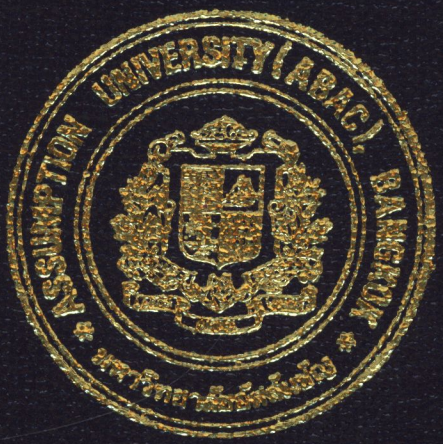

INFORMATION TECHNOLOGY INFRASTRUCTURE PROJECT MANAGEMENT

by

Mr. Chatchawat Assawaraksawong

A Final Report of the Six-Credit Course
CE 6998 - CE 6999 Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
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Academic Year	July 2002

The Graduate School of Assumption University has approved this final report of the six-credit course, CE 6998 — CE 6999 PROJECT, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management.

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ABSTRACT

This project analyzes the problems of current Information Technology (IT) Infrastructure project management then proposes the solutions to solve these problems. This project uses Project Management Approach (PMA) as a major tool and other concepts of project management that apply to the real project of Professional Shared Services (PROSS), Sri Lanka Infrastnicture Readiness for Asian (SAP) Template, to show how the IT Infrastructure project management is improved.

Some other tools for analysis and control of the project are IT Infrastructure Questionnaire and Project tracking and control methodology. IT Infrastructure Questionnaire is used for getting current IT Infrastructure. Before we can recommend anything better, we at least have to know the current situation either what is ready or what is not ready for the new system, project tracking and control methodology used for tracking the status of each task. All tasks in the project are important especially the tasks in the critical path.

After applying PMA and using tools to manage IT Infrastructure project, almost all problems can be solved. There still is a problem that is related to each personality such as knowledge and skill that has to be solved by personality improvement.

ACKNOWLEDGEMENTS

I am indebted to the following people and organizations. Without them, this project would not have been possible.

I wish to express sincere gratitude to my advisor, Dr. Chamnong Jungthiraphanich. His patient assistance, guidance, and constant encouragement have led me from the project inception to the project completion.

I would like to thank Mr. Boonchai Thippaya-archa and Mr. Pakawat Yinchai who both are my bosses at Siam City Cement Public Company (SCCC), which is member company of HOLCIM group, for their helps in giving me the information and guidance.

Special appreciation is due to my family for their fervent and continuous encouragement. Above all, I am forever grateful to my parents whose willingness to invest in my future has enabled me to achieve my educational goal.

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I. INTRODUCTION

1.1 Background

For Information era, IT is a must for corporation surviving and developing. It seems to be a leader for business margin. Nowadays we can observe that all corporations have an IT department, which will be responsible for cooperation for each department (i.e., Marketing, Human resources, Sales, Production, and etc.) and is a fundamental factor for all businesses. They all need computers to communicate and store valuable infoimation for faster and accurate operation. To run all computers and applications smoothly, designing and implementing IT Infrastructure has to be well prepared. Normally, IT Infrastructure will be managed as a project. Managing this kind of project to meet the business requirement, project management methods are required. This project will show the characteristic of IT Infrastructure and how to manage this kind of project to finish on time and under run budget.

SAP now is the most important system of SCCC. It makes the company earn more revenue by using the benefit of IT. To implement Infrastructure for running SAP as a kind of IT Infrastructure project, there are many things have to be concerned and managed.

1.2 Objectives

(1) To analyze the existing IT Infrastructure project management problems then suggest solutions to avoid or solve.

(2) To apply Project Management theory finding optimal solution to manage IT Infrastructure projects.

(3) To evaluate and improve performance of IT Infrastructure project management.

1.3 Scope

This project's scope in the existing project, "Sri Lanka Infrastructure Readiness for ASEAN (SAP) Template" is implemented by PROSS team. The problems of this project will be analyzed and optimal solutions will be proposed.

II. LITERATURE REVIEW

2.1 Definition of Project and Project Management (Spinner 1997)

A project consists of a series of tasks (or activities) that have several distinguishing characteristics:

(1) The project has specific starting dates and ending dates.

(2) It has well-defined objectives.

(3) It achieves a specified product or result.

(4) It is a unique, non-repetitive endeavor.

(5) Cost, time schedules, and resources (personnel/labor, equipment, material) are consumed.

Project management is defined as managing and directing time, material, personnel/labor, 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.

2.2 Project Management Approach (PMA) (By HOLCIM GROUP)

PMA can be categorized into 5 phases as the following:

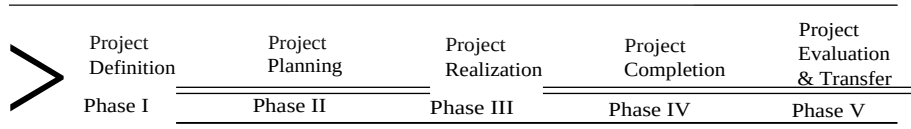

Figure 2.1. Project Management Approach.

(1) Project Definition

The first thing that every project manager has to be concerned is project definition. Project definition composes of many things such as assessment of initial situation, stakeholder analysis, outline project

organization, estimation of costs, risk and etc. First of all, project manger has to understand the existing situation before starting to plan and implement any project. In addition, stakeholder analysis and project organization are also important. Stakeholder analysis will let project manager know who will get advantages or disadvantages from this implementation. Project manager needs to know the project organization since there are many kinds of project organizations and each kind has different characteristics. The thing that project manager also cannot ignore in this phase is costs estimation and risk assessment.

(2) Project Planning

In this phase, project team will be set up. Project members may be chosen from different departments. It depends on project organization structure and the characteristics of project. The project schedule and budget also is defined in this phase. In this planning phase, many related persons are involved and we need a lot of information from them. So communication plan and meeting is very necessary for this phase.

(3) Project Realization

All activities or tasks are listed in this phase by using work breakdown or other methods. Every task status of project has to be reviewed or monitored then reported to project manager periodically. The tasks in critical path have to be monitored carefully since, if any task in critical path is delayed, it will make the project delayed. Project overview also has to be reviewed both in time and budget so the project will not over run budget and over time.

(4) Project Completion

In this phase, project is completed and ready to hand over to operation or team that is responsible for it. All reports, user manual, acceptance test document, and other documents have to be submitted to project manager then project manager reviews and submit it to customer or related person.

(5) Project Evaluation & Transfer

All finished projects have to be evaluated. So project manager and team can know the problems and can avoid these problems in the next projects. Implementing each project will give experience and knowledge to both project manger and team members. It is a good time to set meeting for exchanging or transferring knowledge between members in team.

2.3 Organizational Work Flow (Kerzner 2001)

Organizations are continually restructured to meet the demands imposed by the environment. Restructuring can produce a major change in the role of individuals in both the formal and the informal organization. Many researchers believe that the greatest usefulness of behaviorists lies in their ability to help the informal organization adapt to changes and resolve the resulting conflicts. Unfortunately, behaviorists cannot be totally effective unless they have input into the formal organization as well. Conflicts arise out of changes in the formal structure. Whatever organizational form is finally a selected, formal channel must be developed so that each individual has a clear description of the authority, responsibility, and accountability necessary for the flow of work to proceed.

In the discussion of organizational structures, the following definitions will be used:

(1) **Authority** is the power granted to individuals (possibly by their position) so that they can make final decisions for other to follow.

(2) **Responsibility** is the obligation incurred by individuals in their roles in the foinial organization in order to effectively perform assignments.

(3) **Accountability** is the state of being totally answerable for the satisfactory completion of a specific assignment (Accountability = authority + responsibility)

Authority and responsibility can be delegated (downward) to lower levels in the organization, whereas accountability usually rests with the individual. Accountability is the summation of authority and responsibility. Yet, many executives refuse to delegate and argue that an individual can have total accountability just through responsibility.

Even with these clearly definable divisions of authority, responsibility, and accountability, establishing good interface relationships between project and functional managers can take a great deal of time, especially during the conversion from a traditional to a project organizational form. Trust is the key to success here; it can overcome any problems in authority, responsibility, or accountability. When trust exists, the normal progression in the growth of the project-functional interface bond is as follows:

(1) Even though a problem exists, both the project and functional managers deny that any problem exists.

(2) When the problem finally surfaces, each manager blames the other.

(3) As trust develops, both managers readily admit responsibility for several of the problems.

(4) The project and functional managers meet face-to-face to work out the problems.

(5) The project and functional managers begin to formally and informally anticipate the problems that can occur.

2.3.1 Traditional (Classical) Organization

The traditional management structure has survived for more than two centuries. However, resent business developments, such as the rapid rate of change in technology and position in the marketplace, as well as increased stockholder demands, have created strains on existing organizational forms. Fifty years ago companies could survive with only one or perhaps two product-lines. The classical management organization, as shown in Figure 2.2, was found to be satisfactory for control, and conflicts were at a minimum.

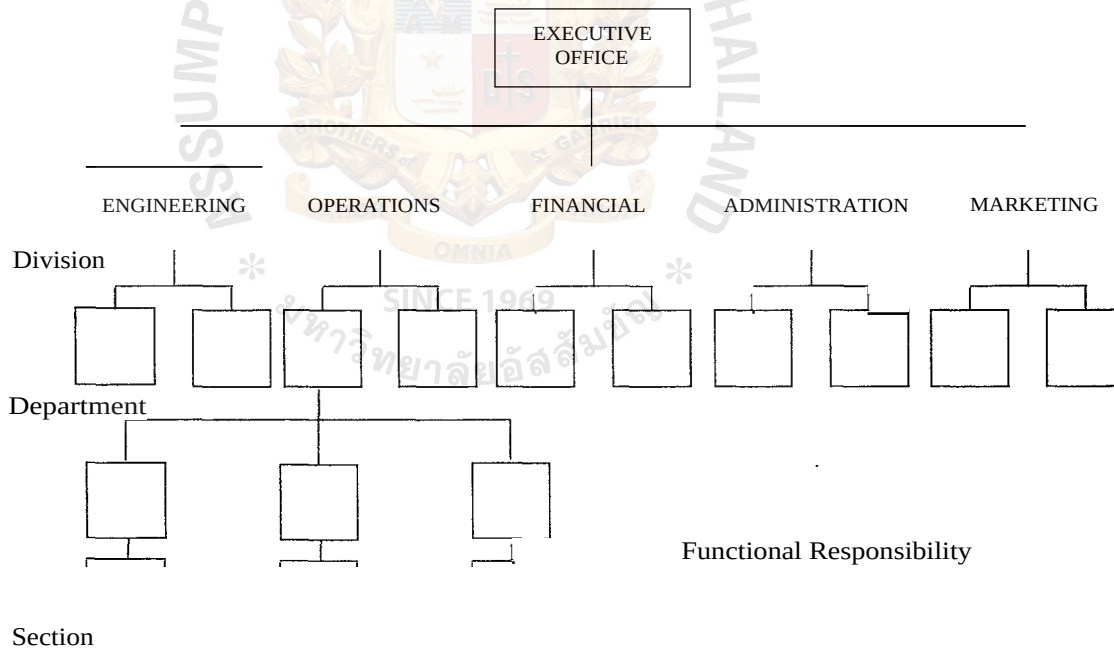

Figure 2.2. The Traditional Management Structure.

However, with the passing of time, companies found that survival depended on multiple product lines (i.e., diversification) and vigorous integration of technology into

the existing organization. As organizations grew and matured, managers found that company activities were not being integrated effectively, and that new conflicts were arising in the well-established fon ial and informal channels. Managers began searching for more innovative organizational forms that would alleviate the integration and conflict problems.

Before a valid comparison can be made with the newer forms, the advantages and disadvantages of the traditional structure must be shown. Table 2.1 and Table 2.2 list the advantages and disadvantages of the traditional organization respectively.

Table 2.1. Advantages of the Classical/Traditional Organization.

Advantages of the classical/traditional organization

• Easier budgeting and cost control are possible.
• Better technical control is possible.
  • Specialists can be grouped to share knowledge and responsibility.
  • Personnel can be used on many different projects.
  • All projects will benefit from the most advanced technology (better utilization of scarce personnel).
• It provides flexibility in the use of manpower.
• It provides a broad manpower base to work with.
• It provides continuity in the functional discipline; policies, procedures, and lines of responsibility are easily defined and understandable.
• It readily admits mass production activities within established specifications.
• It provides good control over personnel, since each employee has one and only one person to report to.
• Communication channels are vertical and well established.
• Quick reaction capability exists, but may be dependent upon the priorities of the functional managers.

Table 2.2. Disadvantages of the Classical/Traditional Organization.

Disadvantages of the traditional/classical organization
• No one individual is directly responsible for the total project (i.e., no formal authority; committee solutions). • It does not provide the project-oriented emphasis necessary to accomplish the project tasks. • Coordination becomes complex, and additional lead time is required for approval of decisions. • Decisions normally favor the strongest functional groups. • There is no customer focal point. • Response to customer needs is slow. • There is difficulty in pinpointing responsibility; this is the result of little or no direct project reporting, very little project-oriented planning, and no project authority. • Motivation and innovation are decreased. • Ideas tend to be functionally oriented with little regard for ongoing projects.

2.3.2 Line-Staff Organization (Project Coordinator)

It soon became obvious that control of a project must be given to personnel whose first loyalty is directed is directed toward the completion of the project. For this purpose, the project management position must be separated from any controlling influence of the functional managers. Figure 2.3 shows a typical line-staff organization.

Two possible situations can exist with this fonn of line-staff project control. In the first situation, the project manager serves only as the focal point for activity control, that

is, a center for information. The prime responsibility of the project manager is to keep the division manager informed of the status of the project and to "harass" or attempt to "influence" managers into completing activities on time. Referring to such early project managers, Galbraith stated, "Since these men had no formal authority, they had to resort to their technical competence and their interpersonal skills in order to be effective."

The project manager in the first situation maintained monitoring authority only, despite the fact that both he and the functional manager reported to the same individual. Both work assignments and the functional managers made merit reviews. Depaituient managers refused to take direction from the project managers because to do so would seem an admission that the project manager was next in line to be the division manager.

The amount of authority given to the project manager posed serious problems. Almost all upper-level and division managers were from the classical management schools and therefore maintained serious reservations about how much authority to relinquish. Many of these managers considered it a demotion if they had to give up any of their long-established powers.

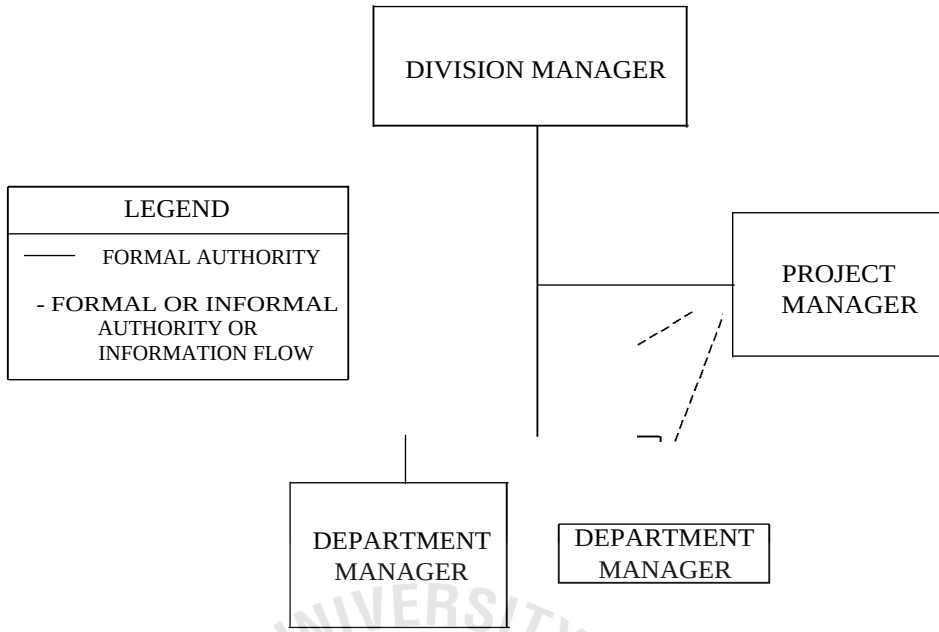

Figure 2.3. Line-Staff Organization.

In the second situation, the project manager is given more authority; using the authority vested in him by the division manager, he can assist work to individuals in the functional organizations. The functional manager, however, still maintains the authority to perform merit reviews, but cannot enforce both professional and organizational standards in the completion of an activity. The individual performing the work is now caught in a web of authority relationships, and additional conflicts develop because functional managers are forced to share their authority with the project manager.

Although this second situation did occur during the early stages of matrix project management, it did not last because:

(1) Upper-level management was not ready to cope with the problems arising from shared authority.

(2) Upper-level management was reluctant to relinquish any of its power and authority to project managers.

(3) Line-staff project managers who reported to a division head did not have any authority or control over those portions of a project in other divisions; that is, the project manager in the engineering division could not direct activities in the manufacturing division.

2.3.3 Pure Product (PROJECTIZED) Organization

The pure product organization, as shown in Figure 2.4, develops as a division within a division. As long as there is exists a continuous flow of projects, work is stable and conflicts are at a minimum. The major advantage of this organizational flow is that one individual, the program manager, maintains complete line authority over the entire project. Not only does he assign work, but he also conducts merit reviews. Because each individual reports to only one person, strong communication channels develop that result in a very rapid reaction time.

In pure product organizations, long lead times became a thing of the past. Trade-off studies could be conducted as fast as time would permit without the need to look at the impact on other projects (unless, of course, identical facilities or equipment were required). Functional managers were able to maintain qualified staffs for new product development without sharing personnel with other programs and projects.

The responsibilities attributed to the project manager were entirely new. First of all, the vice president and general manager now granted his authority. The program manager handled all conflicts, both those within his organization and those involving other projects. Interface management was conducted at the program manager level. Upper-level management was now able to spend more time on executive decision making than on conflict arbitration.

The major advantage with the pure project form is the cost of maintaining the organization. There is no chance for sharing an individual with another project in order

to reduce costs. Personnel are usually attached to these projects long after they are needed because once an employee is given up, the project manager might never be able to get him back. Motivating personnel becomes a problem. At project completion, functional personnel do not "have a home" to return to.

Table 2.3. Advantages of the Product Organizational Form.

Advantages of the product organizational form
• It provides complete line authority over the project (i.e. strong control through a single project authority). • The project participants work directly for the project manager. Unprofitable product lines are easily identified and can be eliminated. • There are strong communications channels. • Staffs can maintain expertise on a given project without sharing key personnel. • Very rapid reaction time is provided. • Personnel demonstrate loyalty to the project: better morale with product identification. • A focal point develops for out-of-company customer relations. • There is flexibility in determining time (schedule), cost, and performance trade-offs. • Interface management becomes easier as unit size is decreased. • Upper-level management maintains more free time for executive decision-making.

Many organizations place these individuals into an overhead labor pool from which selection can be made during new project development. People still in the labor pool for a certain period of time may be laid off indefinitely. As each project comes to a close, people become uneasy and often strive to prove their worth to the company by overachieving, a condition that is only temporary. It is very difficult for management to convince key functional personnel that they do, in fact, have career opportunities in this type of organization.

In pure functional (traditional) structures, technologies are well developed, but project schedules often fall behind. In the pure project structure, the fast reaction time keeps activities on schedule, but technology suffers because without strong functional groups, which maintain interactive technical communication, the company's outlook for meeting the competition may be severely hampered. The engineering department for one project might not communicate with its counterpart on other projects, and duplication of efforts can easily occur.

The last major disadvantage of this organizational form lies in the control of facilities and equipment. The most frequent conflict is that which occurs when two projects require use of the same piece of equipment or facilities at the same time. Hierarchical referral is required to alleviate this problem. Upper-lever management can assign priorities to these projects. This is normally accomplished by defining certain projects as strategic, tactical, or operational.

Table 2.3 summarizes the advantages of this organizational form, and Table 2.4 lists the disadvantages.

Table 2.4. Disadvantages of the Product Organization Form.

Disadvantages of the product organizational form
• Cost of maintaining this form in a multi product company would be prohibitive due to duplication of effort, facilities, and personnel; inefficient usage. • There exists a tendency to retain personnel on a project long after they are needed. Upper-level management must balance workloads as projects start up and are phased out. • Technology suffers because, without strong functional groups, outlook of the future to improve company's capabilities for new programs would be hampered (i.e., no perpetuation of technology). • Control of functional (i.e., organizational) specialists requires top-level coordination. • There is a lack of opportunities for technical interchange between projects. • There is a lack of career continuity and opportunities for project personnel.

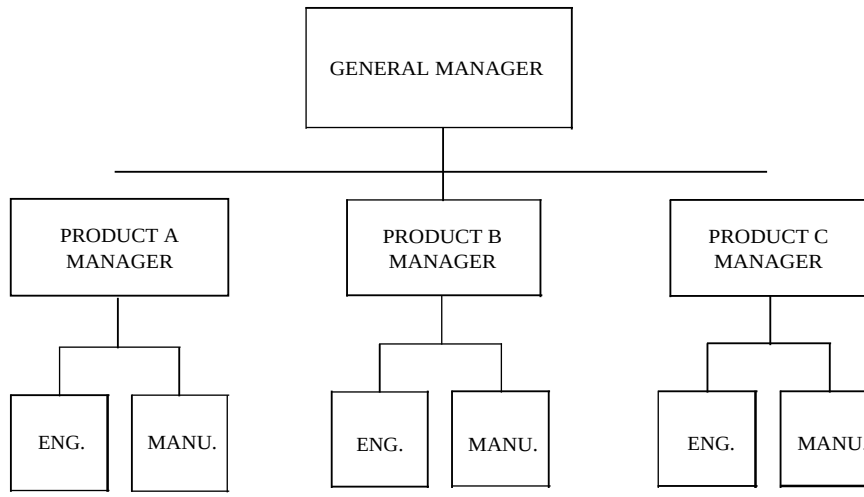

Figure 2.4. Pure Product Structure.

2.3.4 Matrix Organizational Foal' (Nicholas 1999)

The matrix, shown in Figure 2.5, is a grid-like structure of authority and reporting relationships created by the overlay of a project organization on a traditional, functional organization. This overlay gives the matrix three unique capabilities.

First, the functional part provides the repository for the technical expertise and physical resources needed by the project. The project manager creates a project group by negotiating with functional managers and then "borrowing" the expertise and physical resources needed for the project. Each project is composed of workers who are on loan but who work together as a project team during the course of the project. Since the same work force is time shared among several projects, duplication of effort is reduced.

Second, while in their "functional homes" workers associate with colleagues in their fields of specialization; this not only keeps them current in their profession or trade, but also makes them more assignable to new projects. Each functional area has, at

a given time, many individuals who are working on different projects. Sharing ideas and exchanging points of view makes them more effective in their respective projects.

Third, when individual assignments are fulfilled or a project-completed worker goes back to their functional homes for a new assignment. Large fluctuations in the work force and in worker morale and anxiety are thus reduced.

The primary effort of the project manager in the matrix (sometimes called the matrix manager) is integration. The authority granted the matrix manager varies from having judicious control over functional managers to being under their control. Typically, the project manager is considered on the same hierarchical level as functional managers. Functional managers provide the necessary technical counsel, advice, and support, while the project manager integrates and unifies their efforts to meet project goals. The project manager works with functional managers to accomplish the project.

The matrix makes it easy to create unique organizations to accomplish particular goals. It shares the virtue with the pure project organization of having dedicated resources and a project manager to give the project priority.

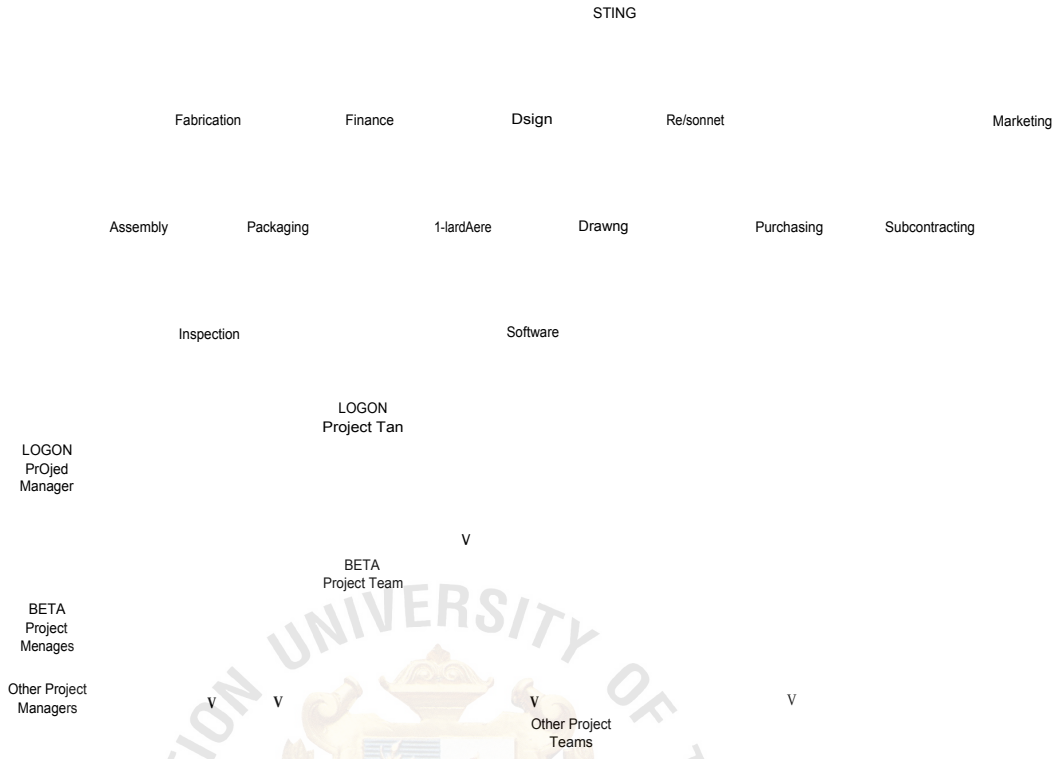

Figure 2.5. Matrix Organization Form.

The strong point of the matrix organization, its combination vertical-horizontal structure, is at the same time the root cause of its problems. The matrix is not just a structure but a whole different way of doing things. To be successful information systems and human behavior that support two-dimensional information processing must reinforce it. With its emphasis on horizontal relations, lateral information flow, and decentralized decision-making, the matrix is clearly contrary. It superimposes a lateral system on a functional system, so companies adopting the matrix must add horizontal information processing systems to existing vertical accounting and command systems. It can be done, but tends to be somewhat complicated and expensive.

In human terms, the major drawback of the matrix is that it is conflict inducing. Theoretically, the two-dimensional structure promotes coordinated decision-making

among functional areas and enables tradeoff decisions to be made for the benefit of the project. It assumes that both functional-technical and project related issues have equal priority and that a balance of power exists between functional and project managers jockey to control one another. Functional managers control project resources, but project managers seldom control functional managers. In multi project organizations additional conflict is generated over which project gets priority and which project manager gets the best resources.

Since each worker in the matrix has two bosses, one functional manager and one project-matrix, the matrix violates a major principle of management: single, scalar chain of command. The project manager directs the worker on the project, but it is the functional manager who evaluates the worker's performance. The inevitable result is role conflict or confusion over allegiance.

The matrix strives to give equal priority to functions and projects, but sometimes neither gets priority. For workers to avoid the chaos and confusion in the matrix, everyone must have a common reference. For this to happen, organizations must establish clear, stable values and priorities. Any attempt to adopt the matrix must be accompanied by both attitudinal and cultural change.

2.4 Project Planning (Kerzner 2001)

2.4.1 Identify Strategic Project Variables

For long-range or strategic projects, the project manager must continually monitor the external environment in order to develop a well-structured program that can stand up under pressure. These environmental factors play an integral part in planning. The project manager must be able to identify and evaluate these strategic variables in terms of the future posture of the organization with regard to constrains on existing resources.

In the project environment, strategic project planning is performed at the horizontal hierarchy level, with final approval by upper-level management. There are three basic guidelines for strategic project planning:

(1) Strategic project planning is a job that should be performed by managers, not for team.

(2) It is extremely important that upper-lever management maintain a close involvement with project teams, especially during the planning phase.

(3) Successful strategic planning must define the authority, responsibility, and roles of the strategic planning personnel.

For the project to be successful, all members of the horizontal team must be aware of those strategic variables that can influence the success or failure of the project plan. The analysis begins with the environment, subdivided as internal environment (such as management skills, resources, wage and salary levels, layoffs and sales forecast), external environment (such as legal, political, social, economic and technological) and competitive environment (such as company requirements and goals, competitive history, present competitive activity, competitive planning and competitive resources)

Once the environmental variables are defined, the planning process continues with the identification of company strengths and weaknesses, understanding personal values of top management, identification of opportunities, definition of product market, identification of competitive edge, establishment of goals, objectives, and standards then finally, identification of resource deployment.

Complete identification of all strategic variables is not easily obtainable at the program level. Internal, or operating, variables are readily available to program personnel by virtue of the organization. The external variables are normally tracked under the perceptive eyes of top management. This presents a challenge for the

organization of the system. In most cases, those in the horizontal hierarchy of a program are more interested in the current operational plan than in external factors and tend to become isolated from the environment after the program begins, losing insight into factors influencing the rapidly changing external variables in the process. Proper identification of these strategic variables requires that communication channels be established between top management and the project office.

Top management support must be available for identification of strategic planning variables so that effective decision making can occur at the program level. Many top-level officers consider this process a relinquishment of some of their powers and choose to retain strategic variable identification for the top levels of management.

The systems approach to management does not attempt to decrease top management's role in strategic decision-making. The maturity, intellect, and wisdom of top management cannot be replaced.

Identification and classification of the strategic variables are necessary to establish relative emphasis, priorities, and selectivity among the alternatives, to anticipate the unexpected, and to determine the restraints and limitations of the program. Universal classification systems are nonexistent because of the varied nature of organizations and projects. However, variables can be roughly categorized as internal and external.

2.4.2 Proposal Preparation

There are four ways in which proposal preparation can occur:

(1) Project manager prepares entire proposal.

This occurs frequently in small companies. In large organizations, the project manager may not have access to all available data, some of which may be company proprietary, and it may not be in the best interest of the company to have project manager spend all of his time doing this.

(2) Proposal manager prepares entire proposal.

This can work as long as the project manager is allowed to review the proposal before delivery to the customer and feels committed to its direction.

(3) Project manager prepares proposal but is assisted by a proposal manager.

This is common, but again places tremendous pressure on the project manager.

(4) Proposal manager prepares proposal but is assisted by a project manager.

This is the preferred method. The proposal manager maintains maximum authority and control until such time as the proposal is sent to the customer, at which point the project manager takes charge. The project manager is on board right from the start, although his only effort may be solely in preparing the technical volume of the proposal and perhaps part of the management volume.

2.4.3 Work Breakdown Structure (WBS)

In planning a project, the project manager must structure the work into small elements that are:

(1) Manageable, in that specific authority and responsibility can be assigned

(2) Independent, or with minimum interfacing with and dependence on other ongoing elements

(3) Integratable so that the total package can be seen

(4) Measurable in terms of progress

The first major step in the planning process after project requirements definitions is the development of the work breakdown structure (WBS). A WBS is a product-oriented family tree subdivision of the hardware, services, and data required to produce the end product. The WBS is structured in accordance with the way the work will be perfoi__led and reflects the way in which project costs and data will be summarized and eventually reported. Preparation of the WBS also considers other areas that require structured data. Such as scheduling, configuration management, contract funding, and technical performance parameters. The WBS is the single most important element because it provides a common framework that the total program or project can be described as a summation of subdivided elements. Moreover, time, costs and budgets can be established and tracked systematically and the responsibility assignments for each element can be established clearly.

2.4.4 Project Charter

The original concept behind the project charter was to document the project manager's authority and responsibility, especially for projects implemented away from the home office. Today, the project charter has been expanded to become more of an internal legal document identifying to the line managers and his personnel not only the project manager's authority and responsibility, but the management — and/or customer-approved scope of the project. The highly detailed project charter should contain scope baseline and the management plan. Scope baseline consists of scope and objective of the project, specifications, template levels of WBS and timing. The management plan may consist of resource requirement, organization structure, responsibility assignment matrix, project policies and procedures and change management plan.

When the project charter contains a scope baseline and management plan, the project charter may function as the project plan.

2.4.5 Procedural Documentation

People communicate in many ways. Often communications get filtered and somewhat distorted. For many reasons, agreements in a project environment must be in writing. Project management believes in the philosophy that only what is on paper is really important.

The procedural guidelines and forms of project management can be especially useful during the project planning/definition phase. Not only does it help to delineate and communicate the four major sets of variables for organizing and managing the project —tasks, timing, resources, and responsibilities —it also helps to define measurable milestones, as well as report and review requirements. This provides the ability to measure project status and performance, and supplies crucial inputs for controlling the project toward the desired results. In addition, the procedural documents give some other benefits such as it provides standard data formats that can reduce the conflict and confusion and it also can help to build an experience track and method for future proj ects.

2.5 Project Time Management (Spinner 1997)

2.5.1 Scheduling Procedure

In the scheduling phase, we are concerned primarily with timing — how much time each job requires to complete and when each job will be scheduled to begin and end. Scheduling a project begins after the sequence of project items has been planned and laid out in a project-planning diagram. By using the following procedure, you will be able to schedule each project activity and determine the project duration.

(a) Determine the required time (time estimate) to complete each project item.

(b) Calculate the available time to complete each project team.

(c) Compare the required time with the available time of each project item for

- its float.

(d) Identify the critical project items.

(e) Determine the float times (slack) of the non-critical items.

(f) Calculate the duration of the project. If it does not meet the objectives and is not acceptable, make the necessary adjustments to the plan and to the timing estimates.

(g) Validate the time schedule by getting concurrence from all of the concerned persons.

(h) Prepare a bar chart time schedule.

Forward Pass Computation.

The network calculation that determines the earliest start and finish times for each activity. These calculations begin with the starting activities or events flowing sequentially in increasing time units until the ending activities or events are reached.

In a critical path method (CPM), the forward pass computation is performed after the logic diagram has been drawn and the activity duration has been estimated. The purpose of the forward pass computation is o find the earliest start (ES) and earliest finish (EF) times for all activities and events in the network. The computation is started by computing each activity's early start and finish times under the assumption that all activities start as soon as possible after all preceding activities have been completed.

The early start of the beginning activity is assumed to be equal to the first working day. The calculation proceeds from left to right or from the beginning to the end of the project. The earliest finish time of the last activity will be the earliest finish date or duration of the project. The following earliest start and finish times are calculated through the forward pass computation.

(1) Earliest finish time (EF) = early start time (ES) + activity duration

(2) Earliest start time (ES) = maximum earliest finish of immediately preceding activity(s)

Backward Pass Computation

In the critical path method (CPM), the backward pass computation determines the latest start and latest finish times for each activity. The activity latest start and latest finish times are the latest times when the activity can start and finish without increasing the project's duration. The calculation is similar to the earliest time but proceeds from right to left or, in other words, from the finish to the start of the project-thus the name backward pass.

In a backward pass computation, an activity late finish (LF) is the minimum late start (LS) of the immediately following activities; the activity late start is determined by its late finish minus its duration. The latest allowable finish time for the end network event is set equal to either an arbitrary scheduled completion time or the early finish time computed in the forward pass computation. The following late start and finish times are calculated in the backward pass computation:

(1) Late finish time (LF) = minimum late start of immediately following activities

(2) Late start time (LS) = late finish time (LF) — activity duration

Activity Total Float (Activity Total Slack)

The latest allowable finish minus the earliest allowable finish and/or the latest allowable start minus the earliest allowable start. It is the possible maximum number of time units (hours, days, etc.) that an activity can be delayed from its earliest start or finish without extending the project completion time.

(1) Late finish minus early finish = finish total float (slack)

(2) Late start minus early start = start total float (slack)

2.5.2 Bar Chart (Gantt Chart)

Bar charts are most commonly used for exhibiting program progress or defining specific work required to accomplish an objective. Bar charts often include such items as listings of activities, activity duration, schedule dates, and progress-to-date.

Bar charts are advantageous in that they are simple to understand and easy to change. They are the simplest and least complex means of portraying progress (or the lack of it) and can easily be expanded to identify specific elements that may be either behind or ahead of schedule.

2.6 Cost Estimating (Kerzner 2001)

Projects can range from a feasibility study, through modification of existing facilities, to complete design, procurement, and construction of a large complex. Whatever the project may be, whether large or small, the estimate and type of information desired may differ radically.

These following are methods used for cost estimation.

(1) Order-of-magnitude analysis

Made without any detailed engineering data. This method may have an accuracy of +- 35 % within the scope of the project. This type estimate may use past experience, scale factors, parametric curves or capacity estimates.

(2) Approximate estimate

Also made without detailed engineering data, and may be accurate to +- 15 %. This type of estimate is prorated from previous projects that are similar in scope and capacity, and may be titled as estimating by analogy,

parametric curves, rule of thumb, and indexed cost of similar activities adjusted for capacity and technology.

(3) Definitive estimate

Definitive estimate or grassroots buildup estimate is prepared from well-defined engineering data including vendor quotes, fairly complete plans, specifications, unit prices, and estimate to complete. This method has an accuracy of +-5 %.

III. MAJOR COMPONENTS OF IT INFRASTRUCTURE

3.1 Network Equipment and Cabling (http://whatis.techtarget.com)

Network equipment and cabling is one of the most important IT Infrastructures in organization. Any kind of network connecting, LAN, WAN or Internet, all requires network equipment and cabling.

(1) Hub

In data communications, a hub is a place of convergence where data arrives from one or more directions and is forwarded out in one or more other directions. A hub usually includes a switch of some kind. (And a product that is called a "switch" could usually be considered a hub as well.) The distinction seems to be that the hub is the place where data comes together and the switch is what determines how and where data is forwarded from the place where data comes together. Regarded in its switching aspects, a hub can also include a router.

(2) Switch

A switch is a network device that selects a path or circuit for sending a unit of data to its next destination. A switch may also include the function of the router, a device or program that can determine the route and specifically what adjacent network point the data should be sent to. In general, a switch is a simpler and faster mechanism than a router, which requires knowledge about the network and how to determine the route.

Relative to the layered Open Systems Interconnection (OSI) communication model, a switch is usually associated with layer 2, the Data-Link layer. However, some newer switches also perform the routing

functions of layer 3, the Network layer. Layer 3 switches are also sometimes called IP switches.

On larger networks, the trip from one switch point to another in the network is called a hop. The time a switch takes to figure out where to forward a data unit is called its latency. The price paid for having the flexibility that switches provide in a network is this latency. Switches are found at the backbone and gateway levels of a network where one network connects with another and at the sub network level where data is being forwarded close to its destination or origin. The former are often known as core switches and the latter as desktop switches.

(3) Modem

A modem modulates outgoing digital signals from a computer or other digital device to analog signals for a conventional copper twisted pair telephone line and demodulates the incoming analog signal and converts it to a digital signal for the digital device.

In recent years, the 2400 bits per second modem that could carry e-mail has become obsolete. 14.4 Kbps and 28.8 Kbps modems were temporary landing places on the way to the much higher bandwidth devices and carriers of tomorrow. From early 1998, most new personal computers came with 56 Kbps modems. By comparison, using a digital Integrated Services Digital Network adapter instead of a conventional modem, the same telephone wire can now carry up to 128 Kbps. With Digital Subscriber Line (DSL) systems, now being deployed in a number of communities, bandwidth on twisted-pair can be in the megabit range.

(4) Router

A router is a device or, in some cases, software in a computer, that determines the next network point to which a packet should be forwarded toward its destination. The router is connected to at least two networks and decides which way to send each information packet based on its current understanding of the state of the networks it is connected to. A router is located at any gateway (where one network meets another), including each Internet point-of-presence. A router is often included as part of a network switch.

A router may create or maintain a table of the available routes and their conditions and use this information along with distance and cost algorithms to determine the best route for a given packet. Typically, a packet may travel through a number of network points with routers before arriving at its destination. Routing is a function associated with the Network layer (layer 3) in the standard model of network programming, the Open Systems Interconnection (OSI) model. A layer-3 switch is a switch that can perform routing functions.

(5) Network Interface Card (NIC)

A network interface card (NIC) is a computer circuit board or card that is installed in a computer so that it can be connected to a network. Personal computers and workstations on a local area network (LAN) typically contain a network interface card specifically designed for the LAN transmission technology, such as Ethernet or token ring. Network interface cards provide a dedicated, full-time connection to a network. Most home and portable computers connect to the Internet through as-needed dial-up

connection. The modem provides the connection interface to the Internet service provider.

(6) Unshielded Twisted Pair (UTP)

Unshielded twisted pair is the most common kind of copper telephone wiring. Twisted pair is the ordinary copper wire that connects home and many business computers to the telephone company. To reduce cross talk or electromagnetic induction between pairs of wires, two insulated copper wires are twisted around each other. Each signal on twisted pair requires both wires. Since some telephone sets or desktop locations require multiple connections, twisted pair is sometimes installed in two or more pairs, all within a single cable. For some business locations, twisted pair is enclosed in a shield that functions as a ground. This is known as shielded twisted pair (STP).

Twisted pair is now frequently installed with two pairs to the home, with the extra pair making it possible for you to add another line (perhaps for modem use) when you need it.

Twisted pair comes with each pair uniquely color coded when it is packaged in multiple pairs. Different uses such -as analog, digital, and Ethernet require different pair multiples.

(7) Shielded Twisted Pair (STP)

Shielded twisted pair is a special kind of copper telephone wiring used in some business installations. An outer covering or shield is added to the ordinary twisted pair telephone wires; the shield functions as a ground.

(8) Coaxial Cable

Coaxial cable is the kind of copper cable used by cable TV companies between the community antenna and user homes and businesses. Coaxial cable is sometimes used by telephone companies from their central office to the telephone poles near users. It is also widely installed for use in business and corporation Ethernet and other types of local area network.

Coaxial cable is called "coaxial" because it includes one physical channel that carries the signal surrounded (after a layer of insulation) by another concentric physical channel, both running along the same axis. The outer channel serves as a ground. Many of these cables or pairs of coaxial tubes can be placed in a single outer sheathing and, with repeaters, can carry information for a great distance.

Coaxial cable was invented in 1929 and first used commercially in 1941. AT&T established its first cross-continental coaxial transmission system in 1940. Depending on the carrier technology used and other factors, twisted pair copper wire and optical fiber are alternatives to coaxial cable.

(9) Fiber Optic

Fiber optic (or "optical fiber") refers to the medium and the technology associated with the transmission of information as light impulses along a glass or plastic wire or fiber. Fiber optic wire carries much more information than conventional copper wire and is far less subject to electromagnetic interference. Most telephone company long-distance lines are now fiber optic.

Transmission on fiber optic wire requires repeating at distance intervals. The glass fiber requires more protection within an outer cable than

copper. For these reasons and because the installation of any new wiring is labor-intensive, few communities yet have fiber optic wires or cables from the phone company's branch office to local customers (known as local loop).

3.2 Network Topology

There are 3 main network topologies as the following:

(1) Local Area Network (LAN)

A local area network (LAN) is a group of computers and associated devices that share a common communications line and typically share the resources of a single processor or server within a small geographic area (for example, within an office building). Usually, the server has applications and data storage that are shared in common by multiple computer users. A local area network may serve as few as two or three users (for example, in a home network) or many as thousands of users (for example, in an FDDI network).

These following are main local area network technologies:

(a) Ethernet

Ethernet is the most widely-installed local area network (LAN) technology. Specified in a standard, IEEE 802.3, Ethernet was originally developed by Xerox and then developed further by Xerox, DEC, and Intel. An Ethernet LAN typically uses coaxial cable or special grades of twisted pair wires. The most commonly installed Ethernet systems are called 10BASE-T and provide transmission speeds up to 10 Mbps. Devices are connected to the cable and compete for access using a Carrier Sense Multiple Access with Collision Detection (CSMA/CD) protocol.

Fast Ethernet or 100BASE-T provides transmission speeds up to 100 megabits per second and is typically used for LAN backbone systems, supporting workstations with 10BASE-T cards. Gigabit Ethernet provides an even higher level of backbone support at 1000 megabits per second (1 gigabit or 1 billion bits per second).

(b) Token Ring

A token ring network is a local area network (LAN) in which all computers are connected in a ring or star topology and a binary digit- or token-passing scheme is used in order to prevent the collision of data between two computers that want to send messages at the same time. The token ring protocol is the second most widely-used protocol on local area networks after Ethernet. The IBM Token Ring protocol led to a standard version, specified as IEEE 802.5. Both protocols are used and are very similar. The IEEE 802.5 token ring technology provides for data transfer rates of either 4 or 16 megabits per second.

(c) Fiber Distributed Data Interface (FDDI)

FDDI (Fiber Distributed Data Interface) is a standard for data transmission on fiber optic lines in a local area network (LAN) that can extend in range up to 200 km (124 miles). The FDDI protocol is based on the token ring protocol. In addition to being large geographically, an FDDI local area network can support thousands of users.

An FDDI network contains two token rings, one for possible backup in case the primary ring fails. The primary ring offers up to 100 Mbps capacity. If the secondary ring is not needed for backup, it

can also carry data, extending capacity to 200 Mbps. The single ring can extend the maximum distance; a dual ring can extend 100 km (62 miles).

FDDI is a product of American National Standards Committee X3-T9 and conforms to the Open Systems Interconnection *(OSI)* model of functional layering. It can be used to interconnect LANs using other protocols. FDDI-II is a version of FDDI that adds the capability to add circuit-switched service to the network so that voice signals can also be handled. Work is underway to connect FDDI networks to the developing Synchronous Optical Network (SONET).

(2) Wide Area Network (WAN)

A wide area network (WAN) is a geographically dispersed telecommunications network. The term distinguishes a broader telecommunication structure from a local area network (). A wide area network may be privately owned or rented, but the term usually connotes the inclusion of public (shared user) networks. An intermediate form of network in terms of geography is a metropolitan area network (MAN).

These following are main wide area network technologies:

(a) Leased line

A leased line is a telephone line that has been leased for private use. In some contexts, it's called a dedicated line. A leased line is usually contrasted with a switched line or dial-up line.

Typically, large companies rent leased lines from the telephone message carriers (such as AT&T) to interconnect different geographic locations in their company. The alternative is to buy and maintain

their own private lines or, increasingly perhaps, to use the public switched lines with secure message protocols. (This is called tunneling.)

(b) Frame Relay

Frame relay is a telecommunication service designed for cost-efficient data transmission for intermittent traffic between local area networks (LANs) and between end-points in a wide area network (WAN). Frame relay puts data in a variable-size unit called a frame and leaves any necessary error correction (retransmission of data) up to the end-points, which speeds up overall data transmission. For most services, the network provides a permanent virtual circuit (PVC), which means that the customer sees a continuous, dedicated connection without having to pay for a full-time leased line, while the service provider figures out the route each frame travels to its destination and can charge based on usage. An enterprise can select a level of service quality - prioritizing some frames and making others less important. Frame relay is offered by a number of service providers, including AT&T. Frame relay is provided on fractional T-1 or full T-carrier system carriers. Frame relay complements and provides a mid-range service between ISDN, which offers bandwidth at 128 Kbps, and Asynchronous Transfer Mode (ATM), which operates in somewhat similar fashion to frame relay but at speeds from 155.520 Mbps or 622.080 Mbps.

Frame relay is based on the older X.25 packet-switching technology which was designed for transmitting analog data such as

voice conversations. Unlike X.25 which was designed for analog signals, frame relay is a fast packet technology, which means that the protocol does not attempt to correct errors. When an error is detected in a frame, it is simply "dropped." (thrown away). The end points are responsible for detecting and retransmitting dropped frames. (However, the incidence of error in digital networks is extraordinarily small relative to analog networks.)

Frame relay is often used to connect local area networks with major backbones as well as on public wide area networks and also in private network environments with leased lines over T-1 lines. It requires a dedicated connection during the transmission period. It's not ideally suited for voice or video transmission, which requires a steady flow of transmissions. However, under certain circumstances, it is used for voice and video transmission.

Frame relay relays packets at the Data Link layer of the Open Systems Interconnection (OSI) model rather than at the Network layer. A frame can incorporate packets from different protocols such as Ethernet and X.25. It is variable in size and can be as large as a thousand bytes or more.

Very Small Aperture Terminal (VSAT)

VSAT (Very Small Aperture Terminal) is a satellite communications system that serves home and business users. A VSAT end user needs a box that interfaces between the user's computer and an outside antenna with a transceiver. The transceiver receives or sends a signal to a satellite transponder in the sky. The satellite sends

and receives signals from an earth station computer that acts as a hub for the system. Each end user is interconnected with the hub station via the satellite in a star topology. For one end user to communicate with another, each transmission has to first go to the hub station which retransmits it via the satellite to the other end user's VSAT. VSAT handles data, voice, and video signals.

VSAT is used both by home users who sign up with a large service and by private companies that operate or lease their own VSAT systems. VSAT offers a number of advantages over terrestrial alternatives. For private applications, companies can have total control of their own communication system without dependence on other companies. Business and home users also get higher speed reception than if using ordinary telephone service or ISDN.

(d) Integrated Service Digital Network (ISDN)

ISDN (Integrated Services Digital Network) is a set of CCITT/ITU standards for digital transmission over ordinary telephone copper wire as well as over other media. Home and business users who install an ISDN adapter (in place of a modem) can see highly-graphic Web pages arriving very quickly (up to 128 Kbps). ISDN requires adapters at both ends of the transmission so your access provider also needs an ISDN adapter. ISDN is generally available from your phone company in most urban areas in the United States and Europe.

There are two levels of service: the Basic Rate Interface (BRI), intended for the home and small enterprise, and the Primary Rate

Interface (PRI), for larger users. Both rates include a number of B-channels and a D-channels. Each B-channel carries data, voice, and other services. Each D-channel carries control and signaling information.

The Basic Rate Interface consists of two 64 Kbps B-channels and one 16 Kbps D- channel. Thus, a Basic Rate user can have up to 128 Kbps service. The Primary Rate consists of 23 B-channels and one 64 Kbps D-channel in the United States or 30 B-channels and 1 D-channel in Europe.

Integrated Services Digital Network in concept is the integration of both analog or voice data together with digital data over the same network. Although the ISDN you can install is integrating these on a medium designed for analog transmission, broadband ISDN (BISDN) will extend the integration of both services throughout the rest of the end-to-end path using fiber optic and radio media. Broadband ISDN will encompass frame relay service for high-speed data that can be sent in large bursts, the Fiber Distributed-Data Interface (FDDI), and the Synchronous Optical Network (SONET). BISDN will support transmission from 2 Mbps up to much higher, but as yet unspecified, rates.

(3) Metropolitan Area Network (MAN)

A MAN (metropolitan area network) is a network that interconnects users with computer resources in a geographic area or region larger than that covered by even a large local area network (LAN) but smaller than the area covered by a wide area network (WAN). The term is applied to the

interconnection of networks in a city into a single larger network (which may then also offer efficient connection to a wide area network). It is also used to mean the interconnection of several local area networks by bridging them with backbone lines. The latter usage is also sometimes referred to as a campus network.

3.3 Server

These following terms and concepts are used in this project so their definitions are explained in this part.

(1) Client/Server Architecture

Client/server describes the relationship between two computer programs in which one program, the client, makes a service request from another program, the server, which fulfills the request. Although the client/server idea can be used by programs within a single computer, it is a more important idea in a network. In a network, the client/server model provides a convenient way to interconnect programs that are distributed efficiently across different locations.

In the usual client/server model, one server, sometimes called a daemon, is activated and awaits client requests. Typically, multiple client programs share the services of a common server program. Both client programs and server programs are often part of a larger program or application. Relative to the Internet, your Web browser is a client program that requests services (the sending of Web pages or files) from a Web server (which technically is called a Hypertext Transport Protocol or HTTP server) in another computer somewhere on the Internet. Similarly, your computer

with TCP/IP installed allows you to make client requests for files from File Transfer Protocol (FTP) servers in other computers on the Internet.

(2) Application Server

In general, a server is a computer program that provides services to other computer programs in the same or other computers.

An application server is a server program in a computer in a distributed network that provides the business logic for an application program. The application server is frequently viewed as part of a three-tier application, consisting of a graphical user interface (GUI) server, an application (business logic) server, and a database and transaction server.

3.4 Security

Nowadays security in Infrastructure comes to be very serious. Since the information in the company all are crucial and make advantage to the company. To secure these infoimation, some security program and hardware are brought in the company. These following are some security programs and hardware explaination:

(1) Antivirus

Antivirus (or "anti-virus") software is a class of program that searches your hard drive and floppy disks for any known or potential viruses. The market for this kind of program has expanded because of Internet growth and the increasing use of the Internet by businesses concerned about protecting their computer assets.

(2) Firewall

A firewall is a set of related programs, located at a network gateway server that protects the resources of a private network from users from other networks. (The term also implies the security policy that is used with the

programs.) An enterprise with an intranet that allows its workers access to the wider Internet installs a firewall to prevent outsiders from accessing its own private data resources and for controlling what outside resources its own users have access to.

3.5 Internet

The Internet, sometimes called simply "the Net," is a worldwide system of computer networks - a network of networks in which users at any one computer can, if they have permission, get information from any other computer (and sometimes talk directly to users at other computers).

Electronic mail (e-mail) has practically replaced the Postal Service for short written transactions. Electronic mail is the most widely used application on the Net because it provides much convenience. And the other most widely used part of the Internet is the World Wide Web. Using the Web, you can access to millions of pages of information. You can see that Internet is now very important for business.

3.6 Uninterruptible Power Supply (UPS)

An uninterruptible power supply (UPS) is a device that allows your computer to keep running for at least a short time when the primary power source is lost. It also provides protection from power surges. A UPS contains a battery that "kicks in" when the device senses a loss of power from the primary source. If you are using the computer when the UPS notifies you of the power loss, you have time to save any data you are working on and exit gracefully before the secondary power source (the battery) runs out. When all power runs out, any data in your computer's random access memory (RAM) is erased. When power surges occur, a UPS intercepts the surge so that it doesn't damage your computer.

3.7 Disaster Recovery Plan (DRP)

Disaster Recovery Plan (DRP) describes how an organization is to deal with potential disasters. Just as a disaster is an event that makes the continuation of normal functions impossible, a disaster recovery plan consists of the precautions taken so that the effects of a disaster will be minimized, and the organization will be able to either maintain or quickly resume mission-critical functions. Typically, disaster recovery planning involves an analysis of business processes and continuity needs; it may also include a significant focus on disaster prevention.

Disaster recovery is becoming an increasingly important aspect of enterprise computing. As devices, systems, and networks become ever more complex, there are simply more things that can go wrong. As a consequence, recovery plans have also become more complex. Appropriate plans vary a great from one enterprise to another, depending on variables such as the type of business, the processes involved, and the level of security needed. Disaster recovery planning may be developed within an organization or purchased as a software application or a service. It is not unusual for an enterprise to spend 25% of its information technology budget on disaster recovery.

IV. CURRENT PROBLEMS OF IT INFRASTRUCTURE PROJECT MANAGEMENT

HOLCIM is one of the world's leading suppliers of cement, aggregates and concrete. HOLCIM has many subsidiary companies around the world. Also in Asia Pacific, Siam City Cement PLC (SCCC) in Thailand, Morning Star Cement in Vietnam, HOLCIM (Lanka) in Sri Lanka, HOLCIM (Bangladesh) in Bangladesh, Cibinong Cement in Indonesia, Alsons Cement in Philippines, Tenggara Cement Manufacturing in Malaysia all are subsidiary companies of HOLCIM. SCCC was promoted to be a regional office in Asia Pacific since now SCCC has the biggest power to produce cement if compared to other subsidiary companies in Asia Pacific. Since SCCC is a regional office in Asia Pacific, SCCC has to set the standard of many things then apply it to all subsidiary companies. IT Infrastructure project is also SCCC's responsibility. Supporting the subsidiary companies that have English native language requires employees who can communicate in English and can travel to work in other countries. In addition, to reduce the complexity of cost charging between SCCC (service provider) and the subsidiary companies (customer), PROSS team was built.

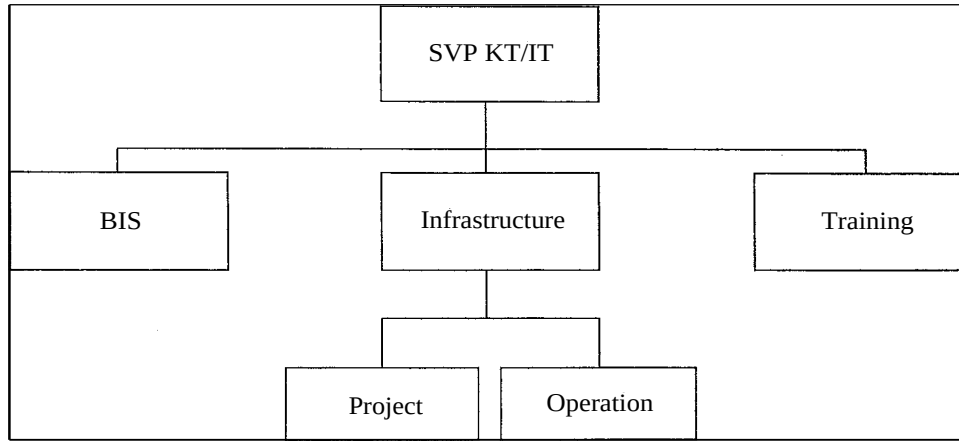

Figure 4.1. SCCC KT/IT Department Organization Chart.

The members of PROSS are the existing staffs who are selected from BIS, Infrastructure and training division. All staffs in this team have a capability to communicate in English and can travel to work in other countries. So the organization chart of PROSS is shown in Figure 4.2 is similar to SCCC KT/IT Department organization chart is shown in Figure 4.1.

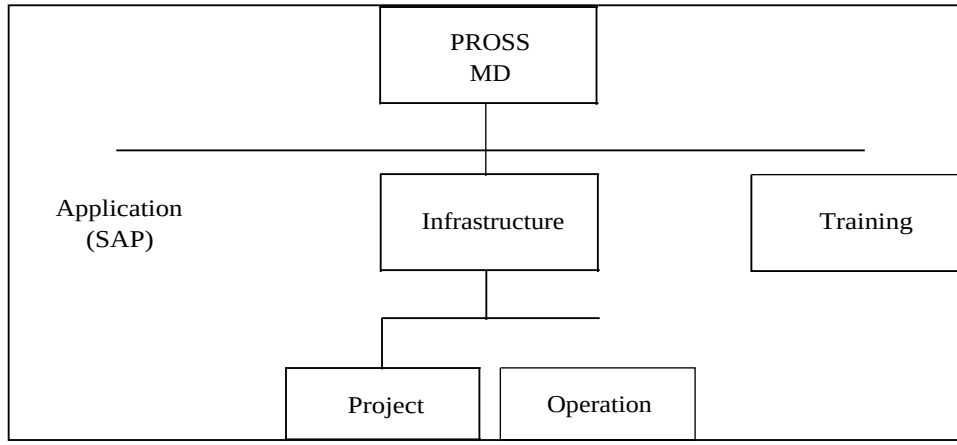

Figure 4.2. PROSS Organization Chart.

Since SCCC was established by Thai people since 1970 (around 32 years until now), the culture in work place is pure Thai style. 80% of all employees cannot communicate in English with foreigners. And they do not like to do documents and exchange the knowledge between each other. Some employees have high skills in some jobs but never teach others. They like to be heroes and do not understand the concept of teamwork. So when those employees resign, it made the company suffer.

Nowadays, SCCC becomes a regional office in Asia Pacific so some cultures of work place have to be improved. In this topic, I will consider only problems that occur in IT Infrastructure project that can be categorized as follows:

(1) Lack of communication (between the same department, between departments, between boss and subordinate)

Communication is a very important thing in work place. Since working in project has to be in a team. It requires coordination from each department to reach the objective of project and company. As SCCC was established for a long time, we still see this problem in each department and also in IT Infrastructure that is responsible for IT Infrastructure projects.

(2) Unclearly identifying of objectives and scope of project

Managing project to reach objectives, identifying clearly objectives and scope are very important because conflicts can easily happen in a project that unclearly identifies objectives and scope.

(3) Lack of planning

Planning is the most important thing in management. Good planning means half the project is finished. In SCCC, every project is hurried. We need high speed for all projects. Although they all can be finished on time but sometimes there are many problems while implementing because of lack of planning.

(4) The technology change too fast.

Managing IT related project is so challenging. Since technology always change and improve. Project manager has to know the change of technology and has to have knowledge to evaluate the technology to use in the company since investing in high technology consumes high volume of budget and it cannot be changed easily after it is already implemented.

(5) Lack of controlling

Some people ignores project control because they think that the project has a good planning already. This is a wrong thinking. Although the project has a good planning, it also requires controlling. And controlling should be in all tasks of project, because each task especially tasks in critical path can make project delayed.

(6) Lack of documentation

Any kind of document (procedural document, forms, and user manual) is important for project management. Members in project team can follow

procedural document that is identified clearly and it helps them work smoothly. Also users, can read and follow user manual that can reduce workload of supporter. SCCC faces this problem also. IT specialists think that documentation loses their time and they do not see the importance of documentation.

(7) Overrun budget

Managing any kind of project has to set up budget that is near the actual expense. But it also should be flexible. To accurately set up the budget, we need experience or historical information. And also in implementing, it should not cost overrun budget. SCCC now also faces this problem.

(8) Project delay

Because of lack of planning and some external environments that are not in our control, SCCC also faces the problem of project delay.

V. PROPOSED IT INFRASTRUCTURE PROJECT MANAGEMENT

5.1 Overview

For this proposed IT Infrastructure project management, PMA, IT Infrastructure questionnaire, project tracking and control and time sheet are applied to be used for managing Sri Lanka Infrastructure Readiness for Asian (SAP) Template project that is an ongoing project of PROSS. This section will show how to do and manage project like an IT Infrastructure effectively and efficiently.

5.2 Project Definition

HOLCIM GROUP Company has a project to rollout SEA SAP template to HOLCIM (Lanka) in Sri Lanka. As a preparation phase for Asian (SAP) template rollout for HOLCIM (Lanka), the existing IT Infrastructure has to be improved and upgraded to be ready for SAP rollout. KT /IT of PROSS is the department responsible for this project.

HOLCIM (Lanka) has 3 major sites; at Colombo (Head office), Puttalam plant and Ruhunu grinding station. There are currently a total of 70 employees at Colombo office, 148 employees at Puttalam plant and 45 employees at Ruhunu grinding station. In addition, there are minor sites at Galle, Kandy, Katugastota, Maradana, Horana and etc. around Sri Lanka.

SAP system in Asia Pacific for subsidiary companies of HOLCIM will be centralize managed by SCCC in Thailand that is a regional office of HOLCIM in Asia Pacific. Therefore, both domestic and international Infrastructure design is needed.

5.2.1 Scope

The scope of project is to implement the necessary IT Infrastructure for HOLCIM (Lanka) to be ready for Asian (SAP) template rollout project. The following is the scope of project:

(1) WAN and LAN network design. Since SAP application requires quite high quality of network Infrastructure, a good design and good configuration is needed.

(2) Network equipment specifications. Since core SAP system in Asia Pacific is located in Thailand, it requires network equipment to make a connection between Sri Lanka and Thailand. In addition, not all network equipment specifications can be used. To choose the best performance and the most proper network equipment specifications, it requires network expert and information from vendors.

(3) Personal Computer (PC) workstation, Notebook and printer specifications. Not just a network that has to be well designed, PC, notebook and printer specifications also have to be properly chosen. PC, notebook and printer specifications should not have too high or too low specification. Too low specifications will cause a bottleneck and it will make users feel that the system is slow. But a too high specification does not mean that it is always good, it sometimes mean that we use more budgets than it should be.

5.2.2 Objectives

(1) To recommend a reliable and cost effective network Infrastructure.

(2) To implement the required Infrastructure to meet local business objectives (SAP implementation) and achieve compliance to PROSS hardware and software standard.

(3) To recommend local support structure.

5.2.3 Project Dependencies

This project is dependent on these following factors:

(1) **HOLCIM (Lanka) IT staff availability.** Local IT staff availability or people resource has an effect to this project since the project has the timeframe to be finished on time. So the probability of finishing project on time also depends on IT staff availability.

(2) **Lead time for all hardware, earth station and leased line installed, and local procurement process.** To order or buy hardware and other equipments, it requires some lead times. Some equipment, require at least 1-month lead-time. Leased line, VSAT and frame relay, need at least 2 months lead-time. So this lead-time also has a major effect to project.

(3) **Hardware and software products available in Sri Lanka.** Some hardware may not be available in Sri Lanka, we have to order from Thailand or other sources. In addition, we still need software such as operating system (Microsoft Windows2000 Server and Microsoft Windows2000 Professional), Antivirus, Firewall, SAP client and etc. running on each PC. If they are not available in Sri Lanka, it means we have to order from Thailand or somewhere else and it needs some lead-time. So it makes the project have dependency with availability of hardware and software in Sri Lanka.

(4) **Availability and quality of vendor support in Sri Lanka.** Availability and quality of vendor is also important. Although we will centralize, manage and give services from Thailand, local vendor in Sri Lanka can help to coordinate with PROSS team in case local staff of HOLCIM (Lanka) cannot. So the project also sometimes depends on availability and quality of vendor support in Sri Lanka.

(5) Agreement on project approach. Project approach is shown clearly in the next item. If the agreement of project approach between PROSS and HOLCIM (Lanka) is accepted, the project team will follow these approaches. Therefore, it also makes an effect to the project.

(6) Decision on cost allocation issues. Cost is one of the most important factors for implementing project. It needs to know which cost will be charged to whom and how to charge. If all cost allocation is clearly defined, we can control all cost and it helps to make project not over run budget.

5.2.4 Stakeholder list

Stakeholder of this project can be categorized into 2 groups:

(1) Sponsor and Decision makers

(a) Steering Committee consists of Managing Director of HOLCIM (Lanka) and Senior Vice President KT/IT of PROSS. These two persons have the highest right to make decisions about this project. Any serious approval has to be approved by these 2 persons.

(b) Sponsor for this project is Managing Director of HOLCIM (Lanka). This person will take care and approve all costs of this project.

(c) Q.A Team (Technical and Products) consists of PROSS KT/IT Infrastructure manager and PROSS KT/IT Project Section Head. They will be persons who make a final decision about technical configuration and product choosing.

(2) Project personnel

(a) Project Manager, There are 2 project managers for this project. One is IT Manager of HOLCIM (Lanka) and another is PROSS KT/IT

Project Section Head. These 2 persons will manage all general things in this project.

(b) Project Team, PROSS KT/IT Project Specialist, PROSS KT/IT Operation Specialist and IT staff of HOLCIM (Lanka). These persons will be project drivers who implement this project, follow the project plan from project manager to meet the project objective on time.

5.2.5 Project Organization

Project organization of this project is shown in Figure 5.1. All project members report to project manager. And project coordinator helps project manager manage all tasks. Project manager is a 1st level decision-maker. This project organization is quite flat. Everyone can talk to project manager directly so that the problems will be solved immediately.

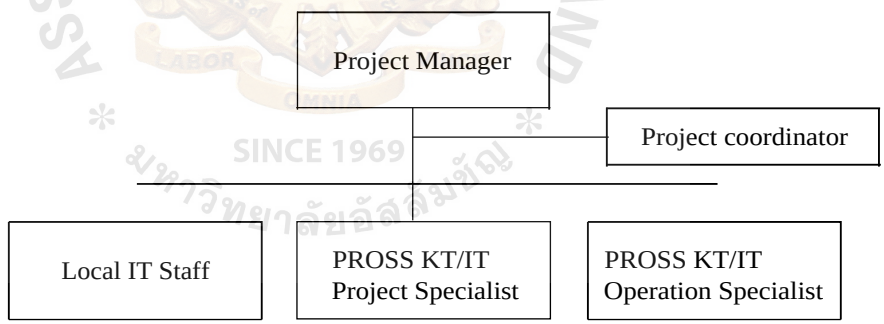

Figure 5.1. Project Organization.

5.2.6 Proposed Phases

The implementation of this project will be in the following phases:

(1) Network Preparation

(a) Domestic — upgrade Frame Relay bandwidth between major sites (Colombo, Puttalam and Ruhunu) and establish new leased line between Colombo and Puttalam and Colombo to Ruhunu.

(b) International — connect HOLCIM (Lanka) head office in Colombo to primary data center of PROSS by submarine fiber cable leased circuit 128 Kbps and connect Puttalam plant to secondary data center of PROSS by VSAT 128 Kbps for backup link.

(2) Upgrade PCs and Notebooks specification — upgrade all PCs and notebooks specification to support the minimum requirement of SAP.

(3) Network printer, SAP printer design and setup — design and setup network printer and SAP printer for each site.

Notice: We use IT Infrastructure questionnaire to get information of current IT Infrastructure of HOLCIM (Lanka) then use that information to analyze and propose the recommended IT Infrastructure. The example of IT Infrastructure questionnaire is in Appendix A.

5.2.7 Current Situation

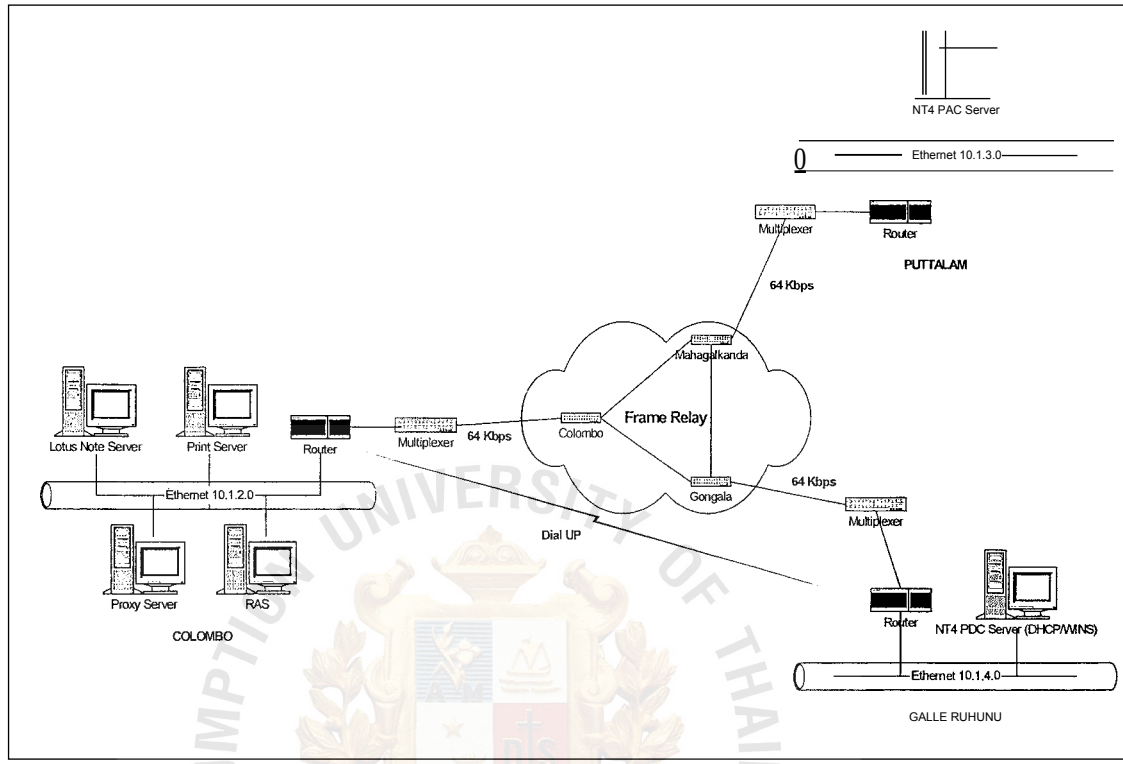

Figure 5.2. Current HOLCIM (Lanka) WAN.

Figure 5.2 shows current HOLCIM (Lanka) domestic WAN. There are connection links between COLOMBO-PUTTALAM, COLOMBO-RUHUNU and PUTTALAM-RUHUNU. We can see that there is just COLOMBO-RUHUNU that has backup link. Since all these 3 sites need to have transactions with each other all the time, so it is not secure to have network like this. In addition, each link between 3 sites is just 64 Kbps Frame Relay. As there are up to 100 SAP users in each site, in technical reference, it needs at least 128 Kbps link speed between each site. So these 3 links also have to be upgraded and 3 backup links also have to be established between each site.

5.2.8 Recommended HOLCIM (Lanka) WAN

(1) Domestic

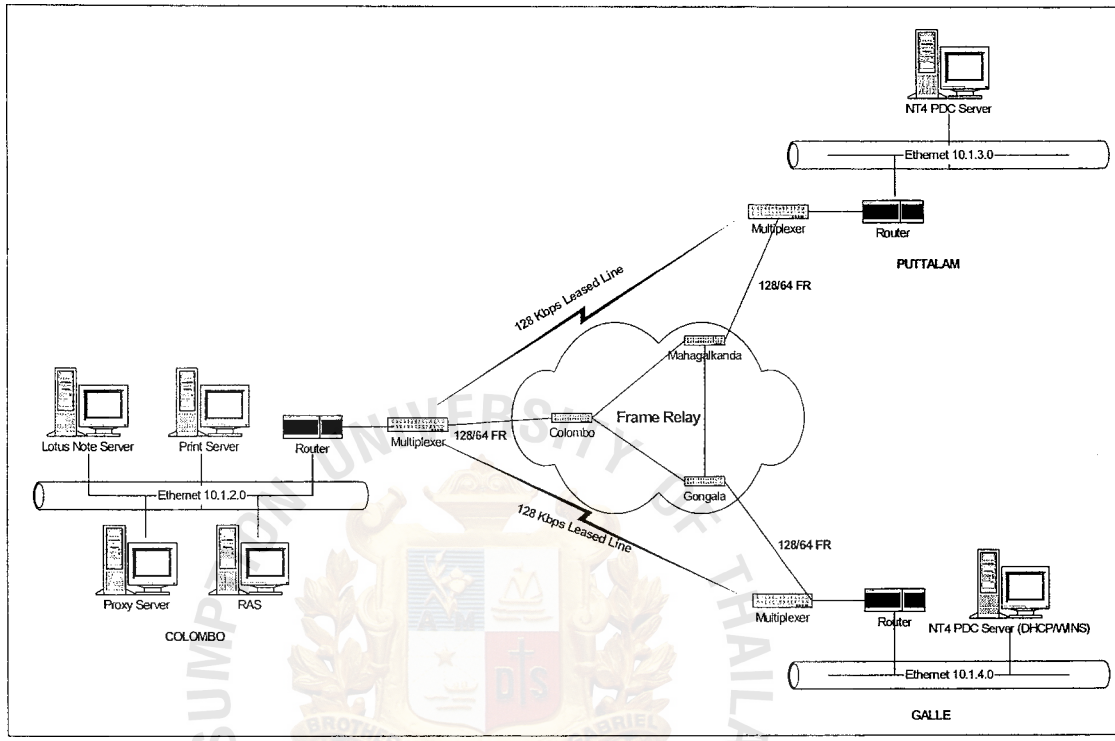

Figure 5.3. Recommended Domestic WAN.

Figure 5.3 shows the recommended domestic WAN for HOLCIM (Lanka). Between each site, there are 128 Kbps Frame Relay and 128 Kbps Leased Line. 128 Kbps Frame Relay will perform as a backup link and 128 Kbps Leased Line will perfoiin as a major link.

(2) International

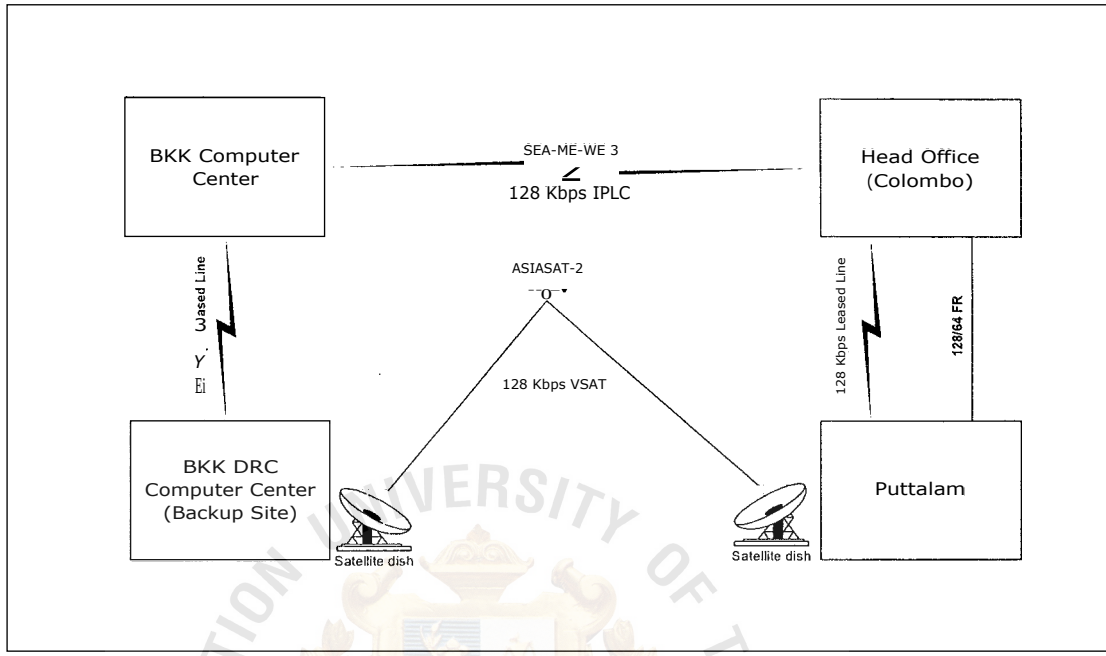

Figure 5.4. Recommended International WAN.

Figure 5.4 shows Recommended International WAN from HOLCIM (Lanka) to computer center of PROSS. Leased Line 128 Kbps and VSAT 128 Kbps are chosen. The reason to choose different carrier is the carrier redundancy.

5.2.9 PCs and Notebooks Specifications

Since SAP application is already run in SCCC in Thailand and Morning Star in Vietnam, so using experience from these 2 companies can help to specify accurate PCs and Notebooks specifications and it also guarantees that it will be work for SAP.

(1) Minimum requirement for SAP

Table 5.1. Minimum Requirement PCs and Notebooks Specifications.

TYPE	CPU Speed	Memory	Hard Disk	OS
PCs	PII 200 MHz	128 MB	500 MB for C:\	Windows 98
Notebooks	PII 200 MHz	128 MB	500 MB for C:\	Windows 98

(2) Recommended new PCs and Notebooks

Table 5.2. Recommended New PCs and Notebooks Specifications.

Type	Brand	CPU Speed	Memory	Hard Disk	OS
PCs	IBM/Dell	PIII 933 MHz	256-512 MB	20 GB	Windows 2000
Notebooks	Fujitsu	PIII 800 MHz	256 MB	20 GB	Windows 2000

5.2.10 Network Printer and SAP Printer Specifications

To recommend printer specification, it's up to work load of printing. Some departments have to print a lot of documents per time so high performances of printers are required. Using experience from SCCC and Morning Star is also a good way to select printer for each department. In addition, we have to recognize local vendor in Sri Lanka also. Choosing good support is always better.

Table 5.3. Recommended Network Printer and SAP Printer Specifications.

Type	Brand	Model
Network Printer	HP	5000N
SAP Printer	EPSON	LQ2180

5.2.11 IT Support and Services

Project implementation and maintenance of networking and desktop PCs equipment comes with the need for local IT support and the 1st level expertise. During the implementation, PROSS KT/IT project specialist will be the point of contact to coordinate with HOLCIM (Lanka)'s local IT Specialist for all matters concerning the project.

After the post implementation period, PROSS KT/IT Operation team will be the focal point of contact for the 2' level system and network support. To ensure smooth operation and for any future hardware/software upgrade, it is strongly recommended that a local IT specialist be available for coordination with PROSS KT/IT operation support team.

In summary, local HOLCIM (Lanka) IT specialist will play the role of the 1st level support, PROSS KT/IT operation team as the 2", and problems may be escalated to vendors as the 3rd level support when necessary.

5.2.12 Project Costs Estimate

All costs of this project will be charged to HOLCIM (Lanka). The cost will be categorized into 2 parts. Network preparation cost as shown the detail in Table 5.4 and upgrading PCs, Notebooks and printer cost as shown in Table 5.5.

Table 5.4. Network Preparation Cost.

Type	One Time Charge	MonthlyCharge	Total Costs
Domestic Circuit	(USD)	(USD)	(USD)
- Upgrade to 128 Kbps (Colombo - DPMCE) - Upgrade to 128 Kbps (Puttalam - DPMCE) - Upgrade to 128 Kbps (Ruhunu - DPMCE) - Point to Point 128 Kbps (Colombo - Puttalam)	*TO BE DEFINED*		
Total DOMESTIC Costs			
International Circuit (VSAT 128 Kbps)	(USD)	(USD)	(USD)
Sri Lanka Half Circuit			
- Deposit of contract (Refundable)	-	-	
- Installation, operation and maintenance	*To be defined*		
- Rental for VSAT terminal	-	-	
- Rental for International Circuit	-	4,200	4,200
- Local Loop Circuit installation	0	0	0
- Local Loop Circuit rental charge (128Kbps)	0	0	0
Thailand Half Circuit			
- Deposit of contract (Refundable)	4,700		4,700
- Installation, operation and maintenance	1,200	-	1,200
- Rental for VSAT terminal	-	700	700
- Rental for International Circuit	-	4,000	4,000
- Local Loop Circuit installation	0	0	0
- Local Loop Circuit rental charge (128Kbps)	0	0	0
Total VSAT Costs	*5,900*	*8,900*	*14,800*
International Circuit (IPLC 128 Kbps)			
Sri Lanka Half Circuit			
- Deposit of Contract	-	-	
- Installation Charge	360	-	360
- Rental for International Circuit (Fiber Optic)	-	1,700	1,700
- Local Loop Circuit installation	150	-	150
- Local Loop Circuit rental charge (128 Kbps)		670	670
Thailand Half Circuit			
- Deposit of Contract	3,600	-	3,600
- Installation Charge	250	-	250
- Rental for International Circuit (Fiber Optic)	-	3,500	3,500
- Local Loop Circuit installation	500	-	500
- Local Loop Circuit rental charge (128 Kbps)		450	450
Total IPLC Costs	*4,860*	*6,320*	*11,180*
Total	10,760	15,220	25,980

*** 1 USD = 45 BHT = 90 Rs ***

Table 5.5. Upgrade PCs, Notebooks and Printer Cost.

Hardware Type	Units	Total Costs (USD)
RAM 256 MB for PC		
RAM 256 MB for Note Book		
HARD DISK 20 GB for PC		
HARD DISK 20 GB for Note Book		
PRINTER Fujitsu DL 3800		
PRINTER Fujitsu DL 6400		
Total		

*** LOCAL PRICING NEGOTIATION ***

Other costs, such as the traveling cost to survey on site in Sri Lanka, on call consult and support cost also charged to HOLCIM (Lanka).

In addition, it has administration and IT staff cost. We use time sheet helps to calculate the man-hour for this project. Time sheet lets us know who relates to this project and how many hours per day that he/she uses for this project.

5.3 Project Planning

5.3.1 Work Breakdown Structure

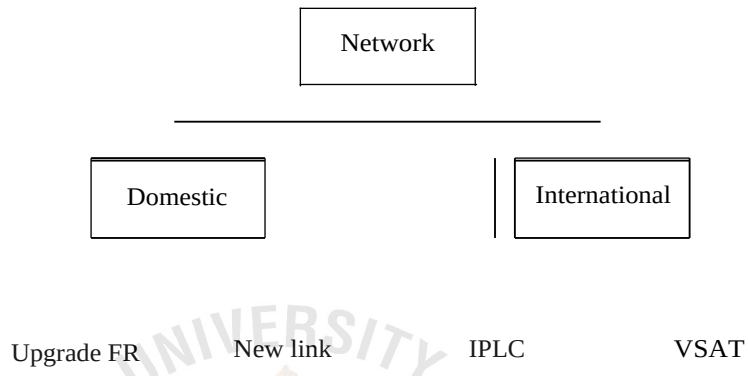

Figure 5.5. Network Preparation Work Breakdown Structure.

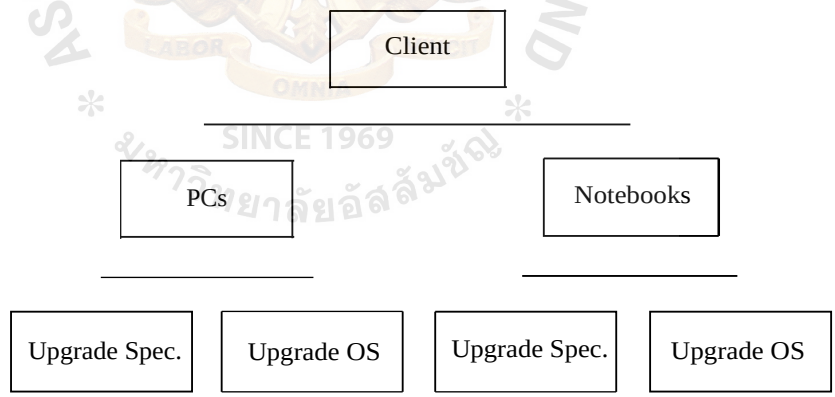

Figure 5.6. PCs and Notebooks Work Breakdown Structure.

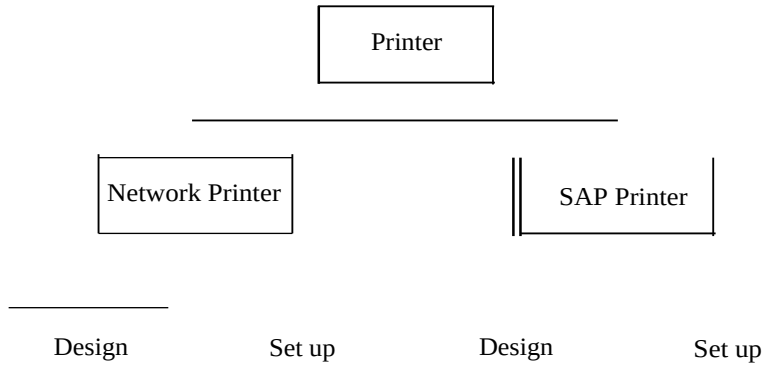

Figure 5.7. Printer Work Breakdown Structure.

5.3.2 Project Schedule

(a) Critical Path Analysis

(1) Upgrade Frame Relay (C - 30 days)

(2) Set up new leased line (D - 30 days)

(3) Set up IPLC (A — 30 days)

(4) Set up VSAT (B — 45 days)

(5) Upgrade PCs specification (E — 25 days)

(6) Upgrade PCs OS (F — 30 days)

(7) Upgrade notebooks specification (G — 25 days)

(8) Upgrade notebooks OS (H- 30 days)

(9) Design network printer (I — 20 days)

(10) Set up network printer (J — 20 days)

(11) Design SAP printer (K — 20 days)

(12) Set up SAP printer (L — 20 days)

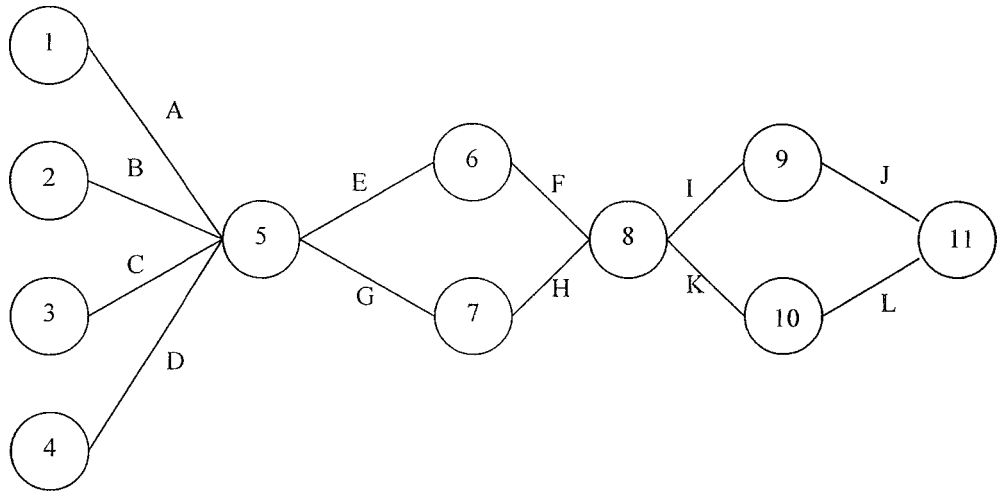

Figure 5.8. Critical Path Analysis.

There are 4 possible critical paths.

(1) B-E-F-I-J

(2) B-E-F-K-L

(3) B-G-H-I-J

(4) B-G-H-K-L

The minimum duration to finish this project is 140 days.

GANTT CHART

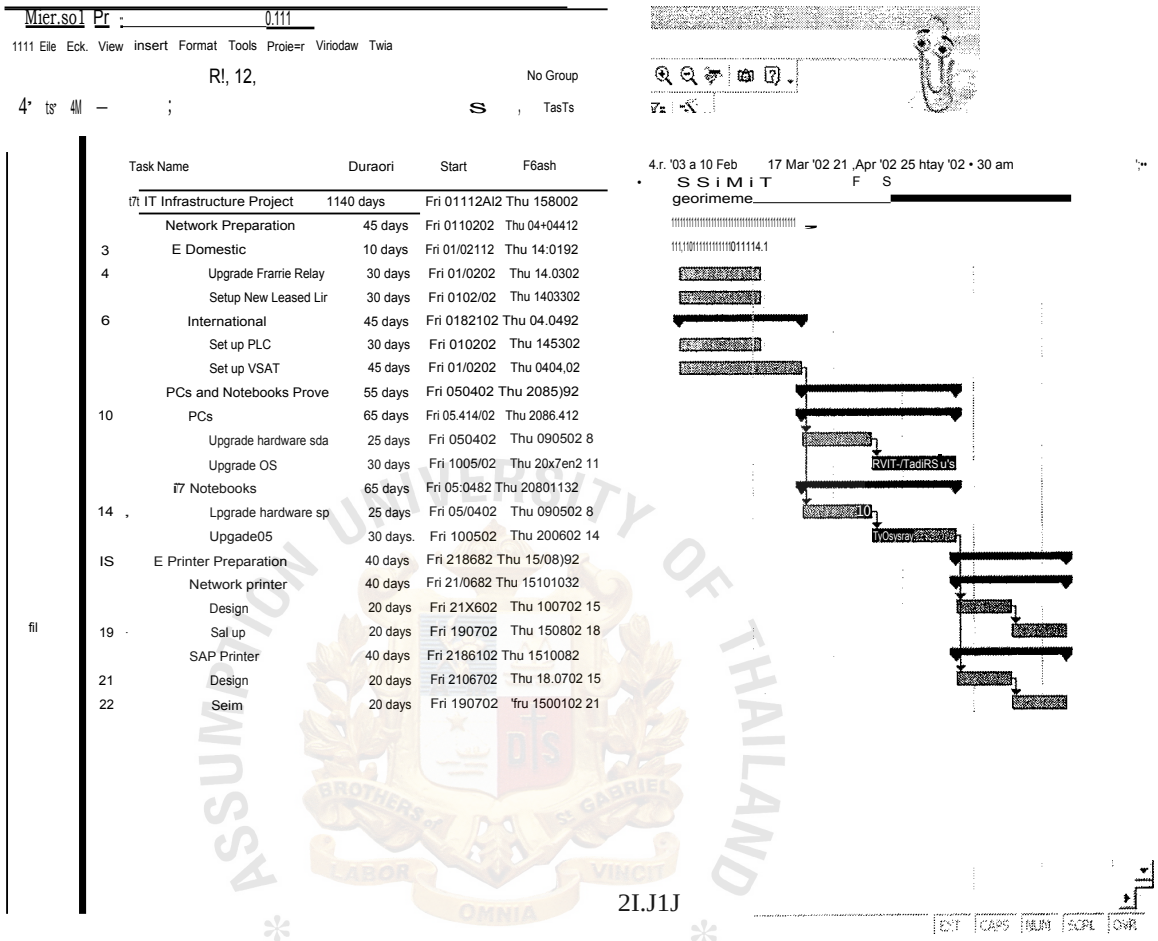

Figure 5.9. GANTT CHART.

5.3.3 Project Budget

Budget for this project consists of technical budget and administration budget. Technical budget is for network preparation, PCs/notebooks upgrade and printer design and setup. We can use the detail from cost estimation in Table 5.4 and Table 5.5 to help setup this technical budget. Marketing survey and information from vendor is very important. It can help project manager compare and choose the product that is the most cost effective.

For administration budget, it includes traveling cost, communication cost, and other general expenses that is used for the project. Administration budget normally is calculated by estimation or use information from the last projects that is already implemented.

5.4 Project Realizing

In this phase, all tasks will be reviewed and followed up to progress on schedule. Status of project should be continuously reported. Any problem that occurs in this phase has to be solved immediately. All tasks in critical path have to be monitored and followed up carefully, otherwise it can cause the project delay. The example of how to track and control project status is shown in Appendix **B.**

5.5 Project Completion

This phase is a completion phase so all documents (Procedural document, form, user manual) and final report should be composed then handed-over to HOLCIM (Lanka), whose IT specialist will be the 1st level, support. In this phase, Acceptance test will be tested by HOLCIM (Lanka) project manager. If the test is accepted, we can say that this project is completed as per agreement.

5.6 Project Evaluation & Transfer

To evaluate the IT Infrastructure project like this project,-technically it is not too difficult and complex because if all clients (PCs and Notebooks) can connect to use SAP and the response time is not too high, it proves that technical side finished well. For non-technical evaluation, such as time (ahead or behind the schedule) and budget (overrun or under run) used for this project, a well-done project has to use the time not to exceed critical path and use budget not to exceed the budget.

In addition, knowledge transfer is an important activity in this phase. User manual and training are the ways to transfer the knowledge to HOLCIM (Lanka)'s IT specialist.

All team member and project manager will use this chance to set up meeting to exchange knowledge and summarize the problems and the method to solve.

VI. ANALYSES OF THE PROPOSED IT INFRASTRUCTURE PROJECT MANAGEMENT

After using PMA and tools manage IT Infrastructure project as applied in Sri Lanka Infrastructure Readiness for Asian (SAP) Template project, current problems that occur in IT Infrastructure project management are almost solved.

The following are the analyses of each problem that are found before PMA and tools were applied and also shows the results:

(1) Lack of communication

From proposed IT Infrastructure project management, project organization is clearly identified in "Project Definition phase" and this organization structure is properly designed in flat organization. Only necessary communication will occur in this organization. Moreover, there is team building activity that company established for all members in project team for making all members know and be familiar with each other, so this problem is solved.

(2) Unclearly identify objectives and scope of project

Top management has set clear project objectives. The objectives and scope of this proposed project is also clearly identified in "Project Definition phase". All members in project team used the scope in Project Definition phase to avoid conflict. In addition, Work Breakdown Structure (WBS) can help to clarify the work detail of each activity. So this problem is solved. After everyone knew the clear objectives and scope, the conflict while running project can be solved easily.

(3) Lack of planning

Using PMA applies to the proposed IT Infrastructure project management, "Project Planning phase" is developed. There are WBS, Project Schedule and Project Budget in this planning. We can see that in this project we have done well in planning phase. Therefore this problem is solved.

(4) The technology change too fast

This problem is from external environment and it depends on personality of each project manager. Getting information from Internet, magazine or vendor can solve this problem. In some companies, there are training courses for employees either internal training or external training. Training is the best way to update knowledge for employees. So the company should give training to employees for improving themselves and it also can help to motivate employees to work effectively and efficiently.

(5) Lack of controlling

"Project Realization phase" has the step of tracking and controlling the project as the example shown in Appendix B. In addition, we have the step to find the tasks in critical path. Then all tasks in critical path are monitored carefully. The problems while running project can be solved on time. So this problem is solved.

(6) Lack of documentation

"Project Completion phase' explained the necessary requirements of developing document (procedural document, forms and also user manual). For this project, we have developed many kinds of documents including project charter, user manual, time sheet, and etc. So this problem is solved.

(7) Overrun budget

"Project Definition and Project Planning phase" has the step to estimate project costs and set up the project budget respectively. We are also concerned about hardware specification that should not be over specifications. In addition, we have time sheet for calculating IT staffs cost. So this can help to avoid the budget overrun problem.

(8) Project delay

"Project Planning phase" has the step of finding the critical path and developing project schedule. So we will know which tasks are in the critical path. Those tasks have to be concentrated more than other tasks because they can make the project delayed if they are delayed. And we have already notified about project dependency then we would know what we have to recognize while planning and implementing project. So it can help to avoid the delay problem.

VII. CONCLUSIONS & RECOMMENDATIONS

7.1 Conclusions

In summary, almost all problems of project management are related to communication, time and cost constraint. To manage project effectively and efficiently, good planning is required. In addition, some tools might help managing project more smoothly. Moreover, top management direction and organization objective is also very important for doing any kind of project. Top management direction has to be defined clearly so any project will be planned and implemented in the right objectives of organization.

After using PMA and some tools applied to IT Infrastructure project, managing project is more systematic and many problems can be solved. It makes project management more effective and efficient. Anything that is related to people, always depends on each personality. To improve project performance, sometimes we need to improve or change the attitude of each person also.

For this project, PMA can help to solve the problems that ever occurred. Improving people is also important, since each person has his/her own attitude and has difference ability. Project manager has to recognize this point because project is done as a team. Providing training to member team is a good way to help them improve theirs knowledge and skills. Project manager also has to manage people. In addition, technology is also important, to manage project that is related to IT, all members in team are preferred to have IT knowledge and they should follow the technology trend.

Therefore IT Infrastructure project management will be more effective and efficient when both peoples and non-people are well managed. In addition, proper work assignment is also important. If we assign job to the right person, the job could be done faster than assigning it to the wrong person. That means some topics in Operation

Research could be used in applying to make IT Infrastructure project management more effective and efficient.

In conclusion, to improve IT Infrastructure project management, applying PMA, and some concepts from Operation Research such as assignment and other tools such as IT Infrastructure questionnaire, project tracking and control, we can develop by ourselves to manage a project like an IT Infrastructure project. Another thing that we also can bring to help planning is information from the past projects that are already implemented. It can help project manager to estimate cost, budget and time precisely. Moreover, we also have to be concerned with human aspect. Since project is implemented in a team, so human resource management is also important to implement project successfully.

7.2 Recommendations

From my research and experience in implementing IT Infrastructure project, I have something to recommend for persons who might use benefits from this project to help manage IT Infrastructure project.

Following are my recommendations for this project:

(a) PMA and some tools have been applied to the proposed IT Infrastructure project management, we can see that they can help to solve almost all problems that have occurred. Each company can develop some tools by itself, such as questionnaire (for getting necessary information from related persons), time sheet (for recording time used of each person in the project, then we can use this record calculate cost and time), and etc. The company might develop some other tools that is proper to its environment.

(b) Since environment in each company is not the same, especially external environment that normally cannot be known in advance or we can call it an

uncertainty risk, each company has to have solutions to manage this kind of risk. The scope of this project does not include risk management. So the person who might have the idea to improve this project, he/she should apply risk management plus to this project.

(c) In this project, the technical aspect is much more concentrated than the human aspect. Actually the human aspect is also important to improve perfoimance of project management. Human resource management, systematic job assignment, change management and conflict management can help to make members in project team work more effectively and efficiently. So this project's scope might be expanded to cover these kinds of management in the next step.

(d) In the proposed IT Infrastructure project management, the decision-maker is one of the most important persons that can make the project go smoothly. And project organization structure is also crucial. Each organization structure has its own advantages and disadvantages. If we can pre define the project organization structure, we should select the one that is most proper to the kind of project and avoid the kind that might generate conflict.

(e) To implement project smoothly. Official meeting is needed periodically. It can help to clarify and solve the problem by brainstorming. In addition, it also can help to avoid the conflicts that may occur. So the technique to set the official meeting might be included in this project in the next step.

(f) Quality assurance and acceptance test can help the customer verify the project delivery standard and quality. After project implementation is finished, it should have the process to assure the quality. In the next step of

this project, it might include these 2 topics by explaining how to check the quality and how to apply to projects like an IT Infrastructure.

Finally, the persons who might want to research this topic more deeper can use these above recommendations for project improvement in the future. I wish that the content of this project will be useful for all persons who would like to improve their skills in IT Infrastructure project management or who would like to understand how to manage this kind of project. Since this project is from the real project in the real company.

APPENDIX A

IT INFRASTRUCTURE QUESTIONNAIRE

General information

1. Number of staffs in this site

2. Number of building in this site

3. Address of this site.

4. Map of this site

5. Floor plan with desk layout of all building

6. Building construction schedule

7. Contact person

8. Contact infoiniation, phone number, E-mail

9. Any specific user requirement

Telephone

1. Number of phone extension

2. Number of out side line (CO line)

3. Number of public phone

4. Number of Fax (direct line)

PC / Computer

1. Number of PC

2. Existing PC inventory

3. Existing cabling
   3.1. Type

   3.2. Quality

   3.3. Interfaces

   3.4. Media filters / cable converter

   3.5. Distances

4. Number of dot metric printer

5. Number of laser printer

6. List of application with version

7. List of desktop application

8. Number of SAP users

   8.1. Standard user

   8.2. High load user

   8.3. SAP printer (dot metric / laser)

9. Number of LN users

10. Support staff
    10.1. Organization chart

    10.2. Staff list + role

Network

1. Existing network diagram
   1.1. LAN diagram

   1.2. WAN diagram

2. Equipment model

3. Network management

4. IOS version

Servers

1. Server diagram
2. Model
3. OS version
4. Tape backup tools

Internet Security

1. Firewall / VPN

2. Virus Protection

Facilities

1. Power supply
   1.1. Single line diagram of feeder / Circuit breaker

   _____

   1.2. How often the power outage

   _____

   1.3. How long is the average power outage

   _____

   1.4. What is the longest power outage ever have

   _____

   1.5. Existing UPS
      1.5.1. Brand, model

      _____

      1.5.2. Input phase / output phase

      _____

      1.5.3. Current utilization

      _____

2. Surge protection
   2.1. For building power supply

   _____

   2.2. For computer room

   _____

   2.3. For telecom line

   _____

   2.4. Grounding system

   _____

   2.5. Lightning arrester

   _____

3. Air condition
   3.1. Location of condensing unit

   _____

   3.2. Location of fan coil unit

   _____

Local service provider

1. Telephone service provider
   1.1. Location / map of the exchange

   _____

   1.2. Stability of the exchange

   _____

   1.3. Last exchange fail event

   _____

   1.4. ISDN availability/quality

   _____

2. Data circuit service provider
   2.1. Location / map of the station / node

   _____

   2.2. Secondary node

   _____

   2.3. Backbone design

   _____

   2.4. Type of existing service
      2.4.1. Leased circuit / Frame relay / Microwave / VSAT / Wireless

      _____

      2.4.2. Lead time to order each type of services

      _____

      2.4.3. One time cost and usage tariff

      _____

   2.5. Type of cable

   _____

   2.6. Control center
      2.6.1. Monitor tool

      _____

      2.6.2. Problem management
         2.6.2.1. Problem escalation process

         _____

         2.6.2.2. Call center

         _____

         2.6.2.3. Night shift/weekend support staff and escalation process

         _____

         2.6.2.4.Backup route

         _____

      2.6.3. Performance management
         2.6.3.1.Performance monitor tool

         _____

         2.6.3.2.Perfoimance monitor process

         _____

         2.6.3.3.Performance report to internal/customer

         _____

2.6.4. SLA

_____

International circuit services provider

1. Location / map of the station / node

_____

2. Secondary node

_____

3. Backbone design

_____

4. Service partner (AT&T, Sprint, Global one, Etc)

_____

5. Type of existing service
   5.1. Submarine cable/ Satellite circuit

   _____

   5.2. Lead time to order each type of services

   _____

   5.3. One time cost and usage tariff

   _____

6. Type of cable

_____

7. Control center
   7.1. Monitor tool

   _____

   7.2. Problem management
      7.2.1. Problem escalation process

      _____

      7.2.2. Call center

      _____

      7.2.3. Night shift/weekend support staff and escalation process

      _____

      7.2.4. Backup route

      _____

   7.3. Performance management
      7.3.1. Performance monitor tool

      _____

      7.3.2. Performance monitor process

      _____

      7.3.3. Performance report to internal/customer

      _____

   7.4. SLA

   _____

APPENDIX B

PROJECT TRACKING AND CONTROL

The traffic lights used for indicating the status of each task in project.

- **Green** indicates that the **criteria have been met** and any major issues have been resolved.
- **Yellow** indicates that the **criteria have not been completely met,** as there may be unresolved issues. These issues may not be significant enough to prevent the project team from progressing to the next phase, however they will need to be reviewed before doing so. Additionally, the yellow light may be used for areas which are not completed yet, however, there are known issues which may affect the timely completion.
- **Red** indicates that the **criteria has not been fulfilled and critical** *issues exist that will prevent the project from moving to the next phase.* Additionally, the red light may be used for areas which are not completed yet, however, there are known issues which may affect the timely completion.
- **Blank** indicates that the criteria is *not due* yet *with no major issues* noted.

Interpreting the traffic light: an example

	Criteria	**Criteria Due Date**
Green	A	xx/xx
Green	B	xx/xx
Green	C	xx/xx
Green	D	xx/xx
Green	E	xx/xx

Example 1: All Green Lights - Most criteria are substantially met. Project will proceed to next phase on schedule.

Criteria		Criteria Due Date
Green	A	xx/xx
Yellow	**B**	**xx/xx**
Green	C	xx/xx
Blank	**D**	**xx/xx**
Green	E	xx/xx
Yellow	F	xx/xx

Example 2: Mostly Green Lights, Some Yellow, one blank- Most criteria are substantially met. One is not assessed yet (with no issues). However, some issues exist. Project may proceed to next phase but only with Steering Committee's understanding of the issues and risks and impacts associated.

Criteria		Criteria Due Date
Green	A	xx/xx
Yellow	**B**	**xx/xx**
Green	C	xx/xx
Red	**D**	**xx/xx**
Green	E	xx/xx
Yellow	F	xx/xx

Example 3: Mostly Green Lights, Some Yellow, One Red - Most criteria are substantially met. However, some issues exist. At least one major issue exists that will prevent the project from moving to the next phase.

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