DESIGN AND IMPLEMENTATION OF A COMPUTERISED PROJECT MANAGEMENT SYSTEM

(A CASE STUDY OF PENTOUCH ACADEMY, UYO)

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In recent years, there has been a rapid growth in infrastructures and project executed in the country, which in turn has created a need to build an application that will address most of the issues address in this research work. This research work will be of paramount importance to these sectors as it will be design to address most of their challenges.

Project Management Software easily automates the whole process of project creating, adding team member to the project, allocating task and creating project milestones as well as setting time frame for each project. System users are created by the system admin where each staff is able to login in with the provided authorization and manage his/her account. Clients are register to the system to view and input necessary details on his/her project, the users/staff all form the project team member, where staff can be added to as many projects he/she so desire. The admin has the sole authority over the system.

System development is a huge and extreme investment project for organization seeking competitive advantage edge in this dynamic global market. In order to survive in this market, many organizations develop information system to enhance efficiency and profitability. This usually makes organizations to commits

considerable time, resources and funds to information system development with the expectation of receiving efficiency and profitability in return. However, many organizations usually make the mistake of valuing technology over the organization process (Drucker, 1998). This usually leads to investment in technology that goes beyond their needs and resulting to inefficiency and wastefulness. Likewise, it might even result to abandonment or failure of the development of the information system. Information system on its own cannot create the gains and advantages that organization need to survive the dynamic competitive global market. The need to explore project management in information system development becomes desirable to ensure successful and effective organization gains and advantages in the global market. Hence the combination of project management and information system development will provide a better philosophy and method for planning and managing successful IS development.

Project management system can be defined as the tools and techniques used in the management of projects whether simple or complex. It can also be described as an electronic information system used to plan, schedule, control, report, communicate, forecast and handle cost for most aspects of a project. According to (Project Management Knowledge, 2010) PMIS are system tools and techniques used in project management to deliver information. Some PMIS tools include Micro-Soft Project, dotProject and Primavera. The major challenge of Project Management is

to achieve all of the project goals and objectives while honoring the preconceived project constraints of time, budget, quality and scope as well as optimizing the allocation and integration of inputs needed to meet pre-defined objectives while mitigating any risks. Ahleman (2009, cited in Caniels et al., 2011) notes that PMIS have become comprehensive systems that support the entire life cycle of projects, project programs and project portfolios. They can support project managers in their planning, organizing, control, reporting and decision making tasks while evaluating and reporting at the same time (Raymond et al., 2008).

Powerful PMIS have become a prerequisite in the management of projects more efficiently and effectively while aiding the project manager in decision making and communication of information among the project team and the stakeholders. According to Raymond et al., (2008) a successful project management information system (PMIS) should have individual impact in terms of satisfied users and effective use of the system and organizational impact i.e. impact on project success in terms of respecting the budget, schedule and specifications. Some factors that determine whether a project manager will use PMIS in the daily running of the projects include; the quality of information it will generate, the ability of the PMIS to provide them with the appropriate level of details in relation to their needs, ease of use of the information generated and easy to share it with the project team members. It cannot be ignored that PMIS have become an important block towards

the success of a project. Just like any other Information System (IS) or computer software PMIS has evolved tremendously to cater for more and more of the project's aspects. Initially they were just deployed as a scheduling application but with time they have been upgraded to cover most of the projects aspects like planning, controlling, evaluating just to mention a few of these aspects. The use of PMIS is advantageous to project managers in that it improves effectiveness and efficiency of managerial tasks (planning, scheduling, monitoring and controlling) as well as the productivity in that decision making is timelier (Ibid).

Parks (2005, cited in Lee et al., 2011) argue that for efficient work performance among the project team members; PMIS supports three basic functions namely communication (PMIS delivers related knowledge and information promptly between members of the team via either external or internal networks), collaboration (PMIS supports an active cooperative management system among the members) and community (PMIS supports accumulation of related information and data through information sharing). Availability of high quality information in PMIS is essential since it assist the project manager to make sound and timely decision thus improving on his/her performance.

The use of these systems not only gives the firms competitive edge against their competitors but also enhances the effectiveness of construction projects throughout their life cycle and across the different construction business functions. According

to (Kaiser et al., 2010) the use of PMIS is based on the belief that their cost will be offset by the benefits that come along with it. They continue to say that the broadening of PMIS scope enables organizations to not only manage individual projects but whole project portfolios. These PMIS support most of the project life cycle phases from the idea generation, risk management, stakeholder management to the management of knowledge created long after the project completion.

1.2 Statement of the Problem

This research work was undertaken to uncover some of the problems with conventional project management systems. Where project team member meets on regularly basis to discuss the progress made on the project team members are not permitted to travel or engage in activities outside the cities as work progress is review by physical presence. Using these conventional methods pose lots of constraint on team member as no team member can focus on other business activities except these is completed. Thereby slowing the growth of the establishment.

1.3 Objectives of the Study

In view of the problems mentioned above, this project is aimed at implementing a project management system which will exclusively:

- Automate every project carried out in the establishment such as registering a project, keeping track of project milestones, projects updates and Asynchronous transfer of message between project team members.
- Efficiently handling of project files and secure channel through which projects will be store, sorted, updated and retrieved.

1.4 Significance of the Study

This research work will provide a reliable way of handling projects effectively and eliminate the lag time in file recovery and also with an inclusion of an asynchronous system. Furthermore, it will aid structural document representation and eliminates the tedium of performing monotonous transaction. This research will also contribute to existing literature in this area and will serve as a guild or blueprint for an undergraduate student.

1.5 Research Methodology

This research work "design and implementation of an interactive project management system" will be a web-based application and will be implemented on a relational database system(MySQL). Html (Hypertext Markup Language), CSS (Cascading Style Sheet) and jQuery will be used to design the web-user interface,

PHP (hypertext preprocessor) will be used as the serve- side script language to link the interface and the database.

1.6 Scope and Limitation of Study

This research work is to develop a system capable of handling all Pentouch Academy task such as creating project, setting time frame for a project, adding team members to each project, adding project milestones to each project and asynchronous messages between team members. The system will also incorporate in its design a feedback layout between project team and client as well. The system will not incorporate in its development all the functions of a project management system but will focus only on the aforementioned functionalities. The system will not be responsible for any loss of data if its environment (network/system installed on) is corrupt.

1.8 Chapter Layout

This section was put in place to explain what each chapter does, chapter one introduces the project to the reader by explaining the problems the project is supposed to solve, objective of the study and research justification is to describe to the reader the purpose and the importance of researching on this topic, research methodology is all about the method used in implementing the research work, scope and limitation describes the boundary of the research work and where the project work can be put into use. Chapter two deals with the literature review and

state-of-the-art. This chapter discusses literature review, what people have published related to this research work and their shortcoming, how this present research can improve their shortcomings. Chapter three deals with the system design methodology i.e. collection of tools methods and practices for achieving a task; the requirement specification states the expectation of the system analysis, and design which is the blueprint of what the system would carry out. Chapter four has to do with the implementation, system testing strategies, target computer system requirement, software maintenance etc. Chapter five discusses the recommendations and conclusion part of the research work and how this work can be applied to the problem domain.

REFERENCES

Caniëls, M. C.J., & Bakens R. J.J.M. (2011). The effects of Project Management Information Systems on decision making in a multi project environment. Retrieved from http://goo.gl/oeq4P

Drucker, P. F. (1998). Peter Drucker on the profession of management. Harvard Business Press.

Kaiser, M. G., & Ahlemann, F. (2010). Measuring Project Management Information Systems Success: Towards a Conceptual Model and Survey Instrument. Retrieved from http://aisel.aisnet.org/ecis2010/20/

Lee, S. K., & Yu, J. H. (2011). Critical Success Factors for Project Management Information System in Construction. KICEM Journal of Construction Engineering and Project Management (2011) Online ISSN 2233-9582. Retrieved from www.jcepm.org/english/download.php?id=105&sid...

Project Management Knowledge. (2010). Project management Information Systems (PMIS). Retrieved from http://goo.gl/u45gB

Raymond, L. & Bergeron, F. (2007). Project Management Information Systems: An empirical study of their impact on project managers and project success. International Journal of Project Management Vol. 26 (2008), pp. 213-220 (2007). Retrieved from http://goo.gl/epgmP

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Project Management era dates back to 1950-s, that was marked as a date for the beginning of modern project management. As before 1950´s, projects were managed mostly by Gantt Charts, and informal techniques and tools. Later on, project management tools and techniques were formalized to more professional and modern solutions. Today's rapid technological advancement, of IT industries, and globalization, project management solutions are in demand throughout the world as a fundamental force to complete projects within a defined scope, time, and within cost constraints. Today's most modern project management systems deliver innovative solutions and its management process has the latest tools, techniques, systems and schemes in use. But what does project management by itself mean?

Project management is like a series of actions added to a process of getting things done on a project by working with project team members to reach project schedule, cost and technical performance objectives. Definitely we could say that project management is a carefully planned and organized effort to accomplish a specific one-time objective. It doesn‟t matter if it is for constructing a building or implementing a major new computer system. What especially does it include then?

To define and confirm the project goals and objectives we need first to develop a project plan, after that we could easily identify tasks and achieve goals. Later on, quantifying the resources is needed, determining budgets and timelines for completion. We can‟tforget to mention, that project management also includes managing the implementation of the project plan, along with operating regular controls to ensure that there is accurate and objective information relative to the plan, and the mechanisms to implement recovery actions where necessary. Projects usually follow major stages, including feasibility, definition, project planning, implementation, evaluation and maintenance.

For last and maybe the one important thing that project management includes is risk management of project. In many projects, risks are identified and analyzed in a random. This is fatal, because unexpected risks arise, which have not been planned for and have to be dealt with on an emergency basis. Rather than look at each risk independently and randomly, it is much more effective to identify risks and then group them into categories, and then to identify potential risks within each category. This way, common influences, factors, potential impacts and potential preventative for corrective actions, can be discussed and agreed on.

Categorizing risks is a way to systematically identify the risks and provide a foundation for awareness, understanding and action. Each potential risk needs to be carefully analyzed and the project team, the supporting teams, the organization

involved in managing the project, all need to be evaluated to determine whether there is the capability to manage that risk successfully, should it arise. There are namely many different sorts of risks, and we have to decide on a project by project basis what to do about each type. Here I would like to show the breakdown, presented by Barry Boehm in his Tutorial on Software Risk Management, IEEE Computer Society, 1989. In Figure 1-2 below. (Bob Hughes and Mike Cotterell c2002, 138.) Figure 1-2 Boehm´s risk engineering task breakdown (Source: Software project management 2001).

2.2 CONCEPTUAL FRAMEWORK

Concept of Project

The fundamental nature of a project is that it is a “temporary endeavor undertaken to create a unique product, service, or result.” Projects are distinguished from operations and from programs.

Temporary Endeavor: To be temporary signifies that there is a discrete and definable commencement and conclusion; the management of a project requires tailored activities to support this characteristic, as such, a key indicator of project success is how it performs against its schedule—that is, does is start and end on time.

Unique Deliverable: The uniqueness of the deliverable, whether it is a product, service, or result, requires a special approach in that there may not be a pre-

existing blueprint for the project's execution and there may not be a need to repeat the project once it is completed. Uniqueness does not mean that there are not similarities to other projects, but that the scope for a particular project has deliverables that must be produced within constraints, through risks, with specific resources, at a specific place, and within a certain period; therefore, the process to produce the deliverable as well as the deliverable itself is unique.

Progressive Elaboration: This unique process and deliverable produces the third characteristic of a project: progressive elaboration. Project management is a group of interrelated processes, implemented in a progressively elaborative manner, in which to produce the deliverable. Progressive elaboration is the revealing and focusing of details through time. For example, in the engineering design process, a general and broad concept may be a starting point for the design team; but through the design process, the concept is narrowed to a specific scope and is further elaborated to achieve the completed design; moreover, it may continue to be elaborated and not be finalized until the product, service, or result is delivered.

Other "Projects": A clarification should be made with respect to Reclamation language. In Reclamation, a project is typically a congressionally authorized or directed activity that allows Reclamation to do something specific. Traditionally, projects are groups of infrastructures, such as the Central Arizona Project, the Lower Colorado Dams Project, or the Central Valley Project. The Reclamation

“project” activities would range from the traditional planning, designing, and building of structures, to negotiating and signing delivery contracts, developing operations plans, and completing environmental compliance documents. In historic reclamation vernacular, the operation and maintenance of the completed project is also often considered as part of the “project.” Additionally at times in Reclamation, the people managing projects are often referred to as something other than project managers—they may be called team leaders, coordinators, activity managers or program managers; people managing “projects” may be called area managers or facility managers. Because of these connotations, care should be taken to distinguish between Reclamation “projects” and projects as defined above.

A Project versus an Operation

The operations of an organization are continuing and repetitive activities that are executed to achieve its mission and sustain the business, but without a definable end to their performance and without a unique output—that is, it is not produced or provided only once.

A Project versus a Program

A project differs from a program in that “a program is a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually. Programs may include elements or related workout side the scope of discrete projects in the program.”4 Furthermore, programs often

involve a series of repetitive or cyclical undertakings. In Reclamation, a program is typically a group of projects administered by Reclamation.

Reclamation programs do not have to be specifically authorized, and a program's schedule may continue past any individual project. Examples of Reclamation programs are the Safety of Dams Program, the RAX Program, and the Title 16 Program.

Concept of Project Management

In today's ever increasingly competitive markets, business and enterprises rely more and more in their information systems to achieve their purposes of effectiveness and efficiency. New technologies bring new opportunities to enhance business operations and interactions. Project management is concerned about the application of tools, skills, knowledge and techniques to achieve effectiveness and efficiency to survival in competitive market (PMI, 2000). The usefulness of project management cut across disciplines and it's applicable to any industry regardless of the service and product it aims to achieve. Despite its wide application in different industries and products, project management has an enormous usefulness on effective development of IS to significantly increase the successful completion.

Kerzner (2013) pointed out that project management is successful due to its methodological approach of process integration, process creativity, effective

planning, execution, supervising and control, and lastly closure to accomplished completed projects. Similarly, Heagney (2011) echoed that project management is highly effective particularly in IS due to its nature of process based. He further added that the sequential phases of project management directly enhance IS development, making it an invaluable means in facilitating successful completion of system corresponding to its original requirements. Hence, the issues of cost, project scope, time and quality is paramount to business efficiency and effectiveness which also defines project success particularly IS development in an organization (Atkinson, 1999). Project management assists organization management to be able to standardize their project and ensure that resources are available in achieving targeted project. It permits organization managers to be able to apply appropriate techniques and measures to ensure completion of projects with minimal cost and least resources.

When project management is incorporated in Information systems development, it leads to an improvement in usefulness and efficiency of business operations and interactions with minimal resources of the organization (Cadle & Yeates, 2004). The capabilities of the information system and characteristics of such business, its employees and the systematic development and implementation of the IS determine the degree to which that aim is accomplished. Coy (2004) explain that IS enhance the coordination of hardware and software to collect, filter, process,

create and distribute date within a confine network to achieve business excellent. It aims to support business operations and managerial decision making in achieving business productivity and excellent. It deals with not only infrastructure but also the manner at which users interact with technology in support of business processes to achieve this excellent.

Similarly, Kroenke (2008) defined IS as an interaction formed by users and information technology (such as process, data, models, applications, machines and others) to achieve some organizational functions and purposes. This interaction can occur within or across organizational boundaries. An information system is the technology an organization uses and the way in which the organizations interact with the technology and the way in which the technology works with the organization's business processes. Hence, Information System (IS) is the interconnection and operation of information technologies and human managerial skills to achieve business productivity and excellence.

In the same scenario information systems development (ISD) can be seen as the process of interaction by which some collective work activity is facilitated by new information-technological means through analysis, design, implementation, introduction and sustained support, as well as process management to achieved business excellence (Korpela, Mursu, & Soriyan, 2002). It is the developmental change in process that is aim at achieving certain business objectives or purposes

by using information systems. This change is targeted toward business operational excellence and productivity. Several information development approaches have been used since the origin of information technology to achieve business excellence. Mingers (2003) identified Waterfall, Prototyping, Incremental, Spiral, Rapid application development (RAD) and Extreme Programming approaches as commonly used in IS project and system development. However, these approaches have been found not to be sufficient on their own to achieve inclusive business excellent that is been anticipated by developers and business managers. For inclusive business excellent and comprehensive solution to complex system development, a multi-methodological approach is considered the most effective strategy (Iden, Tessem, & Paivarinta, 2012; Higgins, Taylor, & Francis, 2012).

In IS development, no one approaches is regarded as the preeminent because of the dynamic nature of business and its requirements needed to achieve operational excellence. These requirements are based on the ever-increasing competitive global market which every business must survive. Although information systems (IS) have become one of the most precious assets in the ever increasingly competitive global market yet development of such system usually encounter many problems. Among the most imperative are low productivity, a large number of failures, and an insufficient relevance of information system with business needs.

Petersen (2011) submitted that low productivity occurs when the business operation functions and excels better in manual mode compare to the IS mode.

In the same vein, Conboy (2010) reported that IS development (ISD) efforts resulted to failure sometimes due to economical mismatches, such as budget, schedule overruns, poor product quality and insufficient user satisfaction. This was supported by Yeo (2002) and Standish Group (1995) revelations that only 16% of all projects are delivered on time and within their budget. This was carried out as a survey among 365 information technology managers, it also revealed that 31% of ISD projects were cancelled prior to completion and the majority, 53%, are completed but over budget and offer less functionality than originally specified. Correspondingly, from the business point of view, Goyal (2012) identified growing criticism of poor alignment of ISs and business needs. He observed that while an increasing part of business' resources are spent on recording, searching, refining and analyzing information, the link between ISs and business performance and strategies has been shown to be dubious. For example, most managers and users are still facing situations where they cannot get information they need to run their units (Rockart & Hofman, 1992). Hence, ISD is continually challenged by the dynamic nature of business together with the ways that business activities are organized and supported by ISs.

Project management is the process of the application of knowledge, skills, tools, and techniques to project activities to meet project requirements.” That is, project management is an interrelated group of processes that enables the project team to achieve a successful project. These processes manage inputs to and produce outputs from specific activities; the progression from input to output is the nucleus of project management and requires integration and iteration. For example, a feasibility report could be an input to a design phase; the output of a design phase could be a set of plans and specifications. This progression requires project management acumen, expertise, tools and techniques, including risk management, contingency development, and change control.

Process Groups: The project management process groups are initiating, planning, executing, monitoring and controlling, and closing.

Initiating defines and authorizes the project or a project phase.

Planning defines and refines objectives and plans the course of action required to attain the objectives and scope that the project was undertaken to address.

Executing integrates people and other resources to carry out the project management plan for the project.

Monitoring and controlling regularly measures and monitors progress to identify variances from the project management plan so that corrective action can be taken when necessary to meet project objectives.

Closing formalizes acceptance of the product, service, or result and brings the project or a project phase to an orderly end. Figure 28 illustrates the relative depth, breadth, and interrelationship between these process groups.

Several significant observations regarding the nature of project management can be made from this figure. The breadth or range of project management is comprehensive—that is, it begins with **initiating** and continues through **closing**; these processes are coincident with the start and end of the specific project itself, respectively. **Monitoring and controlling** occur throughout the duration of the project and have a range relatively similar to that of **executing**. Indicating a project's temporary nature and the importance of the timing of the deliverable, **closing** begins relatively shortly after **initiating** concludes. **Planning** and **monitoring and controlling** have a collective depth similar to that of **executing**, illustrating that these activities require a level of effort and have a implication similar to that of constructing the product, providing the service, or producing the result.

Process Group Interaction: The level of interaction of the five processes indicates a strong relational dependence not exclusive of one another. One process does not simply end and the next one begins. The presence of this interrelationship and range is a function of progressive elaboration. Projects are executed in increments and details are exposed and developed through the progression of

time—objectives are developed, discoveries are made; investigations, studies, and surveys are completed; analysis is performed; constraints are changed; resources are amended; contingencies are exercised; changes are managed; risks are mitigated; and *Force Majeure* (unforeseeable or unpreventable circumstances) occurs. To manage the breadth or range of a project, active and proactive project management is required throughout the duration of the project. It cannot be simply initiated and/or planned and left alone; it must be continually planned and monitored and controlled. Sustained reactive project management is indicative of incomplete or absent planning and/or monitoring and controlling.

Project Phases versus Process Groups: Project management process groups are not project phases. In fact, the process groups may need to be repeated for each phase, such as study, programming, engineering, procurement, construction, and commissioning. A process group or project phase is not discrete; they are interdependent and require integration.

Also, project management must ensure continuity as a project progresses through processes and phases.

Concept of Project Success

A standard must be established by which to define and measure project success. Fundamentally, project success is the delivery of the required product, service, or result on time and within budget. To meet these objectives is to deliver a quality

project. PMI illustrates project quality through the concept of the triple constraint—project scope, time and cost.9 Project quality is affected by balancing these three interrelated factors. “The relationship among these factors is such that if any one of the three factors change, at least one other factor is likely to be affected.”10 Figure 3 illustrates this constrained relationship, sometimes called the “iron triangle.”

Cost and time are intuitive, but the role played by scope warrants further discussion. To understand the significance of scope, one must appreciate the relationship between scope and the project objectives. For the scope to contribute to project quality, it must be managed to meet the demands of the project objective by reliably providing the required functions, nothing more or nothing less. It is not simply a matter of keeping the scope from creeping, or a matter of completing the cheapest and fastest project; it is establishing the appropriate scope and delivering the commensurate product, service, or result.

Concept of Project Manager

The key responsibility of the project manager is to successfully accomplish the project objectives by balancing the competing demands for quality, scope, time, and cost.11 Derivative responsibilities include identifying the project requirements; establishing clear and achievable objectives; and adapting the specifications, plans, and approach to the different concerns and expectations of the various

stakeholders. Fundamentally, the project manager must direct the project from its inputs, through its nucleus, to delivery of its outputs. In order to accomplish these multifaceted responsibilities, the roles of the project manager include that of a leader, administrator, entrepreneur, facilitator, arbitrator and mediator, liaison, and coordinator.

The project manager must lead teams to operate cross functionally towards a common objective while assuring cohesiveness and continuity as the project progresses through project processes and project phases. “The project manager acts as the key catalyst to stimulate effective communication and coordination between design, procurement and construction activities.”

In order to effectively manage these responsibilities and assume these roles, a project manager must have experience in the following project management knowledge areas: project integration, scope, time, cost, quality, human resources, communications, risk, and procurement management.

Concept of Project Management Plan (PMP)

A project management plan is a fundamental tool for the project manager to deliver the project successfully. This document is a strategic and formalized roadmap to accomplish the project’s objectives by describing how the project is to be executed, monitored and controlled, which includes creating a project work breakdown structure, identifying and planning to mitigate risk, identifying manners in which to

effectively communicate with stakeholders and other project team members and developing a plan to manage changes. It is essentially a guide for executing the project, and a manner in which to gain buy-in and approval from stakeholders and sponsors prior to commencement. This plan is a living document that is updated and revised throughout the project at strategic milestones or significant events to accommodate the progressive, elaborative nature of the project. The project management plan will vary based on size, complexity, risk, and/or sensitivity of the project. Implementing the project management plan requires competency in all of the project management knowledge areas and is critical to the success of the project.

Concept of Management Systems

A management system is a group of interrelated components that work collectively to carry out input, processing, output, storage and control actions so as to convert data into information products that can be used to support forecasting, planning, control, coordination, decision making, and operational activities in an organization (Hardcastle, 2008). A project management information system (PMIS) is thus the systematic process of creating, identifying, collecting, organizing, sharing, adapting and using project information. Information management means identifying what information is needed, who has the information, how we can capture and store the information, and finding the best

method for its distribution and use. It is a process the project uses for identifying all the information it needs, to define the methods to collect and organize the information, and use the best methods for its distribution and use. Information is therefore a key resource that needs to be available to the organization to know if the project has met its objectives.

Information management deals with issues such as data bases, abstracts, publications, management information and good practices. Project information, as well as project information resources can be managed and can contribute to becoming more effective and efficient. The most important aspect is that the project information needs to be used. Hence the management of information concerns the management of the information process and not only the product. Every actor in the process is at the same time a user, an intermediary and a producer of information.

Concept of Project Management Systems

Projects must create an information system that will meet their own particular needs, both for managing the data they collect and for delivering information to different groups of users in formats they can understand and make use of. In order to develop such information systems it is important to have strong support from decision makers. It is therefore very important to make decision makers aware that an information system is a priority tool for project resources governance.

Project management information systems do not have to be sophisticated. In southern Africa and other developing countries, a project management information system may be quite simple. What is important is that it should be affordable and work for the project in question. The most important thing is that the information system is accessible to all stakeholders. It needs to be interactive, accessible, affordable, appropriate and equitable.

As put forward by the Global Water Partnership (2009), information needs to be appropriate to the task in hand, proven through research and development, tested in the field and pitched to the capacity of institutions, practitioners and stakeholders to understand and use it. Information needs to be affordable, preferably free, so that there is no discrimination between information providers and users because of lack of funds. Information needs to be accessible to all practitioners through the channels they normally use, not dependent on major upgrades of technical infrastructure and information processes should be equitable. This means that information systems should respect cultural needs, gender issues and embrace stakeholders distanced from decision making because of their location, or economic or social status.

The information system should be designed to fit the financial and human resources available to the project. Too often large initial investments are made, often with external financial support, to establish sophisticated systems that are

then not sustainable due to a lack of funds or lack of human resources. Therefore, before deciding what type of system should be used, it is advisable to estimate the running costs and clearly indicate the size of budget available to ensure the initial investment will not be wasted (Global Water Partnership, 2009).

The problems related to availability, accessibility and sharing of project data and information are widespread and occur at all levels (regional, national, local). Solving these problems means that those involved in the project management must adopt rules for sharing, accessing and using data and data services. Common measures and rules specifically concern:

- Sharing responsibility for producing, gathering, processing and disseminating data and information (who does what and access rules) in order to avoid duplication and create synergies.
- Sharing data. Public authorities should have easy access to data and data services related to the project. This access can be hindered when it depends on ad hoc negotiations between public authorities each time data is required. Partners should remove practical obstacles to data sharing by setting up, for example, agreements between public authorities.
- Interoperability of information systems and the organisation of network services to facilitate, for example, data identification, consultation and downloading (Global Water Partnership, 2009).

If the project information system is to be useful, it must allow all categories of users to retrieve data in a form they can easily understand. As far as possible, the information system should be structured to allow users to retrieve information and accomplish routine tasks easily.

The Current problems with Project Management Information Systems

The following are the major current problems with project management information systems as outlined by Siles (2004):

1. Isolated systems; one of the consistent and recurring messages is that projects are creating and using systems that are too narrow in scope and limited to track project activities and not project outcomes. These systems are designed to manage the information needs of a specific project and as a result, efforts to consolidate information are almost impossible.
2. Drowning on data and starving of information; some project systems focus too much on collecting, organizing and reporting data giving little time to critically analyze the information and make sound decisions.
3. High expectations; people involved in the collection of data receive high expectations as to the value of the data requested from them, only to never see the information come back. In these cases information tends to flow in one direction.

4. Low priorities in information management; PMIS is often relegated to outside consultants or given to staff with inadequate skills or responsibilities. It is often that these responsibilities are not well assigned and accountability becomes diffused.
5. Technology myopia; expectations that technology will be the final solution has led to an inappropriate focus that resulted in spending more time in managing the technology than managing the information.
6. Systems disconnected from the log frame; PMIS are developed but only respond to the immediate needs of the project; reporting on project activities without creating the connections with the desired objectives. Systems designed to monitor progress do not show how the progress relates with what the project has set out to achieve.
7. Reports for reporting sake; reports are not connected with the decision process of the organization. Reports stay at manager's desks and no relevant information is extracted from them.
8. No standard PMIS process; the lack of a standard process has led to the development of many systems, each with its own processes, and all disconnected from each other. Organizations have to deal with information coming from different systems, making the collection and consolidation of

information impossible. Systems are tailored to specific project and donor needs.

9. Duplication of efforts; each project develops its own PMIS system, which results in a duplication of efforts and costs to the organization.
10. Training and maintenance costs for each system; costs to train and maintain the system are seldom considered in the design phase resulting in unexpected expenses not budgeted by the project.
11. Little or no experience in PMIS; lack of experience leads to poor systems or failures at a high cost to the organization. Systems developed with low quality require a high dependency on consultants to keep fixing the system.
12. Projects with little or no IT support; PMIS perceived as a luxury that requires high IT investments. Certain development organizations have a low technology capacity that has not been structured to support complex project PMIS requirements.

Characteristics of Project Management Information Systems

In order to have flexible and responsive interventions, a project information system needs to be more than just a reporting mechanism. It must serve as a powerful management tool for advancing an organization's programme goals of accountability, transparency and partnership. According to Siles (2004), a good PMIS needs to contain the following characteristics:

- The project information system should incorporate both quantitative and qualitative data and feedback from participatory assessments and evaluations continuously through every phase of the project. Systematic monitoring and evaluation of program processes and outcomes are particularly important where new programmes are being implemented;
- PMIS supply the necessary information and feedback so that potential problems are identified and solutions are implemented early before becoming constraints. The system should be able to generate timely information to initiate corrective actions;
- A PMIS is a tool to collect, analyze, store and disseminate information useful for decision making in a project. A good PMIS builds on a project's successes while using lessons from earlier experiences to improve project performance;
- PMIS differ from other management information systems (financial, payroll, etc) because their demand-driven approach requires it to be flexible and adaptable to the changing conditions of the project;
- Flow of information is central to PMIS and constitutes an empowerment agenda that includes:

a. Transparency - the availability and access to information by all project stakeholders;

b. Accountability - the use and application of information to monitor the progress of the project and correct deviations;
c. Inclusion and participation - where project participants are given control over decision-making, including decisions on appropriate criteria and indicators to judge the performance of the services provided by the project.

Identifying a Project's management System Needs

The list below (adapted from Siles, 2004) can help project managers identify the information required to define and develop an information technology solution for the PMIS. This step is needed in order to evaluate the complexity of the information the project will manage.

- requirements of information from the donor;
- requirements of information from the organization;
- the methods the project will use to collect, and organize all the information;
- the frequency the project needs to analyze and report the information to key stakeholders;
- the volume of information it needs to collect from beneficiaries;
- the types of visual reports required, such as graphs, tables, maps, etc;
- the types of access, security and controls to manage, modify and update the information;

- the need to develop especial reports in defined formats; and the need for complex analysis on the information collected.

The next step is to evaluate the current information technology (IT) capacity of the project. This will identify the IT capacity that will satisfy the information requirements.

- available funds for IT resources dedicated to the project;
- the current capacity of the project capacity to manage technology;
- the need for communications, email, internet and other online systems;
- the number of staff that will use computers in the project;
- the level of computer literacy of the project staff; and the IT support required by the project.

Once a project has identified its information requirements it needs to define its technological requirements and start to design a technological infrastructure that will provide with the appropriate hardware and software needed to manage the information.

One of the most critical steps in developing an automated PMIS is the development of a software solution that will meet all the information management requirements. For most projects, and development organizations, the options are to configure a commercial package or develop a customized solution from scratch. Configuring a commercial package means in most cases that the selected product will not be able

to meet certain requirements and that the project will need to make a careful identification and selection process to use the system that meets most of its needs and find other methods to fill in the gaps. In other instances, the project may decide to contract a consultant to develop customized solutions that can meet all of its requirements.

2.3 THEORETICAL FRAMEWORK

The Systems Theory

The American heritage dictionary of the English language (1992) sees a system as 'a group of interacting, interrelated, or interdependent elements forming a complex whole'. The Oxford English dictionary (1995) defines a system as 'a set of assemblage of things connected, associated, or interdependent, so as to form a complex unit; a whole composed of parts in orderly arrangement according to some scheme or plan'. A system is thus a set of interrelated elements functioning as a whole.

A system and its interdependence characteristic is best described by Durkheim's collective conscience, mechanical and organic solidarity thesis (captured in Haralambos and Holborn, 2000). Both mechanical and organic solidarity are a result of the forces of collective conscience. In organic solidarity people are different but need each other. For example, a farmer needs a teacher to teach his

children as much as a teacher needs him for food. Various parts are different yet work together to maintain the organism as in the case of the heart, liver, brains and so forth in the human body.

A system is made up of subsystems. Therefore a subsystem is a system within a system. For example, organizations are composed of various subsystems: the external interface subsystem (the external environment), the task subsystem, the technological subsystem, the structural subsystem, the human social subsystem and the goal subsystem (French and Bell, 1978).

An educational institution like a university is composed of libraries, laboratories, lecture theatres, hostels and the administration as subsystems which can be regarded as systems in their own right. Whatever happens in any of these subsystems affects the operations of the university as a whole. All interventions in the university system must be put in their conceptual context. Otherwise they end up having a negative effect on its operations. As put forward by the Institute of People Management of Zimbabwe (IPMZ) (1994: 10), 'Within this viewpoint, it is not possible to simply consider one part of an organization without looking at its relationship with all the other parts, because changes and influences in one part affect all other parts of the organization'. Anything that affects one part of the system also interacts with other parts of the system.

The systems thinking is based on ‘an interdisciplinary theory about the nature of complex systems in nature, society and science, and is a framework by which one can investigate and/or describe any group of objects that work together to produce some result’(http://en.wikipedia.org). This could be a single organism, organization or society, or any electro-mechanical or informational artifact. The Wikipedia (2009) further states that the systems theory first originated in biology in the 1920s out of the need to explain the interrelatedness of organisms in ecosystems. Bertalanffy, a biologist, is credited with coining the phrase ‘general systems theory’. Bertalanffy (1988) noted the following characteristics of systems studies common to all sciences:

- The study of a whole or organism;
- The tendency of a system to strive for a steady state of equilibrium;
- An organism is affected by and affects its environment.

Bertalanffy (1988) describes two types of systems: open systems and closed systems. Open systems are systems that allow interactions between their internal elements and the general environment within which they operate as illustrated in Figure 2.1 above. Bertalanffy (1988: 4) defines an open system as a ‘system in exchange of matter with its environment, presenting import and export, building-up and breaking-down of its material components.’ Closed systems, on the other hand, are considered to be isolated from their environment. Thus, a system is

closed when it is self-supporting and can exist independently of a particular environment. It is open if it is dependent on the environment in which it operates, the environment is dependent on the system, and there is a specific interaction between the system and the environment.

Other authorities like Nobert Wiener (1894-1964) adopted the word cybernetics in place of systems. The study of cybernetics showed that all systems could be designed to control themselves through a communications loop, which fed information back to the organism, allowing it to adjust to its environment. This feedback meant that an organization could learn from and adapt to possible changes in its environment.

The application of systems thinking is founded on the gelstat concept. According to this concept the whole is more than a mere summation of its constituent parts (Davies, 1971). It is a perspective for going beyond events, to look for patterns of behaviour, to seek underlying systemic interrelationships which are responsible for the patterns of behaviour and the events (Ehlers, 2002). Ehlers (2002) further argues that the systems approach embodies a worldview which implies that the foundation for understanding lies in interpreting interrelationships within systems.

According to Siles (2004) one of the key concepts from a systems perspective are causal streams, that is the flow of cause-effect linkages. Causal streams are a

sequence of conditions or factors linked by cause-effect logic that contribute to a predefined problem.

Although scientific research once focused on one level and in closed systems, research now evolves towards a transdisciplinary approach that integrates human and social sciences in an attempt to embrace the multiple levels of reality (Brelet and Selborne, 2004). This is reflected in most African communal cultures where anthropological studies of values and beliefs show that ethics and normative values are still closely linked to an equitable utilization of natural resources philosophy, a scenario closely resembling Karl Marx's primitive communalism. The scenario actually reveals an astute ecological cleverness, both anticipatory and adaptive, in maintaining natural resources for future generations (Brelet and Selborne, 2004). Humans are not traditionally regarded as separate from their natural environment, but as another part of the same highly complex 'metasystem'. This knowledge comes from the holistic observation of the many interdependencies which make up the natural world. Human and natural systems are mutually responsive and interactive.

2.4 EMPIRICAL REVIEW

The comprehensive comparisons of CMS had been made by various parties like Unal (2011) and Bremer (2005), especially the two commonly employed systems: Moodle (Dougiamas, 2003) and Blackboard (Blackboard Inc, 2013). ClockingIT

(Clocking.com 2008) is a general project management system with licensing free of charge. It provides basic management function like task management with priority assignment to tasks, so that project manager can better arrange manpower and plan the schedule of project. Moreover, it has chat function and forum for ease of communication, while at the same time, it provides share folders for user to access documents and source code simultaneously. This system also included some advanced functions like Gantt chart generator which is a standard tool for project scheduling.

Clement and Bounds (2013) shared similar goal as our system in facilitating the management of FYP. While, their focus was to better connect students with potential supervisors before the project allocation starts. Their system also included tools for assessment submission and collection which are normal functions in a CMS. Bakar et. al. (2011) had reported their experience in developing and using an FYP management system at Universiti Kebangsaan Malaysia. Their system consists of three major modules including user profile, project monitoring and appointment setting modules. Our system also contains similar functional modules as Barkar's, while we have additional modules like project allocation, file repository and online communication. The HKU CS Project Management System (2014) is a project management system that developed in the University of Hong Kong, Department of Computer Science. The system can show project

information, news, schedules and project allocation. In the main page of this system, it includes functions like blogs, calendar and forms downloading. Also, there is a list of projects and related information, as well as some advanced function like providing a virtual machine for students as servers for their FYP.

CHAPTER THREE

SYSTEM DESIGN METHODOLOGY

3.0 Introduction

In the Web technology, the application model usually refers to the structure of the system software layer, the commonly used application model has two application models and three-tier application model.

3.1 Two-Tier Application Model

Two-tier application model is composed of client application and server application and middleware three parts. Among them, the client application is the system user and data exchange part of the information, the server application is used to manage the resources on the server, such as a database management. Its main job is when a number of users on the same resources on the server to send access needs, the server application can optimize the management of these resources. Middleware is a component that can be selectively composed, it is optional. Its main role is to connect the client application and server applications, you can make the two synergies to meet the user's query and access needs.

In the two-tier application model mode, the entire Web system is divided into two parts, part of the client, part of the server database management system. Between

the two through the structured query language for data requests. As shown in Figure 1 below.

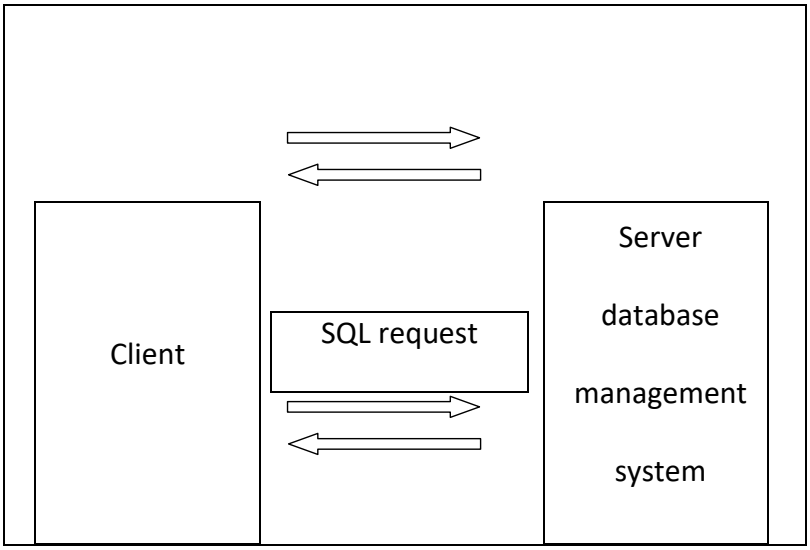


Figure 1: Two-tier application model C / S

The development of software in Client Server (C / S) mode has the following advantages:

1) Greatly reduce the workload of programming, in the system to update and maintain, you can improve the utilization of resources, reduce the cost of programming and software development.

2) Through the SQL request to the client part and the server part of the technology of the distribution of resources, the two sides of the load to a certain

balance, so as not to increase the allocation of resources in the case, can greatly improve the performance of the computer.

3) Users can run applications on different computer platforms on a single client to improve customer access.

4) In the application needs change, you can easily expand the system program.

Although the application of C / S mode makes the information technology has been greatly developed, but there is more or less the problem. First, due to the use of two-tier data processing structure, in the customer and the server between the little bit of direct access to the performance of underground, management complex shortcomings. Second, when a new extension occurs, the need for re-writing the program, affecting the efficiency of the program expansion. Third, the user can directly access the server, so that the security of the server on the lack of a certain degree of protection.

3.2 Three - tier application model

In order to solve some of the drawbacks of the two-tier application model, people developed a three-tier application model B / S development environment. Three-tier application model structure includes the client, Web server and database server composed of three parts. As shown in Figure 2.

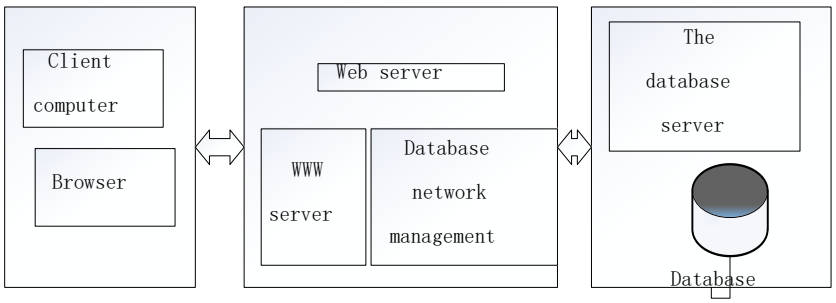


Figure 2: Three-tier application model B / S structure diagram

In the three-tier application model structure, the first layer is the client, it is mainly to provide users with access interface. The second layer is the Web server, its main function is responsible for the WWW server and database management between the logical business. The third layer is the database server, the main function is responsible for the database information storage and internal storage of information to optimize. It can be seen from the above figure that the three-tier application model B / S structure adds a Web server part compared to the two-tier application model C / S structure, which can process the logical unit of the application separately so that the user's access Interface and application on different logical platforms. Through this design can make the database to be shared by all users, which is the three-tier application model B / S structure and two-tier application model C / S structure of the biggest difference.

3.3 SYSTEM DESIGN

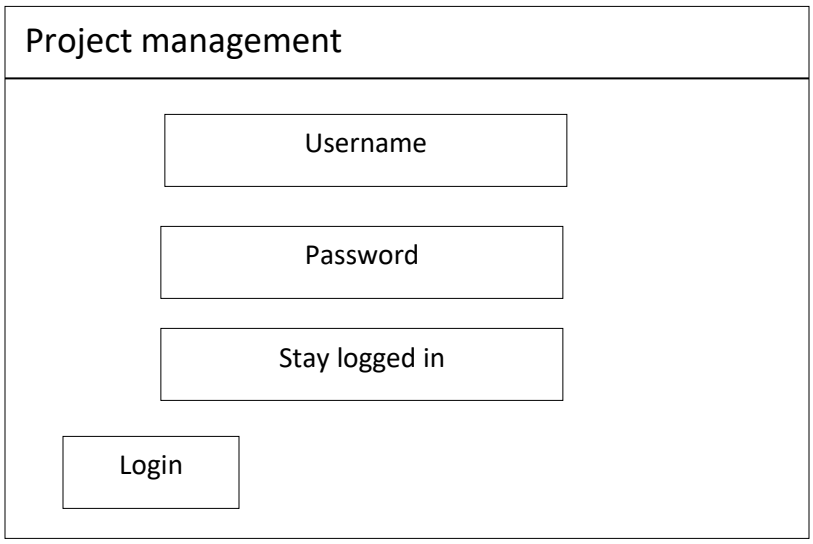
Designing a project management system entails translating the requirements specification into a physical form which requires using different patterns to realize the intended system.

3.3.1 LOGICAL DESIGN

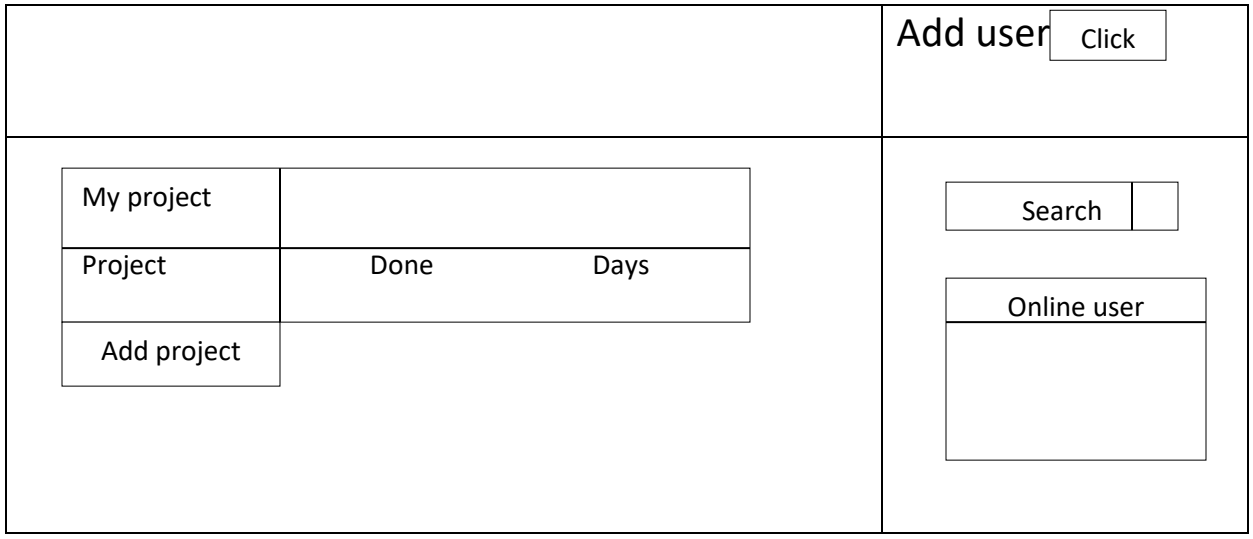
The logical design converts the system requirements specification into system model, by implementing the major features of the system. This design provides a means through which a user can create a new project, add members to the project, develop project milestones and work through using the activities section.

PROGET MANAGEMENT

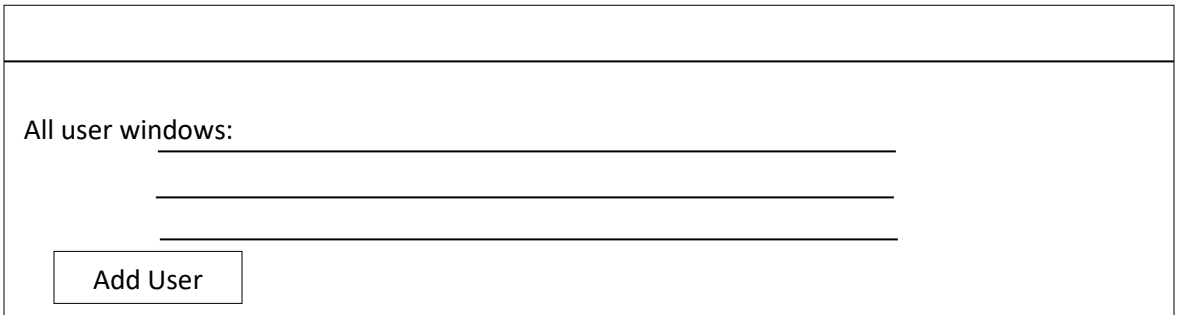
Login



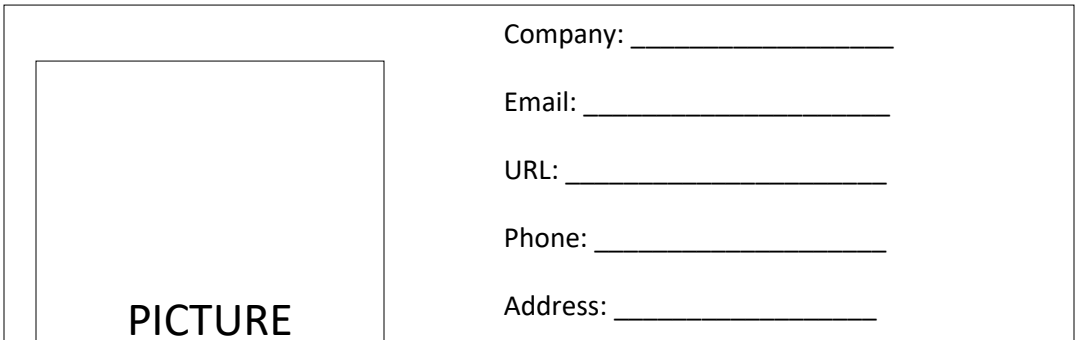
Admin view screen



User administration



User profile



FLOW CHART DIAGRAM

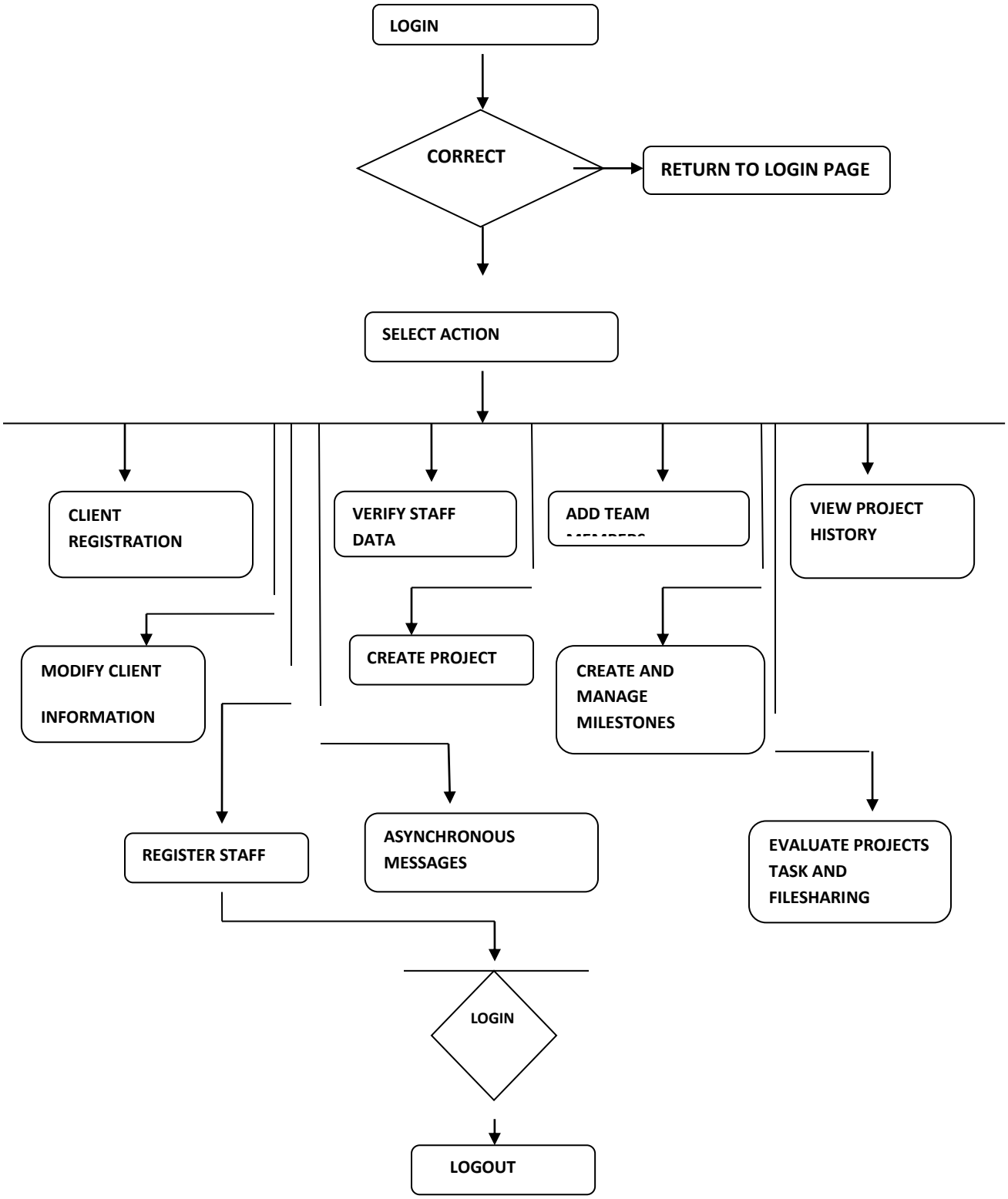


Fig 3.6

3.3.1.6 SYSTEM CONTROLS

The input and output are controlled through the use of automatic validation of input password access to the system sessions are used to keep track of user and data from one page to another.

3.3.2.0 STRUCTURE OF DATABASE

The structure of relational database shows the different tables that make up the database and links among the fields, the database consists of seven tables which are:

COMPANY

Field	Data type	Description
ID	Int (11)	Id auto-increment
Company	Varchar (255)	Company name
Contact	Varchar (255)	Contact address of company

Email	Varchar (255)	Email
Phone	Varchar (255)	Phone
Mobile	Varchar (255)	Mobile
url	Varchar (255)	URL
Address	Varchar (255)	Address
Zip	Varchar (255)	Zip code
City	Varchar (255)	City
Country	Varchar (255)	Country
State	Varchar (255)	State
Desc	Text	Description

Customers-assigned

Field	Data type	Description
ID	Int (10)	
Customer	Int (10)	
Project	Int (10)	

File

Field	Data type	Description
ID	Int (10)	Id auto-increment
Name	Varchar (255)	File name
Desc	Varchar (255)	Description
Project	Int (10)	Project
Milestone	Int (10)	Milestone
User	Int (10)	User who created the

		project
Added	Varchar (255)	Other user added
Datei	Varchar (255)	Date initialize
Type	Varchar (255)	File type
Title	Varchar (255)	Title
Folder	Int (10)	Folder save
visible	Text	Visibility status

Log

Field	Data type	Description
Id	Int (10)	Id auto-increment
User	Int (10)	User (key)
Username	Varchar (255)	User full name
Name	Varchar (255)	Full name
Type	Varchar (255)	User type

Action	Int (1)	Action perform
Project	Int (10)	Project id
Datum	Varchar (255)	Date and time

Message

Field	Data type	Description
ID	Int (10)	Auto-increment
Project	Int (10)	Project id
Title	Varchar (255)	Title
Text	Text	Message text
Tags	Varchar (255)	User tags
Posted	Varchar (255)	Posted
User	Int (10)	User initiated

Username	Varchar (255)	Username
Reply to	Int (11)	Reply id
Milestone	Int (11)	Milestone id

Role

Field	Data type	Description
ID	Int (10)	Id auto-increment
Name	Varchar (255)	Name (user role)
Project	Text	Project
Task	Text	Task
Milestone	Text	Milestone
Messages	Text	Message
File	Text	Files

Chat	Text	Chat
Time tracker	Text	Time tracker
Admin	Text	Admin

User

Field	Data type	Description
ID	Int (10)	Auto-increment
Name	Varchar (255)	Name
Email	Varchar (255)	Email
Tel 1	Varchar (255)	Mobile number

Tel 2	Varchar (255)	Mobile number
Pass	Varchar (255)	Password (md5c)
Company	Varchar (255)	Company name
Last login	Varchar (255)	Last login
Zip	Varchar (255)	Zip code
Gender	Varchar (1)	Gender
URL	Varchar (255)	Universal resource locator
Address	Varchar (255)	Address 1
Address 2	Varchar (255)	Address 2
State	Varchar (255)	State
Country	Varchar (255)	Country
Tags	Varchar (255)	Tags
Locale	Varchar (255)	English
Avatar	Varchar (255)	Picture
Rate	Varchar (255)	Rate

CHAPTER FOUR

SYSTEM IMPLEMENTATION

4.1.0 INTRODUCTION

This chapter focuses on the implementation of the system. The features of the implementation languages used in this research- PHP and MYSQL will be discussed extensively. The system testing strategies, the target computer requirements as well as the software maintenance issues that would arise in the system would be discussed also.

4.2.0 FEATURES OF IMPLEMENTATION LANGUAGES

The programming languages used in the implementation of this project are PHP (Hypertext Preprocessor) and MYSQL programming languages. PHP is a general purpose server side scripting language originally designed for web development to produce dynamic web pages. It has also evolved to include a command line interface capability and can be used in stand-alone graphical applications.

The following features make PHP a preferred implementation language for this project:

i. PHP has its root in C and C++. PHP syntax is most similar to C and C++ language syntax, so programmers find it easy to learn and manipulate.

ii. PHP can run on both UNIX and windows. Hence it is compatible across various operating systems.

iii. PHP has powerful output buffering that further increases over the output flow. PHP internally rearranges the buffer so that the header comes before the content.

iv. PHP is platform independent: this is because it is parsed by the web browser hence compatibility issues do not arise when code written in PHP is ported to a different platform.

v. PHP can be used with a large number of relational database management systems, runs on all of the most popular web servers and is available to many different operating systems.

vi. PHP is fully an object oriented programming language and its platform independence and speed on LINUX servers help to build large and complex web applications.

vii. PHP has also attracted the development of many frameworks that provide building blocks and design structure to promote Rapid Application Development (RAD). Some of these include cake PHP, code igniter, Yii framework and Zend framework.

viii. PHP IDS add security to any PHP application to defend against intrusion. PHPIDS detects cross-site scripting (XSS), SQL injection, header

injection, directory traversal, remote file execution, local file execution and Denial of Service (DOS).

MYSQL is a relational database management system written in C and C++, that runs as a server providing multi user access to a number of databases. MYSQL is used basically to create a relational database structure on a server in order to store data orautomate procedures. The following features make MYSQL also a preferred implementation language in this research:

i. MYSQL is written in C and C++ and tested with a broad range of different compilers. It also functions on different platforms.
ii. It uses multi-layered server design with independent modules.
iii. It is designed to be fully multi-threaded using kernel threads to easily use multiple CPUs if they are available.
iv. It is a server/client system. The database server (MYSQL) and the arbitrary many clients (application programs) which communicates with the server to query data and save changes.
v. MYSQL is designed to make it relatively easy to add other storage engines. This is useful if you want to provide an SQL interface for an in-house database.

vi. It provides transactional and non-transactional storage engines, uses very fast B-tree disk tables with index compression and a fast thread-base memory allocation system.

vii. It executes very fast joins using an optimized nested loop join; implements in-memory hash tables which are used as temporary tables.

viii. It implements SQL functions using a highly optimized class library that should be as fast as possible.

ix. It provides the server as a separate program for use in a client/server networked environment and as a library that can be embedded (linked) into stand-alone applications. Such applications can be used in isolation or in environments where no network is available.

4.3.0 SYSTEM TESTING STRATEGIES

This section is concerned with testing and debugging of the programs and general processes involved in achieving the objectives of the system requirement. System testing is conducted on a complete integrated system to evaluate the system's compliance with its specified requirements. System testing falls within the scope of black box testing and as such should require no knowledge of the inner design of the code or logic. During system testing, the focus is on the software design, behavior and even the believed expectations of the customer.

So, we can also refer to the system testing phase as investigatory testing phase of the software development life cycle. The system testing strategies used in this system include the unit test and integration test.

4.3.1 UNIT TEST

The primary goal of unit testing is to take the smallest piece of testable software in the application, isolate it from the remainder of the code and determine whether it behaves exactly as it is expected to behave. Each unit is tested separately before integrating them into modules to test the interfaces between modules. Unit testing has proven its value in that a large percentage of defects are identified during its use.

The most common approach to unit testing requires drivers and stubs to be written. The driver simulates a calling unit and the stub simulates a called unit. The investment of developer time in this activity sometimes results in demoting unit testing to a lower level of priority and that is almost always a mistake. Even though the drivers and stubs cost time money, unit testing provides some undeniable advantages. It allows for automation of the testing process, reduces difficulties in discovering errors contained in complex pieces of the application. During the unit testing of the application, errors uncovered by the researcher were rectified and the result was satisfactory.

4.3.2 INTEGRATION TESTING

Integration testing is a logical extension of unit testing. In its simplest form, the units that have already been tested are combined into a component and the interface between them is tested. A component, in this sense, refers to an integrated aggregate of more than one unit. In a realistic scenario, many units are combined into components, which are in turn aggregated into even larger parts of the program. The idea is to test combination of pieces and eventually expand the process to test your modules with those of other groups. Integration testing can be done in a variety of ways which include top-down approach, bottom-up approach and the umbrella approach.

In the integration testing of the software, satisfactory results were obtained from the test using the bottom-up approach.

4.4.0 TARGET COMPUTER SYSTEM REQUIREMENTS

This section considers the requirements that must be met by the target system to enable the developed software application function as required.

The target computer system requirement will be discussed in the area of software and hardware requirements.

Component	**Requirement**
Operating system	Windows 2000, XP, Vista
Memory	128MB or higher
Database	MySQL 5
Web server	WAMP server

Table 4.1: software requirement for target computer system

Component	**Requirement**
RAM	256MB of RAM
Hard disk	10GB of hard disk space
Processor	333Hz or higher

Table 4.2: hardware requirements for target computer system

4.5.0 SOFTWARE MAINTENANCE ISSUES

This section focuses on software maintenance issues. Software maintenance is the modification of a software product after delivery to correct faults, improve performance or other product attributes or to adapt the product to a new or changing environment. It also serves as an opportunity to improve the performance o the software to suit the needs of the users if it becomes necessary for the user requirements to be improved upon or changed. Maintenance would be seen in three areas in this research; corrective maintenance, preventive maintenance and adaptive maintenance.

4.5.1 CORRECTIVE MAINTENANCE

Corrective maintenance is a maintenance task performed to identify, isolate and rectify a fault so that the failed system can be restored to an operational condition within the tolerances or limits established for in-service operations. Necessary corrections in the form of removal, modification or addition of program modules should be permitted by the software to allow for optimal use of the application.

4.5.2 PREVENTIVE MAINTENANCE

This is a schedule of planned maintenance actions aimed at the prevention of breakdowns and failures. The primary goal of preventive maintenance is to prevent the failure of software before it actually occurs. It is designed to preserve

and enhance software reliability by replacing error-prone components before they actually fail. Recent technological advances in tools for inspection and diagnosis have enabled more accurate and effective software maintenance. Measures like regular diagnosis, database backups, creating system mirrors preserve the integrity of information stored in the application. If these are strictly followed, limited instances of such occurrences would be noticed in the use of the software application.

ADAPTIVE MAINTENANCE

This involves enhancing the system by adding features, capabilities and functions in response to new technology, upgrades, new requirements or new problems. Since the environment in which the application would be running is dynamic, it should be made to suit whatever requirements that may change in the long run.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 SUMMARY

The aim of this research is to create a project management system which will make project management in organization more flexible and reliable. The existing types of project management were discussed and it was narrowed down to client project management which is the main thrust of this project. The history of project management where highlighted. Principles of project were outlined. The system design was made suitable to the system requirements. Embedded in the system design is activity diagram which shows the activities and actions in the system. The implementation of the software was successful.

5.1CONCLUSION

Project management System improves business activities in large, medium and small enterprise. Hence it is advised that all companies in Nigeria should adopt a project management system which more reliable, flexible and result oriented. The resulting software would be of benefit to individuals who which to manage a project and all form of business enterprise. The software has been able to meet its objectives and will make project management more successful. The software must provide reliable and accurate information that will enable the project team to perform their tasks efficiently and effectively. It is not the complexity of the

software that matters but the quality of the information generated by the system and the ability of the user to use the information to manage the project. This information helps the users/ project managers to perform their tasks in a much professional manner. When tasks are best performed project success is achieved. It is recommended that organizations should adopt the use of PMIS in the management of their projects. PMIS guarantees better management of project since it generates quality information needed for the management of the project.

5.2 RECOMMENDATIONS

The software developed for the implementation of this research can be used by any insurance company other than Pentouch Academy, Uyo. The following recommendations are proposed:

1. Team members should ensure to work on the system daily and check for necessary info pass by message on each project five times a day.
2. Admin should create passwords with long characters so as to make password hacking difficult.
3. System users should ensure safekeeping of password since it provides access to the system.
4. System client should login from time to time to see the progress on his or her work.

REFERENCES

Atkinson, R. (1999). Project management: cost, time and quality, two best guesses and a phenomenon, it's time to accept other success criteria. International journal of project management, 17(6), 337-342.

Bent, James. *Project Management for Engineering and Construction.* Englewood Cliffs,NewJersy, Prentice Hall, 1989, p. 2.

Bertalanffy, L. 1988. General systems theory. Braziller: New York

Blackboard Inc. (2013) "Blackboard", URL: http://www.blackboard.com/.

Bremer, D, Bryant, R. (2005) A Comparison of two learning management Systems: Moodle vs Blackboard, Proceedings of the 18

Cadle, J., & Yeates, D. (Eds.). (2004). Project management for information systems. Pearson education.

Carly, Lauren. *Project Management Primer*. Bureau of Reclamation, 2004, p. 2.

Carly, Lauren. *Project Management Primer*. Bureau of Reclamation, 2004, p. 2.

ClockingIT.com (2008) . ClockingIT free time-tracking hosting, URL: http://www.clockingit.com/

Conboy, K. (2010). Project failure en masse: a study of loose budgetary control in ISD projects, European Journal of Information Systems, 19(3), 273-287.

Coy, W. (2004). Between the disciplines, ACM SIGCSE Bulletin 36 (2): 7–10. doi:10.1145/1024338.1024340.

Crowther, J. et al. eds. 1995. Oxford advanced learner's dictionary: international students' edition. London: Oxford University Press.

Dougiamas, M. & Taylor, P. C. (2003). Moodle: Using learning communities to create an open source course management system. Proceedings of the EDMEDIA 2003 Conference, Honolulu, Hawaii, .

Ehlers, L.I. 2002. A validated approach to South African labour relations system. PhD thesis. University of Pretoria

French, W.L. and Bell, C.H. 1978. Organization development. New Jersey: Prentice Hall

Global Water Partnership 2009. A handbook for integrated water resources management in basins. Stockholm. Global Water Partnership

Goyal, D. P. (2012). Business alignment and critical success factors in information systems implementation: an empirical analysis of

Haralambos, M., Holborn, M. 2000. Sociology: Themes and Perspectives. 5th ed. London: Collins Educational

Hardcastle, E. 2008. Business information systems. Ventus Publishing Aps. Accessed at www.bookboon.com

Heagney, J. (2011). Fundamentals of project management. AMACOM Div American Management Association.

Higgins, E., Taylor, M., & Francis, H. (2012). A Systemic Approach to Fire Prevention Support, Systemic Practice and Action Research, 25(5), 393-406.

http://en.wikipedia.org/wiki/systemstheory

Iden, J., Tessem, B., & Paivarinta, T. (2012). IS development/IT operations alignment in system development projects: a multi–method research, International Journal of Business Information Systems, 11(3), 343-359.

Kerzner, H. R. (2013). Project management: a systems approach to planning, scheduling, and controlling. John Wiley & Sons.

Korpela, M., A. Mursu, A., & Soriyan, H. A., (2002). Information systems development as an activity, Computer Supported Cooperative Work (CSCW), 11(1-2), 111-128.

Kroenke, D. (2008). Experiencing MIS. Prentice-Hall, Upper Saddle River, NJ.

Mingers, J. (2003). The paucity of multimethod research: a review of the information systems literature, Information Systems Journal, 13(3), 233-249.

Petersen, K. (2011). Measuring and predicting software productivity: A systematic map and review. Information and Software Technology, 53(4), 317-343.

PMI, (2000). A Guide to the Project Management Body of Knowledge. PMI Publishing Division, The Project Management Institute, Sylva, NC.

Project Management Institute. *A Guide to the Project Management Body of Knowledge:PMBOK® Guide*, 3rd Edition. Newtown Square, Pennsylvania, Project Management Institute,2004, pp. 9-10.

Project Management Institute. *A Guide to the Project Management Body of Knowledge:PMBOK® Guide*, 3rd Edition. Newtown Square, Pennsylvania, Project Management Institute,2004, p. 8.

Project Management Institute. *A Guide to the Project Management Body of Knowledge:PMBOK® Guide*, 3rd Edition. Newtown Square, Pennsylvania, Project Management Institute,2004, p. 16.

Project Management Institute. *A Guide to the Project Management Body of Knowledge:PMBOK® Guide*, 3rd Edition. Newtown Square, Pennsylvania, Project Management Institute,2004, p. 37.

Project Management Institute. *A Guide to the Project Management Body of Knowledge:PMBOK® Guide*, 3rd Edition. Newtown Square, Pennsylvania, Project Management Institute,2004, p. 5.

R. Clement and P. Bounds (2013). Making Connections between Final Year Students and Potential Project Supervisors, Proceedings of the HEA STEM Learning and Teaching Conference.

Rockart, J. F. & Hofman, J. D. (1992). Systems delivery: evolving new strategies. Sloan Management Review, 33(4), 21

Siles, R. 2004. Project management information systems: guidelines for planning, implementing and managing a DME project information system. Care International

Standish Group, (1995). Chaos report on Application Project Failure and Success, Standish Group, Retrieved from www.standishgroup.com/chaos.html.

Unal, Z., and Unal, A. (2011). Evaluating and comparing the usability of web-based course management systems. Journal of Information Technology Education, 10, 19- 38

Yeo, K. T. (2002). Critical failure factors in information system projects, International Journal of Project Management, 20, 241-246.