CHAPTER 51

DEVELOPMENT OF AN INFORMATION AND DATA COORDINATION SYSTEM FOR SUSTAINABLE DEVELOPMENT

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Introduction

Sustainable development is critical to ensure the future of humanity (Kostoska, 2019). More and more companies are significantly introducing enterprise resource planning (ERP) systems to secure enterprise resources for effective distribution and provide accurate data for sustainable development in enterprise. (Huang et al., 2019). Businesses and technology play an important role in the global economy, where the achievement of sustainability goals has a positive impact on society and companies. In this regard, there is a need to integrate information technology and sustainability to enable companies to act in a greener manner. Knowing that the Enterprise Resource Planning (ERP) system is one of the most powerful business solutions for companies, it is crucial to align its use with sustainability elements through the use of green information technology (IT). (Ursacescu et al., 2019) .

Conceptual Clarification

Enterprise

An enterprise is 'any entity engaged in an economic activity, irrespective of its legal form Günter Verheugen, (2005). Enterprise is a collection of entities (systems) assembled towards achieving shared goal(s). The design of information for an enterprise, therefore, must recognize interconnections of information among components of its various entities. The outcome of this design process is integrated information systems, a distinct shift from disjoint functional information systems.

Resource

A resource is basically any item that can be used. Examples of resources in ICT include printers, disk drives, and other such devices. In many operating systems, including Microsoft Windows and the Macintosh operating system, the term resource refers specifically to data or routines that are available to programs they are also called system resources (webopedia.com).

Planning

Planning refers to the process of deciding what to do and how to do it (Todd Litman, 2011). It is also the psychological process of thinking about the activities required to create a desired goal on some scale. As such, it is a fundamental property of intelligent behaviour. This thought process is essential to the creation and refinement of a plan, or integration of it with other plans, that is, it combines forecasting of developments with the preparation of scenarios of how to react to them.

Enterprise Resource Planning (ERP) Enterprise Resource Planning is a strategic activity for planning and monitoring all of the resources of a manufacturing company, including that of manufacturing, marketing, finance, and engineering functions (Rao,S.S., 2000).

ERP represents application of integrated information systems concepts to the manufacturing resources planning (MRP-II) model. It is a management system with planning and scheduling capability offering gains in productivity, customer service, inventory turns and reduction in material costs (Ng et. al., 1998).

The framework of an Enterprise Resource Planning System developed based on the project life cycle approach, in which the ERP implementation project goes through different phases before it goes live. According to (Shehab & Spedding, 2004) enterprise resource planning (ERP) system is a business management system that comprises integrated sets of comprehensive software, which can be used, when successfully implemented, to manage and integrate all the business functions within an organisation. These sets usually include a set of mature business applications and tools for financial and cost accounting, sales and distribution, materials management, human resource, production planning and computer integrated manufacturing, supply chain, and customer information (Boykin, 2001; Chen, 2001; Yen et al., 2002). These packages have the ability to facilitate the flow of information between all supply chain processes (internal and external) in an organisation (Al-Mashari and Zairi, 2000a).

Methodology

The Approach

The constructive method has been used for these research due to the objective which is to design and develop a new solution for a practical problem which was built based on existing systems and techniques, the method is aimed at producing novel solutions to practically and theoretically relevant problem

Requirements Analysis and Design

This section concentrates on formulating the system designing requirements analysis, and software requirements analysis. UML diagram was used to discuss the architecture and functionality of the system.

System requirements analysis

"Requirements can be predefined set of system functions, attributes and development stages as a specification of what should be accomplished during the development process." These requirements describe the system behaviour and implementation phase of a system (Sommerville and Sawer, 1997) these are used to depict the features and functions that are needed for a specific research. Hence, this depicts the need to define and analyse the system requirements from the start of the designing system. For this research, the functional requirements are solely dependent on user requirements. A successful system begins with an understanding of the needs of the users. The method for analysing user requirements includes the following four elements as illustrated in the figure below which include information gathering, user needs identification, envisioning and evaluation of the user needs, and final requirements specification decision.
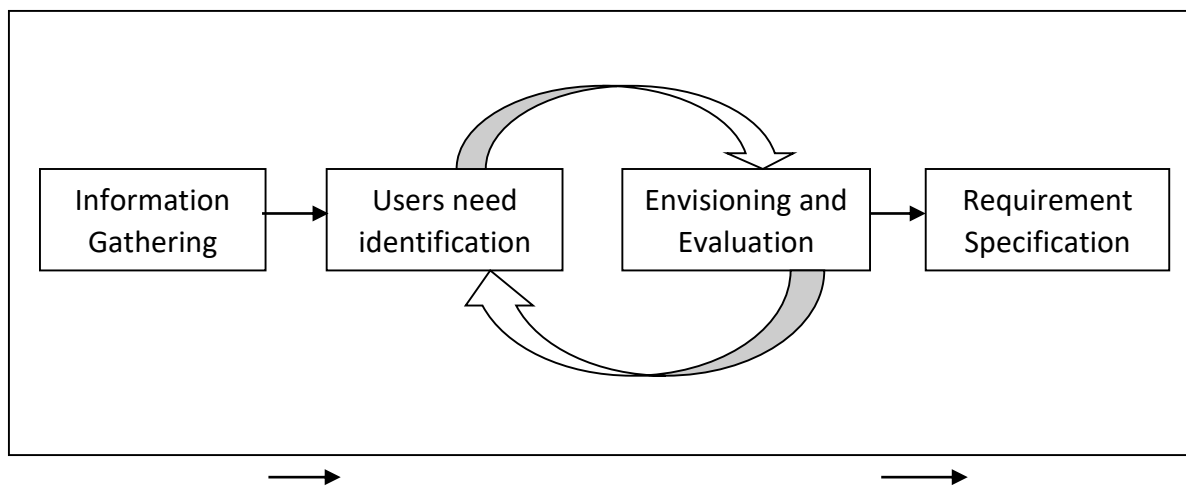

Fig. 1: Analyzing user requirement process (Maguire and Bevan 2002.)

Therefore, it is necessary to design the user requirements to determine the success of the resulting system. User requirements are essential to illustrate the usability in order to be able to design functional requirements for the system. According to (Kotonya and Sommerville 1998) another kind of prerequisites alludes to certain highlights about the framework itself, and how well it plays out its capacity. These necessities are regularly called non-practical prerequisites. Non-functional prerequisites characterize the overall characteristics or traits of the developed framework.

Likewise, they place limitations on the developed system, specify other constraints the framework must meet. Non-functional prerequisites comprise safety, security, reliability, usability, and achievement of the performance requirement. The usability of the system is represented how readily it is accepted by users. The email systems are established as a prime method of communication for companies' or individuals' use that is quicker and cheaper than other traditional methods.

Enterprise resource planning framework is the framework of an Enterprise Resource Planning System developed based on the project life cycle approach, in which the ERP implementation project goes through different phases before it goes live.
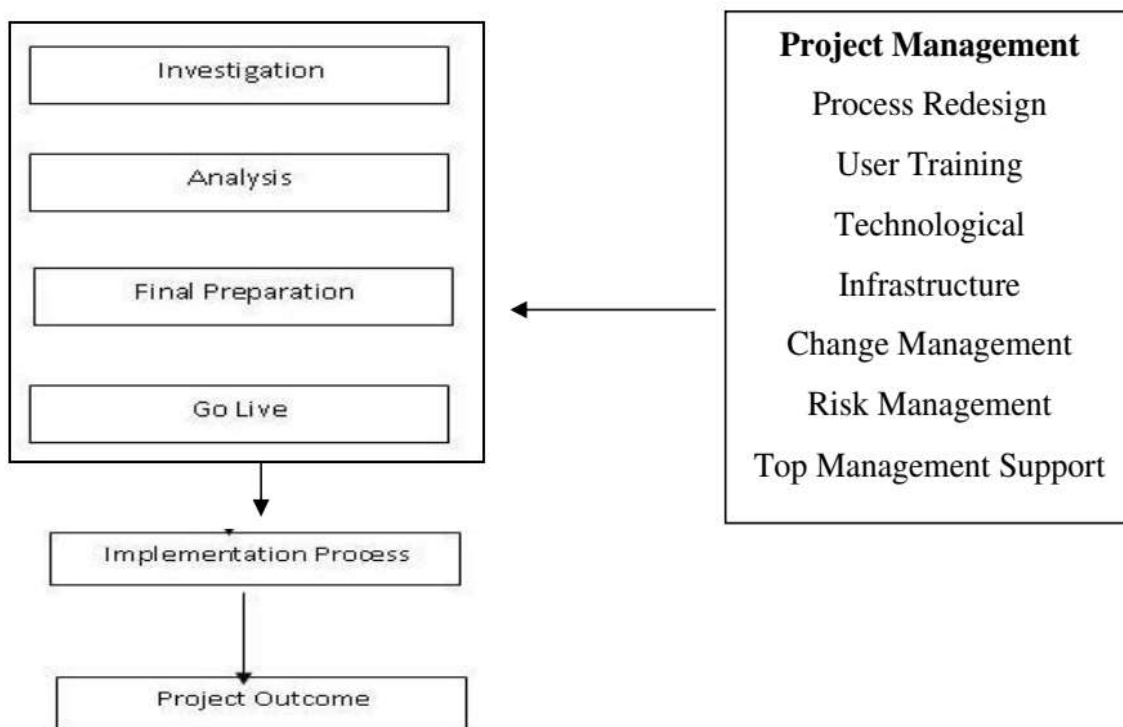

Fig. 2: Enterprise Resource Planning System implementation framework

Architecture and functionality of system

The architecture and functionality of the system representation was carried out by using the UML. This diagram used to depict the functionality of the system.

Use case diagram of the developed system: The Use Case Diagram shows the general image of users and their activities in the created ERP Information Coordination Portal. It comprises of the following inquiry:

Who are the individuals who will utilize the system? What kind of data can each user access?

Who performs what work?

The Use Case chart below is drawn based on the responses to the inquiry above.

Fig. 3: Use Case diagram of the Enterprise Resource Planning Information Coordination Portal (Oyerinde I. M, 2013)

Actors in the system are: Vice Chancellor, Registrar, Bursar, Librarian, Dean, Heads of Department, other staff. The Enterprise Resource Planning Information Coordination System was designed using the following basic components in the Figure below:
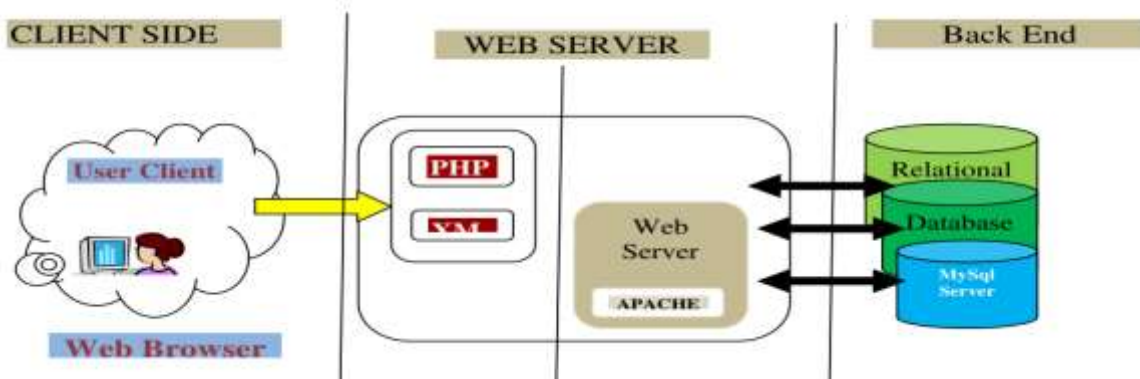
Fig. 4: The three-tier architecture of the ERP Information Coordination System

i.   Web Server (Apache): this is a computer which holds the web page and makes it available on the internet. Anytime a webpage is requested through an internet browser the web server responds to the request by searching for and locating required information.

ii.   Server side: a collection of the programme, listens for client requests that are transmitted via the communication network. Servers perform actions such as database queries or reading files. Server processes typically run on dominant PCs, workstations (Kumar, 2019).

iii.   Client Side: everything in a web application that is displayed or takes place on the client (end user device). This includes what the user sees, such as text, images, and the rest of the UI, along with any actions that an application performs within the user's browser.(Serverless, 2020). Client side script is used for client side validation and other operations like drop down menus, moving fonts. Examples of the Client Side Scripting language are: Java Script, CSS, XSL.

iv.   Relational Database: A relational database uses relations, or two-dimensional tables, to store the information needed to support a business. A relational database is a collection of data items organized as a set of formally described tables from which data can be accessed or reassembled in many different ways without having to reorganize the database tables.

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System Requirement

The hardware and software for running the ERP system are listed below.

Hardware Requirements

Intel Pentium III or faster processor, 20 GB disk space and 512 MB RAM

Software Requirements

Window Vista, window XP professional

Server Configuration

This section highlights the hardware and software requirement for running the ERP server application. These include Apache /2.2.4 (win 32) (web server) 5.2.1, My SQL 5.0.27Tools used, PHP my admin 2.9.2 and SQL Lite manager 1.2.0.

Hardware Requirement

RAM: 512 MB recommended and 5 GB free space on hard disk.

The Developed System Login page

This interface presents the Login page of the Information Coordination System. Here the client can login in with his User name and Password which would have been assigned by the administrator. A client can login on any system that has the ERP Information Coordination Portal installed on it anywhere in the organization.

Home page of the designed system

This interface is the Home page of the user which has a list of the modules that a user has access to and a list of announcements that is posted for all members of the institution to view. It also has a link to all the received messages which includes memo, reports, and announcements.

Compose Memo page

This interface is, where a client can send information to users with the sender's name fixed is shown as the user who signed in to the system and the receiver can be chosen dependent on either the unit or department or to a person's (users) name.

Conclusion

The Enterprise Resource Planning System for Information Coordination has been successfully developed for smooth and faster means of information sharing in higher institutions. The modelled system has several modules, which can send various types of information. It can be accessed by any member of staff who has a username and password which is assigned by the administrator. The evaluation of the enterprise resource planning system for information coordination was carried out to determine the relevance of the research to the means of information coordination and dissemination.

The accessed evaluation was dependent on users' assessment as far as simplicity of usage, dependability, and relevance of the system. a 5-point Likert rating scale was cultivated by controlling a poll on the developed ERP system. A Likert rating scale is psychometric scale usually utilized in polls and is the most generally utilized scale for research. The following was the evaluation of the system performance. The evaluation metrics of the system was summarized as follows: System Degree of Relevance (SDR), System Reliability Index (SRI) and System Ease of Usage (SEU) were formulated to evaluate the system with values 3.83, 4.05, and 3.41 respectively (Oyerinde I. M, 2013).

The Enterprise Resource Planning System for Information Coordination has reduced the use of paper which will eliminate waste materials that end up polluting the environment.

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