FACTORS THAT LEAD TO INADEQUATE MANAGEMENT OF THE SYSTEM DEVELOPMENT LIFE CYCLE

KHAIRUL AZMAN AZIZ [1] & MOHAMAD AZMI NIAS AHMAD [2]

[1] Jabatan Perakaunan
Faculty Pengurusan Perniagaan,
Universiti Kebangsaan Malaysia,
43600 UPM Bangi, Selangor Darul Ehsan.
MALAYSIA
[2] Faculty of Accountancy
Universiti Teknologi MARA Cawangan Pahang,
26400 Bandar Jengka, Pahang.
MALAYSIA

ABSTRACT

In order to avoid poor planning and unrealistic expectations, which lead to project failure, the project manager should have necessary skills to cater for the requirements, which involve in different type of projects. Apart from management skills that would help the project manager to manage the project, good project manager should be alert with project failure warning sign at anytime. They also should response immediately and always look for realistic disaster avoidance steps.

KEYWORDS: Project Manager, System Development Life Cycle

INTRODUCTION

Managing a successful project is like walking the high wire, a complex balancing act fraught with competing distractions. According to Ibbs and Kwak (2000), many organizations are projecting their operations and processes to plan, manage and complete projects more successfully. A driving reason for such projectizing is the growing pressure to improve overall organizational performance. However, it is fair to say that many organizations are uncertain, perplexed and even misdirected about the status of current applications of project management. According to Jaafari (2000), project management philosophy and framework must be able to provide maximum flexibility and encourage maximum innovation in the life of a project. In addition, According to Jeff Moad, "risk involved in IT related projects have increased compared to a decade ago.

SYSTEM DEVELOPMENT LIFE CYCLE (SDLC)

SDLC is an organized approach used in companies to develop an information system. The SDLC consists of the following five phases. The 5 phases are: -

1. Preliminary Investigation
2. System Analysis
3. System Design
4. System Development
5. System Implementation and Evaluation

Preliminary Investigation

Preliminary Investigation is a written request from management or an end user triggers the start of the systems development life cycle. This written request is called a systems request. On the systems request, the end user or manager identifies the information system and the nature of the work that must be done for the information system.

The purpose of the preliminary investigation phase is to identify clearly the nature and scope of the problems mentioned in the systems request. Since identifying the problem is the focus of the preliminary investigation, this phase is sometimes called the problem definition phase.

System Analysis

According to Hoffer, George and Valacich, (1996), the purpose of the systems analysis phase is to learn exactly what takes place in the current system, to determine and fully document in detail what should take place, and to make recommendations to management on the alternative solutions and their costs.

System Design

According to Gelinas, Sutton and Oram (1999), the purpose of the systems design phase is to determine how to construct the information system to best satisfy the documented requirements. The project manager must design all required information system outputs, files, inputs, application software programs, and manual procedures. Also, the project manager must design the internal and external controls, which are computer based and manual steps that guarantee the information system will be reliable, accurate, and secure.

System Development

Systems development is the phase during which the information system is actually constructed: applications programs are written, tested, and documented; operational documentation and procedure are completed; and end user and management review and approval is obtained. The end product of this phase is a completely functioning and documented information system.

System Implementation and Evaluation

According to Shelly, Cashman and Adamski (1991), activities for this phase include conversion of data to the new system files, final training of the end users and the transition from the old system to the new system.

GENERAL CONSIDERATION FOR SDLC

Complete Phases in Sequence

The successful development of an information system requires that the project manager follow the SDLC phases in order, that is the project manager must complete one phase before start on the next phase. When phases are bypassed or are hurried, the project manager can expect problems with the developed information system.

Focus on End Products

Each end product represents a milestone or checkpoint in the information system's development and signals the completion of a specific phase.

The project manager uses each checkpoint to assess where the development stands and where it should go next. The project manager's choices at each checkpoint are to proceed to a subsequent phase, to redo portions of the work just completed, to return to an earlier phase, or to terminate the development entirely.

One major factor in the project manager's decision is the quality of the end product. Since the end products from the SDLC phases are highly visible measures of the progress, be sure to focus on the content and quality of these end products.

Estimate Required Resources

Cost-effective information systems are important to the success of every organization. The project manager is keenly interested in the estimates of what it will cost to develop and operate the information system. At the start of each

phase, the project manager must provide accurate cost estimates for that phase and projected cost estimates for all succeeding phases and for the operation of the information system.

PROJECT MANAGER'S ROLE IN SDLC

Project management is the structured coordination and monitoring of all activities involved in a one-time endeavor, or project. According to Hunter (1998), three functions are required for the management of an information system project, planning, monitoring and resource control. According to Kuprenas et. al. (2000), in most cases, a single project manager is accountable for the success of a project.

A project management team usually consists of a project manager and, depending upon the size of the project, various numbers of users, system analysts, programmers, and other specialists.

A project manager is responsible for planning and coordinating the tasks to be accomplished by a team. According to Szymanski et al., (1991) the project manager breaks down a project into small tasks that have specific end points. The manager assigns each task a time frame in which to be completed by specific team members. Then, the manager monitors the tasks to see if they are on schedule and within budget.

ASPECTS OF INADEQUATE MANAGEMENT OF SYSTEMS DEVELOPMENT LIFE CYCLE

Researchers found that majority of projects fail even before the implementation of the new system. The following are the aspects or reasons of inadequate management of SDLC.

Single Project Leader to Define, Design and Execute the Tests

When the project team expects that their single project leader will define, design and execute all the tests, in the case of large complex systems (LCS), this leads to inadequate management of the testing phase of the SDLC. For smaller and less complex systems, the traditional approach for determining whether things work, i.e. the systems testing is adequate. However, according to Ryan (1999) for a LCS with many projects and many interdependencies, the systems testing approach comes up against some real limitations.

A LCS has the following characteristics.

a. The system requires many years to develop
b. The system requires a hundred or more people to be involved

c. The system is expected to have a significant business benefit
d. The system has both a high potential value and a high potential risk

Ryan (1999) states that the new complexity of systems development can be seen in several ways. First, more people now are involved in development than was seen during the mainframe development days or in the early years of client/server. Projects today may involve between 100 to 500 people, and may increase until thousand-person projects become common over the next several years.

Second, the number of years required to develop the more complex business solution also has increased. Enterprise wide solutions, delivered over several releases, may require three to five years or more to bring all aspects of the system to work. This contributes to additional complexities. For example, with longer development periods, it is likely that management will go through at least one change during the development of the project. If the project leader has not been careful to communicate and gain sponsorship at many different management levels, a change in management may put the investment at risk.

According to Ryan (1999) a LCS effort consists of a set of projects with many interdependencies. Many of these interdependencies may be rather mild, but each of them must work. The traditional systems testing is no longer adequate for LCS projects. Experiences show that it is unreasonable to expect a single project leader to define, design, and execute all the tests that are needed to verify that the LCS works as a whole. He, and the planning team do not have the application skills and user contacts to undertake the testing. Hence the project management team is not in the position to guarantee the quality of the timely delivery of an LCS effort

A way to overcome this is by a combination of project management and 'V-Model' testing strategy, developed through experiences in successful LCS. This is also called 'engineering management'. Engineering management adds a testing responsibility to traditional project management. This testing role is charged with validating and verifying that the LCS effort works as a whole, as a system of systems, to meet user expectations of a release of an LCS. For example, it will test that when all the online applications are running as a whole, online response time, reliability, and availability meet service level agreements (SLAs). Individual project leaders can be expected to have confirmed that they meet their SLAs.

Change Management is not incorporated in the Systems Project Planning

When the management of change is not incorporated in the overall systems project planning, there will be inadequate management in the implementation phase of the SDLC. According to St. rebel (1994), chief executives are putting their companies through radical restructuring with little account being taken of the time and process needed to change skills or behaviour. Bridges (1991) identified the main issues of change as unlearning the old system and learning something

new; as unlearning old attitudes and values and changing people; and as motivating changes through a multi-stage process. The process is very people-oriented.

'Change' is a word that creates stress in the business world. According to Handy, a business philosopher, change is not what it used to be (1995). He feels that, if we are to maximize opportunity and minimize risk, we must understand change better. He also feels that those who understand why change has to occur, will waste less effort in protecting themselves from the change or in resisting the inevitable. In a positive light, he argues that 'change is ... another word for growth, another synonym for learning' (Handy, 1995: 5).

Ryan (1999) stressed that if a change is to yield the desired results, it must be managed. If it is to be managed, it must be understood. Bridges (1991) describes passing from one state to another as the transition process. He describes this process as one that involves leaving behind the old reality and it's value systems, beliefs and behaviors. As one situation ends, another begins. The period between the old and the new is the 'neutral zone'. It is in this stage that creativity, renewal and revitalization form the core of the transition process, and shape the future direction. Incorrect management of the transition may result in guilt, resentment, anxiety, stress which offsets the benefit that was supposed to come from the change.

According to Ryan (1996), the key areas of change management are planning for change, ensuring appropriate change leadership, creating a readiness for change, managing resistance to change, managing the transition, implementing the change, and finally, evaluating change. The key tool for planning is the project workplan. Individual tasks should detail the steps that deal with the human aspects of change in addition to task-oriented functions. Individual level view of change may lead to the success or failure of the change. Hence, the impact on people needs recognition, analysis and careful planning.

Schaffer & Thomson (1992) and McKersie & Walton (1991) agree that successful change programmes begin with a statement of expected results. Any change that is introduced should have a very specific goal. ODR (1991) and Bridges (1991) stressed the need to address how individual behaviour and attitudes will have to be change. In selecting a change strategy, a manager should determine whether the approach used will be participative or directive.

In the long run, participative change is more successful because it results in commitment of people. However, it would take more time to plan and implement the change using this approach. On the contrary, a directive change, imposed from the higher level, may be achieved in a much shorter time. However, most likely it will create hostility and secretive, disheartened behaviour. In reality, a

combination may be appropriate, but care must be taken to ensure the 'balance' is not just imaginary.

Nichol (1992) found that changes are best brought about through middle managers, and not top managers. Although middle managers are often reluctant to change, once they are convinced of the need and advantages of change, they become the advocates of change who are best positioned to effect the change. According to Hersey and Blanchard (1982), managers are normally viewed as having influence over events and staff look to them for protection and assurance. Managers have to accept responsibility for the change and provide support to those who will be affected. In addition, managers require analytical and implementation skills to plan and implement the change.

Poor Requirement Analysis

Incomplete requirement management in the analysis phase of SDLC will result in inadequate management of the systems project. Requirements management is among the most neglected aspects of IT project management; poor requirements analysis is a major reason why more than half of IT development projects fail, according to market researchers.

Experts point to various causes of faulty or incomplete requirements management, including inadequate customer involvement, vague requirements, and unused functionality. Scope creep, a project's expansion beyond the initial requirements, also is a concern. This usually occurs when requirements are missed during the initial systems analysis stage or when some classes of users are overlooked.

According to Farre (2001), managing requirements effectively requires a sound process, and and he suggested the aid of requirements-management software. The software provides a mutual platform and toolset for helping marketing staff, project leaders, and analysts to extract user input on system requirements; create a document-like system requirements specification with database underpinnings; manage requirements implementation, changes, and testing throughout the system's life cycle; and communicate working requirements and project status to the entire development team.

"Requirements-management software can be valuable for any company that needs to build their product in a rapid fashion," says Shelly Nakaishi, director of product management in Cygent Inc.. "By having a complete product process that includes a strong requirements-management tool, we make sure our product meets all the requirements and gets completed on time."

Lack of High Level Support

Lack of high-level support leads to inadequate management of systems development. When conflict is a likely incident during the implementation of a new system, there is an overwhelming need for high-level support to control and overcome the conflict.

Madgwick, who won the 1999 Project Manager of the Year Award from Project Manager Today, identifies two key areas where extra care has to be taken in the management of a complex project. First, the person who is supporting the project should be known. It should be someone at the very high level since a complex project will cross departments. The stakeholders, how they feel about the project, and how the would react to it should also be known. Stakeholders are those who will be affected by the project.

Next, the needed resources, and the cost of acquiring them across departments should be known. The cost implies the resistance and inertia. Active resistance, poses as a lesser threat than inertia, which can be less visible and those practising it can hide behind the project process, going for delaying tactics and subtle sabotage.

Madgwick added that sometimes, the project manager could not soothe all sources of resistance and hostility. Hence the project manager needs support at a very high level, to which he can raise resolutions of conflict if necessary. The project manager must insist that problems and risks are identified and officially acknowledged, and senior support guaranteed, or the project will become unmanagable.

The project must have a very senior champion capable of driving by force over internal opposition. The project team should not undertake a complex project without adequate high level support, otherwise the project, or the project team will fail. The project team should try to keep people believing in the project. Cynicism, especially from the top level ensures that the project never completes.

Budget and Time Constraint

Kuprenas et. al. (2000) stated, as a project manager's workload increases, the time to study all of the complexities of an active project is no longer available, and project performance suffers. Technology is too expensive and it is important to proceed with carefully analysis (Sherman: 1998). A good system development can help improve the overall business operation. Investment decisions are no longer limited to the Top management. The user (Accountants, Engineers and etc.) must also be involved because they who are using the system. A main concern of every project manager is not to exceed the approved project budget (Raz: 2000). Major portion of project control efforts is devoted to ensuring that

actual costs do not deviate from planned costs. The project manager will try to minimizing the usage of resources, try to complete on time and try to do what required by the user without adding any additional or enhance features.

A main concern of every project manger is not to exceed the approved project budget. According to Raz, Zwikaael and Globerson (2000), if a project is bound to deviate from its approved budget, then it is helpful to be able to predict the extent of the deviation. Therefore, the project manager could plan mitigating steps in order to cope with the problems.

Lack of Future Planning on System Requirement

According to Kinnear (1997), "It is usually left for the customer to decide how to partition the design to take into account expected changes and enhancements needed to respond to the market requirements". For example, in UiTM Shah Alam, the system developed in 1984 for Student Information system (Sistem Maklumat Pelajar) cannot cater the need to add one digit for student number due to increase in number of students (Sanib,2002). As a result, UiTM Shah Alam has to incur more than RM 100,000 to fix the problem. In this situation, the system analyst cannot foresee the future requirement of the system.

In contrast, the Student Information system (Sistem Maklumat Pelajar) in Universiti Kebangsaan Malaysia developed at earlier stage only for staff information system and Faculty with the most students. According to Associate Professor Dr Kasmiran (2001), however, when the system was fully implemented, the demand from other faculty start to arise and there was need to have fully computerized Student Information system. The computer department has to fulfill this demand within short period of time. In this situation, the effectiveness and efficiency of the new developed system have increased the demand. The project manager who involved in this project foresee the future needs for this project, however his team did not developed a full version of the system for all the modules in the University because of time constraint, budget and risk of the system might have defects and need further configurations.

Poor Communication

Bad planning by the user is not the sole factor to be blame. The developer or system analysis must have good communication skills to develop data collection skills. Compatibility of the innovation with previous experiences among the IT staff will support adoption of an innovation (Kellogg: 1999). The system developer must be creative innovative and analytical. Normally, the user did not voice out what their future prospect in term of usage, demand and transactions. Therefore, it is the job of the developer to gather these informations. From these informations, the developer will create useful and meaningful information to develop an effective system. According to Sircar (2000), spending on IT staff and

staff training is positively correlated with performance. A good communication skill is vital and the project manager should be analytical and creative. The project manager should encourage free flow of communication between the users and the staff in his team.

Lack of Motivation Among Team Members

Motivation helps the project manager to systematically analyze the team member's behavior, how they behave and perform the way they do. The project manager should motivate the team members and eliminate any undesirable situations. Team building could improve problem solving and decision making process. It also increases the level of commitment and involvement of the employee. Problems could be easily negotiated and conflict could be resolved.

Motivation is extremely complex. Motivation cannot be studied directly but must be inferred from observable behavior. The motivation concepts often are nothing more than circular description and are not scientific explanation of behavior. The most important aspect is employees differ in what motivates them to work.

According to Shelly, Cashman and Adamski (1991), factors that would motivate people are more recognition of good work, more information about what is going on, more opportunities to develop skills, abilities and creativity, more money and more interesting work, The project manager should always aware that a satisfied employee is a motivated employee. They also must aware that happy employees are not necessarily productive.

The project manager should create a friendly environment, where the employees feel that they are belonging to a particular group. It will increase quantity and quality of interactions. They free to communicate, giving ideas and help each other in doing the task given to them. The team should organize members meeting on timely basis. It should be no gaps between level of hierarchy where the managers and the workers wear same uniform and having lunch together in the cafeteria.

The team member should be given empowerment where they could make decision. Apart from that, performance appraisal also important. Giving them awards for the effort by the team members is another way to motivate them. The team must have their own objectives. They must have their own goal to be accomplished. To achieve personal satisfaction of the members, the project manager should conduct training or career developments programs to increase the job scope.

A project manager should also allow equal employment opportunity. Mondy and Noe (1996) stated, "the employee should have clear guidelines to curb discrimination base on races, religion, sex and age". Apart from that, the project

manager must ensure that the work environment is safe and healthy. Safety and health problems seriously affect both the productivity and quality of worklife. Team member accidents and illness can dramatically lower a team's effectiveness and employee morale.

The last motivation factor that considered the most important is employee compensation. Compensation can help to reinforce key organization values and to facilitate the achievement of organization objectives. The project manager must ensure that the team member paid accordingly. Clear guidelines on salary scheme, incentive and employee benefits must be available. Approach to compensation must be consistent with its overall corporate objectives.

CONCLUSION

As a conclusion, the project manager could not develop system exactly as they planned. They could however, minimize the risk. Many firms today have reached the point where they know that they don't know, what they used to know, and more importantly need to know in order to be competitive (Fisher: 2000). Experienced project managers should be employed and they might use their past personal experience on handling the project with these characteristics. Generally, a series of brainstorming sessions who involve the management, users and system developers is useful to define goals, objectives and future prospects of the project (Royer: 2000).

REFERENCES

Associate Professor Dr Kasmiran. 2001. *Interview* , 5 February 2001, Pusat Komputer Universiti Kebangsaan Malaysia.

Bridges, W. 1991. *Managing transitions: making the most of change.* Massachusetts: Addison-Wesley Publishing Company Inc.

Farre, T. 2001. Get It Right The First Time-Improved Requirements Management Is Vital To The Success Of Software Development Projects. (Industry Trend or Event), *Information Week*, Jan 8, p91

Fisher M. 2000. Working Knowledge-How organizations manage what they know, *Project Management Journal*, September: Sylva

Gelinas U., Sutton S. and Oram A., 1999 *Accounting Information Systems*, Fourth Edition, South Western College Publishing, Ohio.

Handy, C. 1995. *The Age of unreason.* London: Arrow Books.

Hersey, P. & Blanchard, K. 1982. *Management of organizational behaviour: utilizing human resources*. Fourth Edition. Englewood Cliffs, New Jersey: Prentice-Hall Inc, pp.266-293.

Hoffer J.A., George J.F. and Valacich J.S. 1996. *Modern System Analysis and Design,* The Benjamin/Cummings Publishing Company Inc, California.

Hunter M.G. 1998 *System Development Case Studies* , Irwin McGraw-Hill Publishing, US.

Ibbs C.W. and Kwak Y.H. 2000 Assessing Project Management Maturity", *Project Management Journal*, Volume 31, Issue 1, p.32-43, Sylva

Jaafari A. 2000. Life-cycle Project Management: A proposed Theoretical Model for Development and Implementation of Capital Project, *Project Management Journal*, Volume 31, Issue 1, p.44-52, Sylva

Kellogg W. 1999. Community-Based organizational and neighbourhood environmental problem solving: A framework for adoption of information technologies, *Journal of Environmental planning and Management*, Volume 42, Issue 4, p.445

Kinnear D. 1997. Conflicting goals call for creative solutions, *Electronic News*, Volume 43, Issues 2185, p.66

Kuprenas et. al. 2000. Project Manager Workload–Assessment of Values and Influences, *Project Management Journal*, Volume 31, Issue 4, p.44, : Sylva

McKersie, R.B. & Walton, R.E. 1991. *Organizational change: the corporation of the 1990s: information technology and organizational transformation.* New York: Oxford University Press, pp.244-276.

Meredith et al. 2001. *Project Management In Practice* . John Wiley & Sons Inc. New York

Mondy R.W. and Noe R.M. 1996. *Human Resource Management* . Prentice Hall International edition, London: page 77-79

Nichol, R.L. 1992. Get middle managers involved in the planning process, *Journal of Business Strategy*, May/June: 26-32.

ODR. 1991. "Managing Organizational Change (MOC)", *Research Review*, Atlanta, USA: ODR.

Royer P. 2000. Risk management: The undiscovered dimension of project, *Journal of the Australian Society of Certified Practicing Accountants*, CPA Australia, Volume 68, No.10, p.52-54

Raz T., Zwikael O., and Globerson S. 2000. Evaluation of models for forecasting the final cost of a project . *Project Management Journal*, March : Sylva

Ryan, H. W. 1999. Managing Development in the Era of Large Complex Systems, *Information Systems Management*, Vol. 16 Issue 2, p89

Sanib wahid. 2001, *Lecture notes,* delivered 31 January 2001, UiTM Shah Alam

Schaffer, R.H. & Thomson, H.A. 1992. Successful change programs begin with results, *Harvard Business Review*, January-February: 80-89.

Shelly G.B., Cashman T.J. and Adamski J. 1991. *Systems Analysis and Design.* Boyd & Frase Publishing company: Boston. Pg. 1.14

Sherman L. 1998. Investing in IT : Finding the best match, *Journal of the Australian Society of Certified Practising Accountants*, CPA Australia, Volume 68, No.10, p.52-54

Sircar S., Turnbow J. and Bordoloi B. 2000. A framework for assessing the relationship between information technology investments and firm performance, *Journal of Management*, Volume 16, Issues 4, p.69-97

St. rebel, P. 1994. Choosing the right change path, *California Management Review*, 36(2): Winter.

Szymanski et al. 1991. *Introduction to Computers and Information Systems*, Second Edition, Macmillan, New York.