dijalankan dengan tujuan untuk menentukan strategi untuk meningkatkan keberkesanan pengurusan projek dalam proses pembinaan. Kaedah yang diguna pakai untuk kajian ini adalah pengedaran soal selidik. Dapatan kajian ini mengesahkan bahawa industri pembinaan khususnya di Malaysia perlu diperbaiki dari segi keberkesanan. Terdapat juga banyak masalah yang berkaitan disebabkan oleh proses pembinaan, seperti masalah komunikasi, masalah pengurusan tapak, dan masalah penyelaras tapak, kurang memantau rapat dan kawalan, dan kurangnya tumpuan kepada jangkaan pengguna pelanggan. Kajian itu juga menentukan bahawa strategi yang kini dinaikkan pangkat untuk mencapai peningkatan adalah dengan Sistem Bangunan Berindustri dengan menggunakan (IBS). Banyak organisasi juga mengintegrasikan sistem pengurusan kualiti seperti ISO9001 dan Sistem Total Quality Management (TQM) dalam proses mereka. Yang digunakan alat pengurusan dan falsafah daripada industri lain tidak banyak strategi popular

TABLE OF CONTENT

		Page
STATUS VALIDATION		i
SUPERVISOR'S DECLARATION		ii
STUDENT'S DECLARATION		iii
DEDICATION		iv
ACKNOLEWDGEMENT		v
ABSTRACT		vi
ABSTRAK		vii
TABLE OF CONTENTS		viii
LIST OF TABLES		xi
LIST OF FIGURES		xii
CHAPTER I	INTRODUCTION	
	1.1 Introduction	1
	1.2 Problem Statement	2
	1.3 Objectives of Study	2
	1.4 Scope of Study	2
CHAPTER II	LITERATURE REVIEW	
	2.1 Introduction	3
	2.2 Traditional Construction Process	3
	2.3 Effectiveness of Project Management In Construction Process	4
	2.4 Ineffectiveness of Project Management In Construction Process	4
	2.4.1 Poor Time Management	4
	2.4.2 Construction Waste	7

2.4.3	Communication Breakdown	12
2.4.4	Lack of Project Monitor and Control	13
2.4.5	Uncertainty Handling Approach	15
2.5	Construction Process Improvement	16
2.5.1	Adapting Project Management Perspective	16
2.5.2	Using Philosophy from Other Industry	20
2.5.3	Technological Advancement Perspective	33

CHAPTER III RESEARCH METHODOLOGY

3.1	Introduction	34
3.2	Identification of Research Topic and Study	34
3.3	Data Collection	35
3.3.1	Questionnaire Survey	35
3.3.2	Respond to Questionnaire Survey	37
3.3.3	Frequency Analysis	38
3.3.4	Average Index Analysis	38
3.3.5	Limitation of Survey	39
3.4	Research Findings	40
3.5	Make Conclusion	40
3.6	Conclusion and Recommendation	40

CHAPTER 1V RESULT AND FINDINGS

4.1	Introduction	42
4.2	Questionnaire Survey	42
4.3	Demographic Respondent	43
4.3.1	Respondent Position	43
4.3.2	Respondent Working Experience	43

4.4	Major Cause to Project Delay	44
4.5	Problem and Limitation in Traditional Construction Process	45
4.6	Strategies Used to Improve Traditional Construction Process	46
4.7	Element of Improvement in Enhancing Construction Improvement	48

CHAPTER V

CONCLUSION AND RECOMENDATION

5.1	Introduction	49
5.2	Needs to Improve Effectiveness of Project Management in Construction Process	49
5.3	Urgent Needs to Improve the Current Performance	51
5.4	Strategies to Improve Construction Process	51
5.5	Elements of Improvement	52
5.6	Achievement of This Study	53
	5.6.1 Objective No.1	53
	5.6.2 Objective No.2	53
	5.6.3 Objective No.3	54
5.7	Limitation of Study	54
	5.7.1 Cost Limitation	54
	5.7.2 Area of Coverage Limitation	55
5.8	Recommendation	55
	5.8.1 Recommendation Based on Findings	55
	5.8.2 Recommendation for Further Research Studies	56
	REFERENCES	57
	APPENDIX	60

LIST OF TABLES

Table No.	Title	Page
2.1	Pre-construction people involved in materials Management	9
2.2	Construction site people involved in materials Management	10
2.3	Off-site people involved in construction materials Management	11
4.1	Questionnaires delivered	42
4.2	Respondent Position	43
4.3	Respondents working experience	44
4.4	Factors that contribute to project delay	44
4.5	Problems related to construction process	45
4.6	The need to improve traditional Construction process	46
4.7	Strategies to improve construction process	47
4.8	Important elements in improving construction process	48

LIST OF FIGURES

Figure No.	Title	Page
2.1	Construction waste percentage by volume and weight	8
2.2	Basic Ingredients in Project Management	18
2.3	Generic configuration of a supply chain in Manufacturing	22 9

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

There are a lot of definitions of effectiveness of project management in construction process. In general, effectiveness of project management in construction process can be defined as the project constructed within time scheduled and cost budgeted. It is also were defined as process that produced less or no construction waste with a good monitoring and controlling construction process. The term traditional work process can be literally understood as the common practice inherited from the long established custom of delivering the construction project based on fragmented work process. In general this practiced has dominated the industry with the separation of design and construction function. Traditional construction process always been related with ineffectiveness because it produced a lot of problems. Traditional construction process is always indicated as poor in management such as site management (resources and materials), quality management, communication management, waste management, and personnel management. Traditional construction process always been connected with the ineffectiveness in terms of project time. Traditional construction method generally adopted by past experience or project. Furthermore, there is no standard measurement in enhancing traditional construction process such as monitoring and controlling method for construction progress. Contractor used their past experience in predicting the project time. In reality, they faced a lot of problem in engaging the project and project time will be behind the schedule. It is very important to improve the effectiveness of project management in construction process. Generally, by enhancing the effectiveness in construction process, project time will be reduced, improved construction quality, eliminated waste and saved cost.

1.2 PROBLEMS STATEMENT

Many issues were raised in traditional construction process due to its effectiveness. People do aware about issue and problems in traditional construction process but do not try to address this issue. Traditional work process usually is associated with problem and limitation. A lot of implications that has been outline in his study such as project delay, redundant work and activities, poor management, and communication breakdown. They also related to abandoned projects. Current construction industry also was sometimes not achieved the expectation of end user and costumer. Problems of delay and low quality project seem to be happened in construction project. A serious actions need to be taken but there is no indicator can be measure towards the effectiveness of construction project. Many new strategies and method were introduced to the industry but the practicality of the strategies still cannot be assured.

1.3 OBJECTIVE

Below are the objectives of this study:

- To review the need to improve the effectiveness of project management in construction process.
- To define the method used currently by to improve the effectiveness of project management in construction process.
- To determine strategies to improved effectiveness of project management in construction process.

1.4 SCOPE OF STUDY

The scope of this study was focused on the process of construction project in area Kelantan. It is limited on the construction stage/phase and time factor. Data analysed were from the project manager, engineer and other construction player involved directly in construction process.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Construction processes include several activities. Construction processes are mapped onto the different construction stages that include feasibility and strategy, preconstruction planning and design, construction and completion and maintenance. Construction is a process that consists of the building or assembling of infrastructure. However, current construction process faced a lot of problems and ineffectiveness. This chapter elaborated the limitations and problems that associated with current construction practice.

2.2 TRADITIONAL CONSTRUCTION PROCESS

Basically traditional construction process is a task or activity that viewed from only one perspective (generally time). It is useful in a restricted way and whereby conditions are stable, repetitive, predictable and certain. It is said not dependent on teamwork as the design and construction are separated. No integration between these two teams.

Traditional construction is part of the informal sector of the building industry, largely carried out without professional involvement by builders working with a vernacular that they have learned through some form of apprenticeship. While construction methods vary across the world all share some simple characteristics. They make use of local materials, had to evolve to cope with local conditions and said to be robust.

The building methods will have been developed to use the most economical materials available that will give adequate standards of performance. This performance includes both the satisfactory planning of the building to suit local patterns of use and a sufficient construction to provide adequate thermal performance and resist the imposed loads. There are two main deficiencies: it is not recognized that there are also other phenomena in production than transformations; it is not recognized that it is not the transformation itself that makes the output valuable, but that the output conforms to the customer's requirements. The transformation view is instrumental in discovering which tasks are needed in a production undertaking and in getting them realized. However, the transformation view is not especially helpful in figuring out how not to use resources unnecessarily or how to ensure that the customer requirements are met in the best manner. Therefore, production, managed in the conventional method, tends to become inefficient and ineffectiveness.

The traditional construction process is essentially linear, that is an input undergoes a transformation that results in an output. Thus the traditional view of process is that of a task or activity. Yet construction is not at any level a simple linear process brief in building out. What is required is a process that makes sense of the complex relationships in construction and responds to uncertainty and risk. What is required is a process that gets you from where you are to where you want to be.

2.3 EFFECTIVENESS OF PROJECT MANAGEMENT IN CONSTRUCTION PROCESS

Construction time has always been seen as one of the benchmarks for assessing the performance of a project and the efficiency of the project organization. Timely completion of a construction project is one goal of the client and contractor because each party tends to incur additional costs and lose potential revenues when completion is delayed Thomas et al (1995). Chan and Kumaraswamy (1996) opined that a project is usually regarded as successful if it is completed on time, within budget and to the level of quality standard specified by the client at the beginning of the project. Attempts to predict construction duration represent a problem of continual concern and interest to

both researchers and project managers. Skitmore and Ng (2003) identified the use of detailed analysis of work to be carried out and resources available as well as limited budget and time available to the client as the common methods of estimating construction time in practice. However, to reduced subjectivity according to them', serious interest in construction time performance commenced with a pioneering investigation by Bromilow in 1969 in Australia Chan and Kumaraswamy (1999). His efforts yielded result in 1974 when he established a model for predicting project duration for building projects based on a time cost relationship. Efficiency in construction process can be defined as efficient construction site communication, managing time efficiently, and managing waste and avoid waste production. According to Preece *et al.* (1998) effective communication is one of the strategic tools available for gaining employee commitment, improving morale, increasing productivity, quality and safety and introducing new technologies. All parties involved in a construction project are producers, suppliers and consumers of information. Hence, owners, designers, contractors, suppliers, and construction managers will benefit substantially from having the means to deliver and access to information wherever and whenever they need to Bakeren and Willems (1993).

2.4 INEFFECTIVENESS OF PROJECT MANAGEMENT IN CONSTRUCTION PROCESS

There are many factors that contribute due to the ineffectiveness of project management in construction process. The factors are presented as below:

2.4.1 Poor Time Management

Time delay is the most widely held cause for construction disputed. In the past, it was an accepted to have delays in construction projects completion time. However, today, with a client tight budget, delays became a very significant cost item. Delays in construction projects are frequently related to word "expensive", since there is usually a Construction loan involved which charges interest, management staff dedicated to the Project whose costs are time dependent, and ongoing inflation in wage and material

prices. A lot of techniques are used to analyze delays. Some of these methods have inherent weaknesses and should be avoided.

The most efficient management system is ultimately useless if the people who need to use it cannot. Here is an example of how the right materials management solution was implemented and then linked between buildings, various campuses and people, bringing the benefits of the system to everyone who needed them.

Basically reducing time in construction could give effect and implication to other elements which are gave advantages to clients, consultants and contractor. "For example a rule of thumb for moderate-to high-technology firms is that a six-month delay in bringing a product to market can result in a gross profit or market share of about 30 percent. In these cases, high-technology firms typically assume that the time saving and avoidance of lost profits are worth any additional costs to reduce time without any formal analysis (Gray and Larson, 2000).

Other reasons of reducing construction time because it is been imposed. It is explain such as when a project that been instructed by president or government for a certain reason. The rationale of reducing construction time is also because the project is important for all users or other function. For instance, constructions of highway or road networked. Highway and road network is important as that will be used for all residents.

To measure the effectiveness of the material management process is needed in order to analyse problems, suggest solutions, and assess the impact of modifications to the process. Such measurement is also required for any benchmarking effort. Productivity is extremely important in the construction industry. "Governments and Other owners are investing significantly less money into capital works and preventative maintenance programs, even though these programs would help curb the deterioration of the infrastructure. One of the reasons for this lack of financial commitment towards construction projects is that productivity and quality in the Construction industry has as much as in other industries, and construction is therefore regarded as a poor investment. Ineffectiveness used of allotted time.

2.4.2 Construction Waste

Waste in construction is a result of ineffectiveness of project management. It can also result in project failure or ability to get maximum profit for the contractor. It is also leads to environmental issues. The huge volume and various compositions of construction waste have made its disposal a serious problem because it leads to environmental impacts such as landfill space and resource depletion. A huge concern must be given to construction waste generation and management to reduce its burden to the environment. The most significant environmental aspect was disposal of paper-based packaging waste followed by disposal of inert waste and plastic-based packaging waste, and recycling of steel containers off-site. The most preferred sorting scheme was to sort at specific work area for different types of work tasks. On-site sorting should be encouraged to facilitate construction waste reuse and recycling. Specific guidelines for construction waste management should be formulated and enforced to ensure sustainable construction.

I. Type of construction waste

Patterson (1999) stated that construction waste were included materials from all categories, the main components (by weight) are typically:

Rubble, concrete etc	40-45% &
	20-25% concrete & clean fills
	10-15% plasterboard

Construction Waste

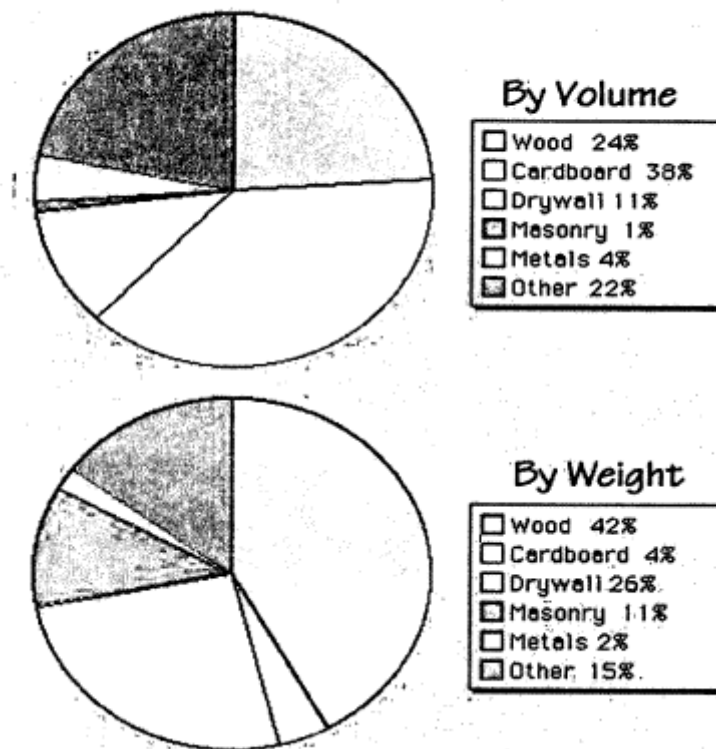


Figure 2.1: Construction Waste Percentage by Volume and Weight.

Here are some important generalizations about residential construction waste.

- By weight or volume, wood, drywall and cardboard make up between 60 and 80% of jobsite waste.
- Vinyl and metals are generated in small quantities, but have good recycling value.
- Cardboard waste is increasing on most jobsites as more components, such as windows, appliances cabinets and siding, are shipped to builders over long distances.
- Most wood waste is “clean” unpainted, untreated and recyclable. This usually includes dimensional lumber, plywood, OSB and particle boards without laminates.
- Brick, block, and asphalt shingle waste are insignificant in volume, but can be important in terms of weight.

- For most builders, the largest share of waste that could be considered hazardous is generated from painting, sealing, staining and caulking.
- Drive-by contamination (waste placed in a container by a party other than the builder or subcontractor) can be as much as 30 percent of the total volume hauled from a site.

II. Personnel involved in construction waste and management

Successful materials and waste management is like any successful project that relies on the skills of many professionals and personnel from the architect and designers through project management to the trade contractors.

Table I presents a list of personnel that are typically involved before the materials arrive on site, and their roles in achieving the effective materials management.

Table 2.1: pre-construction people involved in materials management

Team Member	Role in Material Management
Architect	Design for the best use of standard sizes, for multiple applications and for their recyclability. Specifies materials with recycled content, responsible packaging and from renewable resources
Engineer	Ensures appropriate structural component dimension, quality and spacing for use of standard fasteners and material for multiple applications and recyclability. Specifies material with recycled content, responsible packaging and from renewable resources.
Estimator	Uses latest materials take off technologies and exercises accuracy in estimates. Reviews actual waste generation data and updates actual waste factor regularly.
Purchaser	Plans purchases and deliveries to reduce surplus and to balance material maintenance during on-site storage versus transportation energy consumption. Specifies recyclable and returnable packaging.

Source: American Institute of Architect Houston, 1994

Table 2.2 lists personnel directly involved in the use of the materials. They may participate in the planning process, since they know first-hand the actual site and working conditions.

For commercial buildings or multiple-housing projects, it may be prudent to employ a Site Materials Manager, a function that is not common in today's Construction practice. Or the role may be given to one or more individuals as a part of their assignment on smaller projects.

Table 2.2: People Involved In materials Management

Team member	Role in material management
Site construction management	Applied the materials management plan to the site and oversee its implementation. Takes into consideration physical space available and ensures subcontractors are familiar with and committed to the plan.
Site material manager	Keeps track of new materials, cuts and used materials, organizes and stores them for availability by the various trades throughout the project in accordance with the materials management plan.
Subcontractor management	Communicates with site management and Material Manager regarding the types of material they may be able use for various purposes, even if temporarily. Ensures trades follow the plan's practices.
Trade workers	Use materials properly, store new materials properly, handle and cut them carefully for maximum use and minimum waste Consider using cuts before new pieces.

Source: American Institute of Architects Houston, 1994

People not employed by the owner, contractor or subcontractor are a part of the materials management team as well. Suppliers, hauler and recyclers each play a role in

the successful reduction of waste and optimum utilization of materials. Refer to table 2.3

Table 2.3: Off-site People Involve in construction materials management.

Team Member	Role in Materials Management
Suppliers	Use recyclable packaging and returned containers and pallets or informs the site of others who will accept them.
Recyclers & haulers	Provide containers for convenient materials storage and retrieval if appropriate. Instruct the site personnel in separation and quality requirements

Source: American Institute of Architects Houston, 1994

Construction Safety and Hazardous Materials

Waste minimization is the best way to curb your hazardous waste generation and reduce potential liability. Minimizing waste involves good housekeeping practices, employee training, process modifications, or substitutions of a non-hazardous material for a hazardous one. Examples include:

- Minimizing your supply of raw materials to prevent overstocking.
- Adopting a "first-in, first-out" inventory policy.
- Labelling waste containers properly to avoid mixing incompatible wastes or contaminating clean materials.
- Controlling access to storage areas and routinely inspecting containers (received containers that are leaking or damaged should be rejected).
- Maintaining vehicles and equipment at a central location, preferably in a garage or maintenance facility--not on the construction site.

2.4.3 Communication Breakdown

Communication within project based environments presents special challenges. This is especially true within the construction industry, where interaction tends to be characterized by unfamiliar groups of people coming together for short periods before disbanding to work on other endeavours.

Organizations undertaking multiple building projects or even single, highly complex project can face communications inefficiencies that create unnecessary and costly delays and disputes. Even as some organizations successfully streamline the communication of project information internally, they still struggle to communicate effectively with their external project team.

Recognizing the impact of poor communication on project results, many companies involved in building design and construction have sought to optimize their internal processes and project controls. Some companies may even have a centralized repository for creating, managing, and storing project documents and information but they have no way to track and manage information created, revised or reviewed externally. With the massive amount of information passed back and forth between companies at each stage of the design and construction process, this lack of centralized, streamlined communication represents a significant risk. Poor communication and collaboration is pervasive and impacts each phase of the construction process as well as everyone involved in the process from owners and construction managers to architects, engineers, and contractors. Building projects suffer from lack of accountability, poor information sharing, and not enough time to resolve problems that arise.

Communication plays a critical role in a project's success. Poor communication can lead to schedule problems, scope increases, excessive change orders, quality problems, and cost overruns for projects in any of these categories:

Below are the time impacts regarding communication problem in construction:-

- i. Delays in document turnarounds between companies.
- ii. Need to recreate data between companies.
- iii. Need to update multiple logs, creating redundant data.
- iv. Unnecessary travel.

2.4.4 Lack of Project Control and Monitor

Any control system needs an objective against which performance can be measured. If the control system is to have beneficial effects by keeping the project orientated towards a meaningful result, then the objective needs to be framed in terms which relate to the task environment.

2.4.4.1 Cost Control

The application of ideas from control theory is easy and obvious when applied to something like cost control. The cost plan must be framed by reference to the financial environment of the project. (In its turn, the financial environment must be understood with reference to the wider economic situation.) Cost control is the activity which compares cost performance against the cost plan, adjusting one or the other dynamically by reference to the changing circumstances in the project's financial environment. These are the basic tenets of systems theory, applied to objectives, control and feedback. What is not so readily understood, but is implied by the foregoing analysis, is that the other four facets of the environment also have corresponding needs for control.

2.4.4.2 Time Control

The policy environment of the project is the major influence around the timing of the project. Timing is influenced by many environmental factors, but the client's attitude to the timing of the project is an issue of policy. Therefore, when considering time, the policy of the client needs to be unambiguous.

2.4.4.3 Functional Control

The physical environment dictates the technology which is available. Technology includes the physical resources being utilized in the provisions of the built facility. This also ties in the ecological issues about the effect that the construction project has upon the physical environment. In terms of a control system, it is functional control which forms the strongest link here. The function of the building, and its parts, is a direct result of the technological task environment. This environmental factor is concerned not only with the technology of construction, but also the technology of the client's organization. Therefore, the function of the building, and the way in which the Client's requirements are achieved, are essential elements of functional control.

2.4.4.4 Conflict Control

The legal environment influences the development, or avoidance, of conflict. The control of conflict is an essential part of project management, but is often neglected. There seems to be unwillingness by many people to even consider conflict; almost as if they were being asked to contemplate divorce when planning a marriage! However, construction projects are not marriages, and the purpose of contracts and conditions of engagement is to make clear and unambiguous enforceable promises. A certain amount of conflict between the members of the team is a healthy source of new ideas. Therefore, just like cost, it needs to be controlled, not eliminated.

2.4.4.5 Quality Control

The aesthetic environment is a particularly subjective aspect. As such, previous studies have tended to avoid dealing with it. If a model is to be widely applicable, it cannot consist only of objective phenomena. Quality control and quality assurance are very topical at the moment. However, the word and the concept have been diluted by British Standards, and by quality programmes. There are two aspects to the definition of quality. First, it is a word used to describe the characteristics that something or someone has. It is this sense that has been used by quality assurance schemes, where it refers to characteristics which can be specified and quantified. These schemes have defined

quality as "conformance to requirements" for the purposes of achieving some sort of uniformity in their application. Configuring a scheme to increase the reliability of the process is a useful and valuable exercise. However, it is not going to engender quality. Conforming to requirements means that if the client specifies poor quality, then that is what will be provided. Perhaps this "conformance to requirements" belongs more properly under the heading of function control referred to above. The second meaning of quality refers to a subjective reaction to something which is good. This is a lot more difficult to define, and very difficult to control or assure. The quality that something has when it is good does not reside in its measurable characteristics. For example, considering a dining table, the components of which it is made do not individually contain the source of its stableness. What makes it a table is our perception of it. That perception resides in us, the subjects, not in the object. Quality in a building, in the sense of excellence, also depends upon the way in which people react to buildings. It is primarily a question of perception, and secondarily a question of characteristics. Therefore, this kind of quality control is not easy to deal with. Because it is difficult many people avoid the issue altogether and restrict themselves to re-defining quality so that it holds no reference to anything subjective. What is needed is an exploration of these issues, to examine the possibility of addressing the subjective problems associated with describing quality, without compromising the more objective problems of ensuring reliability in function.

2.4.5 Uncertainty handling approaches

Uncertainty is a risk element in construction projects. Many uncertainties such as uncertainty of activity duration, physical conditions, scope of work, resource requirement, and delivery of information are generally found. Three main uncertainty handling approaches existed to date are:

- i. Probabilistic analysis – normally deals with uncertainty of activity duration and resource requirement. Well known techniques are Program Evaluation and Review Technique (PERT), Monte Carlo simulation, and process simulation (Mawdesley et al, 1997);

- ii. Buffer management – considers a wide range of uncertainty. The principle of this technique is to pre-identify possible uncertainties and insert appropriate size of buffers to absorb any effects that may interrupt critical paths or critical chains. Goldratt (1997), Ballard and Howell (1998);
- iii. Shielding production and look-ahead analysis –was designed based on Lean construction concept. The principle of this technique is to detect and satisfy all potential constraints prior to releasing operation assignments to the work face Ballard and Howell, (1998).

2.5 CONSTRUCTION PROCESS IMPROVEMENT.

In general construction improvement can be described into three parts which are:-

- I. Adapting project management perspective to construction management
- II. Using tool and philosophy from other industry
- III. Using advance construction technology

2.5.1 Adapting Project Management Perspective to Construction Management

According to Spinner (1997), project management is defined as managing and directing time, material, personnel/labour and costs to complete a project in an orderly, economical manner and to meet the established objectives of time, costs and technical and/or service results. Current practice in construction management is very much influenced by the traditional management mind-set. It is necessary for the manager in construction project to be more open minded and try to adapt management concept and practice from non-construction project based to construction. Construction need to reconsider many aspects of modern project management system in managing the construction project. One of the important key areas that have been given a lot of emphasis by other industry is related to the need to focus and end user requirement. This perspective cannot be achieved within the framework of traditional and fragmented construction process.

The management of construction projects requires knowledge of modern project management as well as an understanding of the need to integrate design and