ADVANCED e- PRESENTATION SYSTEM OF A WORK PLAN FOR IMPROVED PROJECT COMMUNICATION

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ADVANCED e- PRESENTATION SYSTEM OF A WORK PLAN FOR IMPROVED PROJECT COMMUNICATION

by

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SISTEM PERANCANGAN KERJA TERMAJU e-PERSEMBAHAN UNTUK PENAMBAHBAIKAN DALAM KOMUNIKASI PROJEK

ABSTRAK

Kejayaan sesebuah projek bergantung secara kritikalnya kepada usaha, perhatian dan kemahiran yang digunakan di dalam perancangan awalan. Perancangan pembinaan adalah satu proses kompleks yang melibatkan koordinasi di antara berbagai-bagai peserta projek di dalam dan di luar tapak bina . Dengan meningkatnya bilangan projek dari segi saiz dan kerumitan , bilangan peserta yang terlibat di dalam sesuatu projek juga bertambah. Beberapa kajian mencadangkan bahawa komunikasi di dalam pengurusan projek memerlukan sistem kawalan yang berkesan untuk memasti pertukaran maklumat yang tepat di antara pelbagai unit kerja projek. Mereka melaporkan bahawa kelemahan mengintegrasikan perancangan di antara pelbagai unit projek tidak cukup untuk menyokong usaha koordinasi yang diperlukan bagi mencapai kejayaan projek .

Kajian ini membincangkan satu siasatan kritikal terhadap ketidak pastian teknik persembahan perancangan skedul pada masa kini yang menyebabkan berlakunya kesilapan kontraktual di dalam Pengurusan Projek. Ia mendedahkan perlunya format persembahan perancangan yang standard bagi meningkatkan penyelarasan kerja-kerja di kalangan beberapa kontraktor yang terlibat di dalam satu projek. Maklumat diperolehi melalui soalselidik dan temuduga dengan 130 kakitangan projek yang terdiri dari Pengurus Projek, Pembantu Pengurus Projek, Perancang Projek, Jurutera, Juruanalisa/ Juruukur Bahan dan Penyelia Tapak di dalam atau di luar tapak projek. Untuk tujuan menganalisa, data-data dikategorikan dalam bentuk data kuantitatif (data dikutip dari semua responden) dan data pakar (data dikutip dari Pengurus Projek, Pembantu Pengurus Projek dan Perancang).

Penyelidikan ini mendapati bahawa sumber utama masalah dalam persembahan yang digunapakai masakini ialah komunikasi yang tidak berkesan. Skedul yang tidak jelas menyebaban kakitangan projek tidak faham dan keliru dan justeru itu menyampaikan maklumat yang tidak tepat yang akhirnya menimbulkan salah faham. Perhubungan antara aktiviti juga didapati tidak jelas dan memerlukan masa yang lama jika pengemaskinian diperlukan. Untuk mengatasi kelemahan – kelemahan tersebut sistem termaju e-Persembahan telah dibangunkan dan di uji penggunaannya dalam projek dalam Lingkaran Luar Butterworth, yang terletak di Butterworth, Pulau Pinang, Hasil penggunaan sistem termaju ini menunjukkan komunikasi dan koordinasi yang lebih baik antara setiap unit dalam projek tersebut berbanding dengan projek serupa yang melibatkan bilangan kontrakor utama yang ramai dalam satu projek.

ADVANCED e-PRESENTATION SYSTEM OF A WORK PLAN FOR IMPROVED PROJECT COMMUNICATION

ABSTRACT

The success of a project depends critically upon the effort, care and skill applied in its initial planning. Construction planning is a complex process that involves coordination between many project participants on- and off-site. As projects have been increasing in size and complexity, the number of participants involved in a single project has also increased. Numerous studies have suggested that the communication in project management needs effective controlling system for a flawless information exchange between the various working units of the project. They have reported that the lack of planning integration between the various units of project do not adequately support the coordination efforts required to successfully deliver projects.

This research discuss a critical investigation into the loopholes in the present planning scheduling presentation techniques that lead to communicational and contractual errors in Project Management. It highlights the need of a standard plan presentation format for better coordination of works among the various parties involved in a project. Information both objectively and subjectively are obtained through questionnaire survey and interviews of 130 project personnel which comprises of Project Managers, Assistant Project Managers, Project Planners, Engineers, QA/QS and Site supervisors of the Project on- and off-site. For analysis the data was categorized into quantitative data (data collected from all the respondents) and expert's data (data collected from experts i.e. Project Managers, Assistant Managers and Planners).

The research identified that the source of most problems with the current plan presentation is poor communication and ambiguity. The work program causes difficultly in understanding and conveying information, resulting in misunderstanding. Interrelationship between activities too is not clearly defined thus significant time is consumed if updating is required. To counter the loopholes in the present plan presentation system and practices, an advanced e-presentation system was developed and tested on an ongoing Butterworth Outer Ring Road Project (BORR) in Butterworth, Penang, Malaysia. The result has shown that communication and coordination between various working units with in the project has been far better in e-presentation than similar projects having more than one main contractor

CHAPTER 1.0
INTRODUCTION

1.1 Background to the Research

For a pre-contract Construction Projects in Malaysia, which involves Contractor and Employer, the tender invitation given to the contractors includes many contractual documents; the following are the documents that were listed in JKR tender Specifications:

1. Instruction to Tenderers
2. Conditions of contract
3. Appendices to the conditions of contract
4. Bills of quantity
5. Preamble to the Bill of quantities
6. Method of measurement
7. Schedule of Particulars
8. List of Drawings

The Tenderer is supposed to be abiding by the above-mentioned synopsis and has to produce a work program, apart from fulfilling other formal requirements of the Tender. The work program contains information of how the Tenderer would carry out his work if at all he were being awarded the contract. The work program also reflects, to what extent is the Tenderer capable of producing an effective plan, which in application would lead to the best desired outcome for the employer. Once the contract is decided and after the issuance of the Letter of Award, the contractor has to produce a Master work program which describes in detail, what and how the schedule of works be done. Also monthly/weekly work programs with updated project progress will be submitted to the client to compare the actual and planned schedules and also to evaluate the project status.

Well! Today most of the Tenderers or the contractors follow a formal approach in developing their work program which is either in a typed format or a spread sheet or software program with some time related bars on a chart. These work programs does not give any detailed information of how the Tenderer is intending to work on. In most of the cases the work program is overlooked, as pricing of the Tender is the main concept even the pricing is not done with respect to the work program. The following are the possible drawbacks in this scenario.

1. The client may not get the exact content as planned by the Tenderer from his program of works.
2. All the possible activities of the project may not be incorporated in the program
3. All the activities are not well organized and related as scheduled.
4. The relation between cost and progress is unexplained
5. The relation between progress and project constrains is not highlighted
6. The client cannot judge critical activities in the project
7. On any delay or failure of an activity, they employer may not get proper evidence to prosecute the contractor nor the contractor has sufficient program to justify himself.
8. For any changes that take place in the project, the program is not amendable
9. The program is not self explanatory

1.2 Researcher's Experience

Further the researcher; working with the consultant firm as a Project Planner in the ongoing project BORR in Penang Malaysia personally experienced the difficulty in coordinating the work programs with different formats submitted by the working contractors for the same project. There was a bit of ambiguity in explaining the client about the project overall work program.

The contractors were then instructed to follow a common procedure in presenting their work programs. Each of the contractors has produced his work program as instructed by the consultant, thus it was easy for the consultant to verify the work ability of the work program and also to explain the client about the overall work program of the project since the overall work program's objective is to complete the project in the least time with the available resources.

The client expressed his contentment upon giving him the complete picture of the project work program in a single presentation detailing the working procedure adopted by the various contractors in achieving the project goals.

1.3 Planning in Project Management

Project planning is the process to quantify the amount of time and budget a project will cost. The purpose of project planning is creating a project plan that a project manager can use to track the progress of the project.

The architecture of the project plan includes complete task definition, resource requirement definition, major milestones, application, reliability and the performance measurement, which results in early identification of problems that may jeopardize successful project completion, also help in controlling the two important elements of the project management Time and Cost.

Scheduling or work program is important because it brings together project definition, timing, resource, cost and methods of performing work to define the logical sequence of activity for the project. The schedule is the final product of scope definition, planning budgeting, and forms the basis against which all the activity is measured. Project tracking and control can be accomplished with a good plan and

schedule. All activities should have a due date. If the activity is completed on time, everything is great. If the activity is not completed, a common question to ask is what percentage of the work is completed. Knowing the percent complete is very subjective. The problem is that by the time we make a formal update, we may have already missed some activities. In addition, if we are behind schedule or over budget and it takes too long to notice, we may be too far behind to make up the difference.

Poor planning can cause serious problems in many areas later in the project. These problems may be in communicational and contractual areas. The need of a standard communication plan in a project was highlighted by Peter van der Heijden (2003) as one of the Top Ten Key risks to project acceptance.

Table 1.1: Top 4th Risk to Project Acceptance as per Peter van der Heijden(2003)

4. No standard communication plan to support the project	Every project should use a communication plan to make sure that all users and the broader organization are informed about the project, its goals, and appropriate project updates. The communication plan should analyze the various target groups and make sure that each target group gets the appropriate message.

Thus we see that project planning is an integral part of project management; hence it has to be communicated in a well-organized transmissible format.

1.4 Communicating a Project Plan

Proper communication is vital in Project success. While communicating a Project Plan or work program, the work program has to be well organized such that the end user will get the information what exactly the planner is intent to do. Incase of ambiguity, distortion of information in the proposed work plans, there will be breakdown in the communication which is well illustrated in the following Figure 1.1.

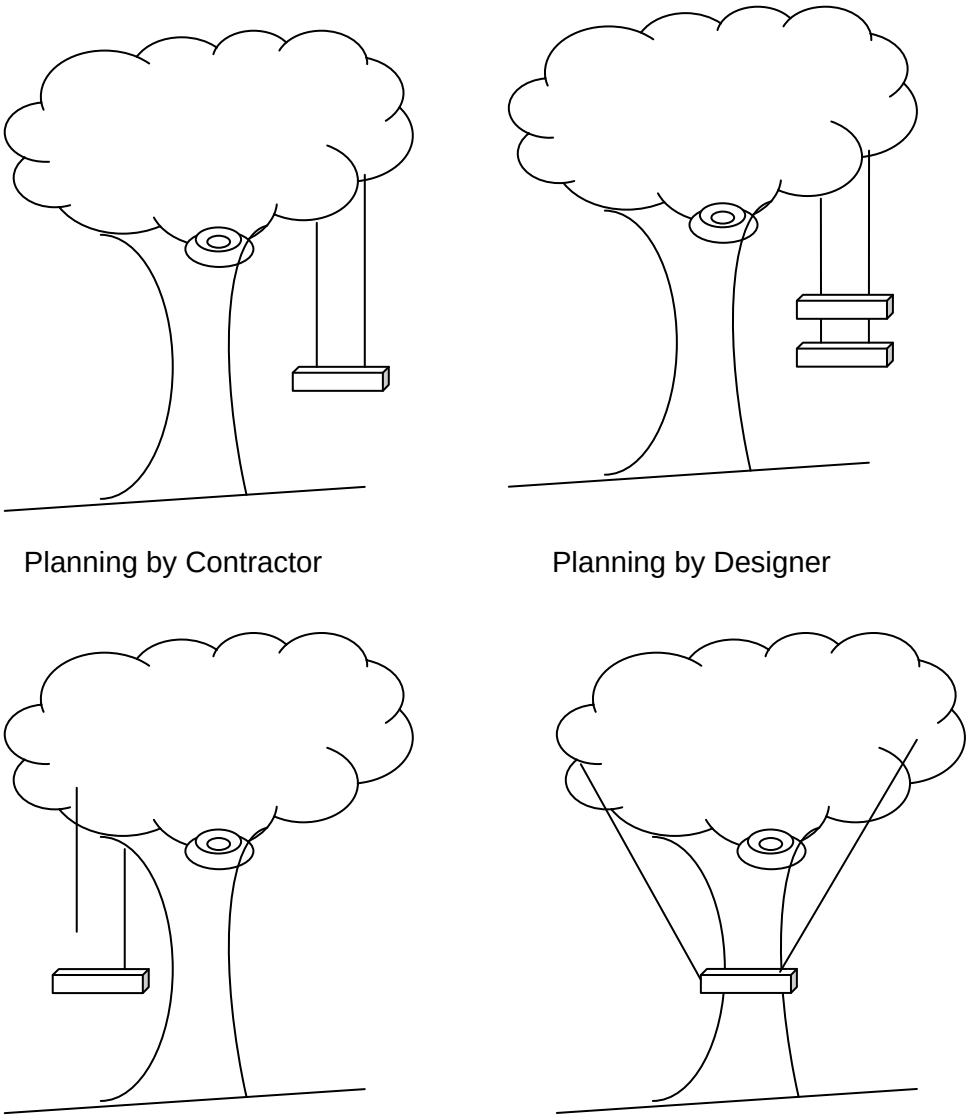

Figure 1.1: Difference in the Interpretation of common plan
(Source: http://workstart.com/library/pm1.htm)

The swiftest and most effective communications take place among people with common points of view. Since a Project plan is not done with respect to any one or two individuals of the project, but for the entire project Team, hence it is necessary that the work program presentation has to be effectively clear and communicable.

For an effective presentation, it is important to know the client constrains and to convey information that is of value and interest to the Project. It should be prepared and presented from the client's point of view and organized in a logical pattern so each part of the presentation will relate to the other parts. A flaw in many work program presentation by the contractors is an attempt to tell the client too little and incorporating his personal views then to a step by step detailed description of the client's requirement. The presentation should have a summary showing the important milestone activities of the project. To increase the clarity and to emphasize the key points, the presentation should add necessary notes, comments and pictures. To be a meaningful part of the communication program, the project plan must be revised, reviewed, and revisited throughout the project

A work program presentation is greatly enhanced graphically, particularly the activities of the project, relationship between the activities, Target bars, Layout, headers and footers and so on. The value of graphical presentation is that the client having a minimum knowledge of the planning techniques can still understand and the amount of information he retains from the presentation is greatly increased.

Further the construction projects in Malaysia and India are facing a communication gap with respect to project planning systems mainly due to the lack of application usage of computers and also due to difference in formatting the work program. The contractors are to produce work schedule programs through out the

project and it is necessary that the information exchange between the various units of the project is ensured correctly.

1.5 Problem Statement

In most of the Construction projects the scheduled work program submitted by the contractor to the client are not well organized and are incomplete. Due to which confusion and misunderstanding take place, as a result communication failure will occur, there by creating an unhealthy project planning.

Many contractors do not take serious measures while presenting the work program. As soon as the contractor gets the project, he makes his plan showing the project completion date and necessary milestones as required by the client. The work program does not have the feel of the project flow; it is mainly done for formal requirements and client's satisfaction only.

Further for a client having more then one main contractors for the same project, the work program submitted by the different contractors is not similar in presentation. The client finds difficulty in synchronizing work program of different contractors to obtain his desired output.

There are no detailed specifications in the contract documents that restrict the contractor to follow a procedural format while presenting their schedule of works. In this situation the understandability of the work program largely depends on the client view. Not in all cases the client will be able to understand what exactly the contractor has mentioned in the work program of the project and how efficient is the work program, so that the program output is in the favor of the client.

The deficiency or ambiguity in a Project Plan Presentation may lead to communicational and contractual errors.

Many contractual issues that rise in a construction project and further lead to arbitration has to deal with initial program submitted by the contract, also the variation in the project cost has to deal with the agreed schedule program. For example the price of steel and concrete may vary from time to time; the contract allows the addition or omission to the contract sum with the variation in the price of any materials used in the project. The variation calculated will be accounted through work program agreed by the client and the contractor. Hence the program of works has to be done in a very precise manner, with the best information embedded in, also easy to understand and clear in appearance. Disputes may rise for any injustice done, either to the contractor or to the client for an ineffective plan presentation as the root. In general there is a need of communication enhancement in the project management in terms of project planning and presentation.

1.6 Study Objectives

Based on the research background and problem statement the main objectives of this Research are:

1. To identify communicational and contractual problems arising from inefficient and incomplete project plan presentation in construction projects.
2. To develop an Advanced e-Presentation system that can minimize possible communicational and contractual problems arising from inefficient and incomplete Project Plan Presentation.

To ensure accomplishment of these objectives, the following course of action was adhered to:

1.6.1 Understand Project Planning Processes

At first it is very important to understand the importance of project planning in Project Management, the plan architecture and the planning phases, how to plan a project and the various components of a plan. Also to study and understand Planning in Construction Management

1.6.2 Understand Communication System in Project Management

Understanding the importance of communication in a Project management, communicating plans in the form of work programs. Effects of poor communication in project management

1.6.3 Understand Work program and Techniques.

Understanding the Project work programs or schedules and presentation techniques, utilities, features and Work program formats.

1.6.4 Understand the Current Plan Presentation Practices

In order to improve the current practice of presentation, a clear understanding and analysis of it is mandatory. This includes both project planning and application that occurs throughout the life of a project. It will be worthwhile to compare the current mode of plan presentation with the intended mode of construction project plan presentation followed by planners. Many researchers and professionals have advocated that project planning alone does not suffice in successfully managing a complex construction project. Thus, it is important to review the current mode project management assumes during a construction project. A clearer understanding of current practices will provide a better picture what requirements in the presentation will enhance the communication in term of planning between the various units of project management.

1.6.5 Understand the Current Software used for Planning

The research objective is also to study the widely used software in Malaysia for planning. These software include Primavera Project Planner, SureTrak and Microsoft Project, while other software like Plan view eTaskmaker, Open Plan or Welcom's Spider, Artmis Project view and Project Kick start which are less in Application.

1.6.6 Analyzing the Findings in the Current systems

Understanding project planning techniques in terms of communication in their current implementation and a case study will allow for better analysis of the disadvantages of the current planning system.

1.6.7 Determine an Advanced Plan Presentation System

With the development of Information Technology, usage of computer software In construction industry helps Management in advanced “e-management system” also in planning, budgeting reporting the project status in advanced e-planning system using Primavera project planner software.

1.6.8 Develop the Advanced e-Planning system

To develop a system which is able to over come shortcomings of planning systems currently in use. The new system which will be called “Advanced e-Planning system” will be designed using the best features currently available with Primavera Project Planner software. In designing the “Advanced e-Planning system”, the following factors will be taken into consideration:

1. Easy monitoring of progress and cost control
2. Provide a structured basis for work
3. Derive procedure to control work effectively
4. Obtain optimum results with respect to time and cost
5. Establish a standard of performance

6. Minimize risks and uncertainties
7. A clear understanding of project objectives
8. A complete self explanatory program

1.7 Scope of Works

The study is on plan presentations and its controversial understandings between employer, contractor and also between the various working units in the project. Different types of plan presentation formats are followed by different contractors, as there is no restriction, specifications, nor a standard way in presentation of a schedule of works. As the study is on planning and presentation, the thesis is limited to pre-contracted projects where project planning is of high priority.

This study is done in the construction industry in Kuala Lumpur and Penang Malaysia, as these projects are pre-contracted.

The quantitative data was collected from the Malaysian and non Malaysian contractors and clients executing their signed projects in Malaysia during the year 2003 and 2005 also from the Indian contractors and clients executing their signed pre-contracted projects.

The data collected from the contractors is a hard copy of work program submitted to their respective client. Only the approved work program of the contractor by his client is considered for this study. Also interviews based on a prepared questionnaire were conducted with the contractor's and employer's Project Managers, Assistant project Managers, Project planners, Engineers and other onsite personals were conducted and their view in regard to the thesis problem statement is taken and recorded. Best possible measures have been taken to cover all classes of clients and contractors.

1.8 Significance of Study

The significance of this study is to generate awareness among the contractors and clients about the possible communicational and contractual issues that may rise due to ineffective and deficient presentation of a scheduled work program of the project. The study emphasizes on the need of improvement on the means of communicating information among project members and the non project members in a Project there by making the goals clear and specific of the project.

The study also underlines the alignment between the working and planning managements in a project. The study is also to forward the need of a procedural and a common format in design of a work program. Imparting a common means of communication between contractor and employer will help improvement of understandability and clarity in the communication of project plans.

The enforcement of a procedural plan format in planning a project will develop a healthy environment between all the working parties in the project in terms of communication and understandings

The main application significance of this study is to bring to notice to the Malaysian Government Department of Works (Jabatan Kerja Raya) to develop specifications for presenting a work program and enforce it in all of its contracts. The contractors and sub-contractors, has to follow the prescribed specifications while submitting their work program during tender stage, also in the submission of monthly project progress reports, which would help in minimizing communicational and contractual conflicts that may rise in a project due to deficient and ambiguity of a project plan presentation.

Advanced e-Planning system is very much similar to the ideology of the guidelines one has to follow in the preparation, submission of a research thesis. The university has prescribed certain regulation to be followed while presenting the thesis, mainly for uniqueness and easy reference. e-Planning system is an attempt to improve the information conveyance between the various parties involved in the project by adopting specifications in the plan presentation techniques.

CHAPTER 2.0
LITERATURE REVIEW

2.1 Planning in Project Management

A project consists of three components: scope, budget and schedule (Harold Kerzner, 2000). It is important that all three of these components to be defined clearly and linked together since one effects the other, both individually and collectively. Scheduling is important because it brings together project definitions, people, cost, resource, timing, and methods of performing work to define the logical sequence of activity for the project. The schedule is the final product of scope definition, budgeting, and planning and forms the base against which all activity is measured. Project tracking and control cannot be accomplished without a good plan and schedule.

A project can be considered to be any series of activities and tasks that:

1. Have a specific objective to accomplished with in certain specifications
2. Have defined start and end dates.
3. Have funding limits (if applicable)
4. Consume resource (i.e. money, people, equipment)

Project Management on the other hand, involves project planning and project monitoring and includes such items as:

1. Project planning
    a. Definition of work requirements
    b. Definition of quality and quantity of work
    c. Definition of resources needed
2. Project monitoring
    a. Tracking progress
    b. Comparing actual outcome to predicted outcome
    c. Analyzing impact

d. Making adjustments

All project plans should specify key points within the project, deliverables at these points and threats represented by delay and/or failure of deliverables. The project plan should be a document which describes how the project work will be conducted, what is to be accomplished, when specific segments are performed, who is responsible and how much it will cost. The plan should define responsibilities and accountability for all people involved in the project. Construction contractors have the lead role during the construction phase; however the client and designer have an important role as well. A cooperative environment of team work must be developed so that all parties can work together as a unit to achieve the project.

2.1.1 Project Plan Architecture and Phases

Harold Kerzner (2000) proposed that the project plan architecture should constitute:

1. Complete task definitions
2. Resource requirements definitions
3. Major timetable milestones
4. Definition of end-item quality and reliability requirements
5. The basis for performance measurement

Planning Phases

1. Omissions
2. Inaccuracy of the work breakdown structure
3. Misinterpretation of information
4. Use of wrong estimating techniques
5. Failure to identify and concentrate on major cost elements
6. Failure to assess and provide for risks.

2.1.2 How to Plan a Project

Cohenca-Zall, D., Laufer, A., Shapira, A., and Howell, G.A. (1994) has developed the following to plan a project

1. Determine the exact conditions for the project to be completed or to be terminated. Before it is absolutely clear what the objectives of the project are, it makes little sense to start estimating how long it will take and how much it will cost. Unfortunately, many project managers fail to take this first, crucial step. Each project should have a clear connection to one or more real of organization's business issues.
2. Make an inventory of all the work that needs to be done with an estimate of the time it will take to complete by a single team member. This can be done in a planning session with all the team members. Tasks that will take over three weeks to complete need to be broken down further to get good granularity. To avoid getting swamped with details, the tasks at the lowest level should take approximately 1 week. The result is a work breakdown structure. Make sure that having the project's deliverables injected into the organization or its environment will actually cause the expected benefits (project objectives) to materialize.
3. Identify the resources needed to complete each terminal element of the WBS. At this point you can usually estimate the cost to deliver each terminal element and, consequently, the project (bottom-up approach). Sometimes a top-down approach to estimating costs is also possible by means of using coefficients
4. Make a decision whether this initial plan makes sense, i.e. whether the costs justify the benefits. Modify the objectives and the supporting work as necessary.

5. Define dependencies among tasks. Some tasks need to be completed before other tasks can begin. By putting tasks into their relative completion order, a project manager constructs a project network.
6. Calculate the minimum time the project will take: it is the longest path through the project network from the start of the project until its end. This path is called the critical path (or critical chain, if resource dependencies are taken into account). Other tasks can be done in parallel to the critical path but any delay in the tasks on the critical path will automatically result in a delay in the overall deadline of the project.
7. Create a project schedule (e.g. in the form of a Gantt chart).
8. Plan for risk management and modify the project plan accordingly.
9. Commit the organization to starting the project implementation.
10. Project planning is not something that is done only once at the beginning of the project. It should be an ongoing task of the project manager to keep an eye on the progress of his team and update the project plan accordingly. Project management software can be helpful if used properly. There are several project management standards that describe in detail how to plan and manage a project.
11. Planning how risk management will be held in the particular project. Plan should include risk management tasks, responsibilities, activities and budget.
12. Summarizing planned and faced risks, effectiveness of mitigation activities and effort spend for the risk management.

2.1.3 Components of Project Planning

Components of project planning and scheduling as mentioned in the Chaos report (1994):

1. Milestones:→ major checkpoints for progress review on a defined time line
2. baseline:→ starting point at beginning, ending point for future changes
3. assumptions:→ provides vision/understanding of the projects goals and direction
4. risks, dependencies:→ defines uncertainty
5. contingencies:→ for known, high probability risk
6. diagrams, graphics:→ showing tasks and their sequence

2.1.4 Principles of Planning and Scheduling

There must be an explicit operational plan to guide the entire project. The plan must include and the three components of the project: scope budget and schedule. Too often, planning is focused only on schedule without regard to the important components of scope and budget.

Leicht, Michael (1999), to develop an integrated total plan, the project must be broken down into well defined units of work that can be measured and managed. This process starts with the work break down structure. Once this is complete the project team members who have the expertise to perform the work can be selected. The team members have the ability to define the time and cost that will be required to produce the work. With this information the complete project plan can be developed. The project plan and schedule must clearly define individual responsibilities, schedules, budgets, and anticipated problems. The project manager should prepare formal agreements with appropriate parties whenever there is a change in the project. There should be equally concern given to schedule and budget, and the two must be linked. Planning, scheduling and controlling begin at inception of the project and are continues throughout the life of the project until completion. The following are the key principles fro planning and scheduling.

1. Begin planning before the work, rather then after starting the work.
2. Involve people who actually do the work in planning and scheduling process.
3. Include all the aspects of the project: scope, cost, schedule, and quality.
4. Built flexibility into the plan, include allowance for changes and time for reviews and approvals.
5. Remember that schedule is the plan for doing the work, and it will never be precisely correct.
6. Keep the plan simple, eliminate irrelevant details that prevent the plan from being readable.
7. Communicate the plan to all the parties, any plan is worthless unless it is known.

2.2 Construction Planning

Chris Hendrickson (2001) mentioned *Construction planning* as a fundamental and challenging activity in the management and execution of construction projects. It involves the choice of technology, the definition of work tasks, the estimation of the required resources and durations for individual tasks, and the identification of any interactions among the different work tasks. A good construction plan is the basis for developing the budget and the schedule for work. Developing the construction plan is a critical task in the management of construction, even if the plan is not written or otherwise formally recorded. In addition to these technical aspects of construction planning, it may also be necessary to make organizational decisions about the relationships between project participants and even which organizations to include in a project. For example, the extent to which sub-contractors will be used on a project is often determined during construction planning. Like a detective, a planner begins with a result (i.e. a facility design) and must synthesize the steps required to yield this result. Essential aspects of construction planning include the *generation* of required activities,

analysis of the implications of these activities, and *choice* among the various alternative means of performing activities. In contrast to a detective discovering a single train of events, however, construction planners also face the normative problem of choosing the best among numerous alternative plans. Moreover, a detective is faced with an observable result, whereas a planner must imagine the final facility as described in the plans and specifications.

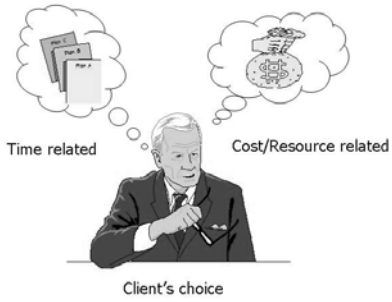

Figure 2.1 Emphasis on Cost or Schedule

(Source: http://www-cdf.fnal.gov/internal/cdfphotos/cdfphotos.html)

In developing a construction plan, it is common to adopt a primary emphasis on either cost control or on schedule control as illustrated in Figure 2.2. Some projects are primarily divided into expense categories with associated costs. In these cases, construction planning is cost or expense oriented. Within the categories of expenditure, a distinction is made between costs incurred directly in the performance of an activity and indirectly for the accomplishment of the project. For example, borrowing expenses for project financing and overhead items are commonly treated as indirect costs. For other projects, scheduling of work activities over time is critical and is emphasized in the planning process. In this case, the planner insures that the proper precedences among activities are maintained and that efficient scheduling of the available resources prevails. Traditional scheduling procedures emphasize the maintenance of task

precedences (resulting in *critical path scheduling* procedures) or efficient use of resources over time (resulting in *job shop scheduling* procedures). Finally, most complex projects require consideration of both cost and scheduling over time, so that planning, monitoring and record keeping must consider both dimensions. In these cases, the integration of schedule and budget information is a major concern.

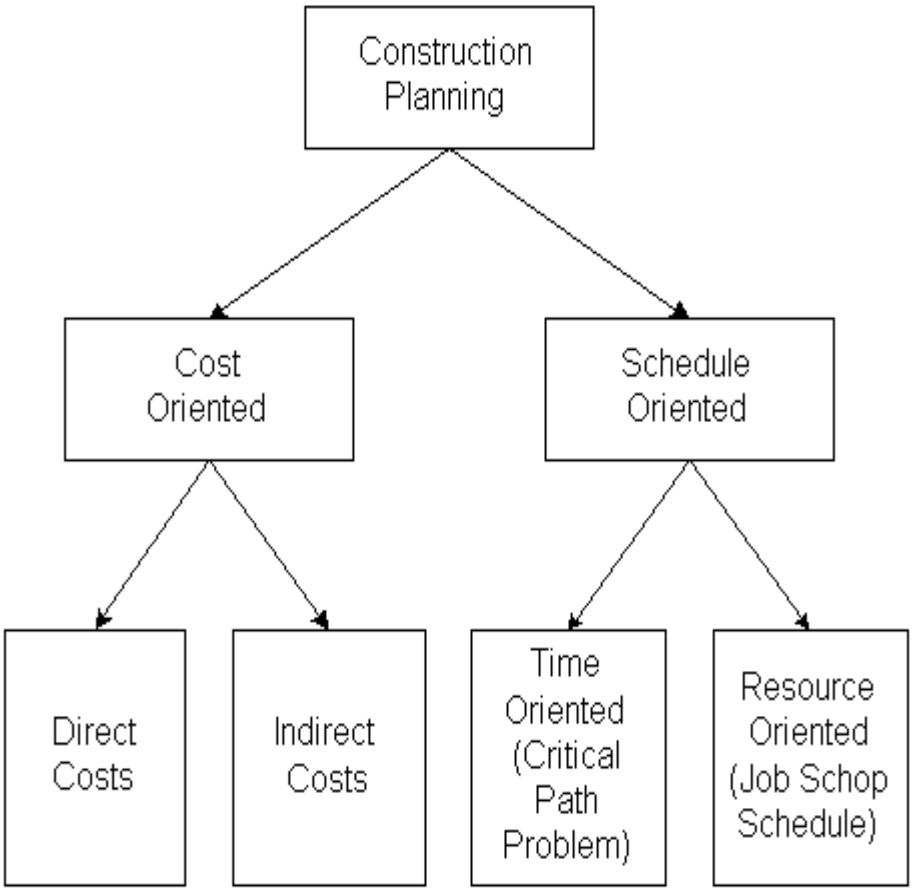

Figure 2.2 Alternative Emphasis in Construction Planning

Construction planning is not an activity which is restricted to the period after the award of a contract for construction. It should be an essential activity during the facility design. Also, if problems arise during construction, re-planning is required.

As in the development of appropriate alternatives for facility design, choices of appropriate technology and methods for construction are often ill-structured yet critical

ingredients in the success of the project. For example, a decision whether to pump or to transport concrete in buckets will directly affect the cost and duration of tasks involved in building construction. A decision between these two alternatives should consider the relative costs, reliabilities, and availability of equipment for the two transport methods. Unfortunately, the exact implications of different methods depend upon numerous considerations for which information may be sketchy during the planning phase, such as the experience and expertise of workers or the particular underground condition at a site.

In selecting among alternative methods and technologies, it may be necessary to formulate a number of construction plans based on alternative methods or assumptions. Once the full plan is available, then the cost, time and reliability impacts of the alternative approaches can be reviewed. This examination of several alternatives is often made explicit in bidding competitions in which several alternative designs may be proposed or *value engineering* for alternative construction methods may be permitted. In this case, potential constructors may wish to prepare plans for each alternative design using the suggested construction method as well as to prepare plans for alternative construction methods which would be proposed as part of the value engineering process.

In forming a construction plan, a useful approach is to simulate the construction process either in the imagination of the planner or with a formal computer based simulation technique. By observing the result, comparisons among different plans or problems with the existing plan can be identified. For example, a decision to use a particular piece of equipment for an operation immediately leads to the question of whether or not there is sufficient access space for the equipment. Similarly, problems in resource availability identified during the simulation of the construction process might

be effectively forestalled by providing additional resources as part of the construction plan.

Wixom, Barbara H (2001), stated that there are several factors that are important in order to achieve a successful project during construction. A detailed construction schedule that is developed and used by the contractor who is performing the work, not the owner or designer, the owner should only define the start and end dates of the project. Contractors know their capabilities, resources, and how they plan to coordinate the many activities required to built the project in field. Thus they are best qualified to develop a schedule to guide the numerous construction projects.

According to Macomber, Hal (2003), Planning skills are helpful for any undertaking; they are absolutely essential, however, for the successful management of large complex projects. The project plan is the road map that defines how to get from the start to the final results.

Hendrickson and B.N. Janson (1984), program planning is an ongoing activity at all the organizational levels. However, the preparation of a project summary plan, prior to schedule start, is the main responsibility. Effective project planning requires particular skills far beyond writing a document with schedules and budgets. It requires communication and information processing skills to define the actual resource requirements and administrative support necessary. It requires the ability to negotiate the necessary resources and commitments from key personnel in various support organizations with little or no formal authority, including the definition of measurable milestones. Effective planning skills required in the areas of:

1. Information processing
2. Communication
3. Resource negotiations

4. Securing commitments
5. Incremental and modular planning
6. Assuring measurable milestones
7. Facilitating top management involvement

In addition the plan should remain a viable document, changes in project scope and depth are inevitable. The plan should reflect necessary changes through formal revisions and should be the guiding document throughout the life cycle of the project. Finally the possibility that the planning can be overdone, if not controlled, planning can become an end to itself and a poor substitute for innovative work. Hence the program should be flexible.

2.3 Project communications

In terms of project communications, the project plan itself is probably the most meaningful communication vehicle in the entire arsenal. By committing to paper the deliverables, the responsible parties, the scheduled delivery dates, and the dependencies, we take the overall engagement—which may be large and difficult to visualize—and break it down into its component parts, thus making it much easier to comprehend and discuss at the level of detail necessary.

According to Paulson, A (1999), people communicate in many ways, often communications get filtered and somewhat distorted. For many reasons, agreements in the project environment must be written. Project management believes in the philosophy that only what is on paper is really important. Another important facet of any project management system is to provide the people in the organization with procedural guidelines for how to conduct project oriented activities and how to communicate in such a multidimensional environment. The project management