

Quality assurance of project management information system with ISO 9126

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ARTICLE INFO

Article history

Received June 11, 2021

Revised July 1, 2021

Accepted July 28, 2021

Keywords

Information system

Project management

ISO 9126

ABSTRACT

Information systems are a combination of information technology and the users' activities to support operations and management. Companies need information systems to improve their business processes. Companies do not want to be left behind by their competitors. One of them is a property developer, where companies need a project management information system. Hope after the creation of this information system will make the company can run the transaction process step by step. With the use of the application compared to the manual, the application can assist companies in carrying out the process in a structured manner and makes it easier for companies to know the profit/loss of a project, and certainly helps companies make reports easier. Making an application must be perfect; there are no errors or bugs. Therefore, this study uses ISO 9126 and sub characteristics to implement and evaluate applications. There are six characteristics of software quality measurement in ISO 9126, namely functionality, efficiency, portability, usability, maintainability, and reliability. This paper only focuses on functionality. 4 types will be discussed in functionality: suitability, accuracy, interoperability, and security.

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1. Introduction

In the era of globalization, there is much competition to lead businesses in companies. All competitions require a valid information system to be used by management to make the right decisions to decide rights and improve company performance. The existence of a precise and accurate information system can reduce problems and unwanted errors to increase performance more efficiently and quickly [1], [2]. Information systems are one of the most relevant components of the current business environment. They offer great opportunities for success for the companies, given that they can collect, process, distribute, and share data in an integrated and timely manner [3]. In this context, Information systems are essential tools that can contribute to the project's success, in the sense that they can help plan the work, make a report, facilitate the control, help the company run the business process step by step [4]. The information system that we want to discuss in this research is a project management information system.

Project Management defines projects as a short-term endeavor undertaken to create a unique product or service [4]. This study creates a project management information system (PMIS) implemented in the property development company. The program and the projects: cost, time, scope and quality. The team consist of people, organizations and roles, which helps manage agreements: contracts, permits, approvals and commitments. It manages documents, produces standard and custom reports, and presents vital signs on dashboards. It guides collaboration and communicates best practices with policies, workflow diagrams, and document management [5], [6].

Ensuring the quality of IS is seen from the regulation and management and refers to strict standards. Through measurements and metrics, industries that discuss software will examine services and products that meet the requirements. Software quality is a critical issue, especially for companies in the current rapid changes in the software development industry. Evaluating software quality is beneficial during the development process because developers provide excellent, high-quality software for companies. In this paper, ISO 9126 is extended with the specific characteristics of the PMIS product. ISO 9126 is a model of quality characteristics of the software used to: discuss, plan, and evaluate the quality of software products. It consists of the following six characteristics: functionality, reliability, usability, efficiency, maintainability, and portability. It includes measures to measure the degree of each quality attribute of the product that can be achieved [7], [8], [9].

2. PMIS and ISO 9126

As long as organization information systems are under development, project management information systems prove their position as an effective tool for success. Many of the characteristics of these systems are still unknown. Using PMIS to manage projects is not enough, but it is essential as it plays an essential role in the success of the companies. Since human activities affect the results of information systems, measuring the success of information systems and their impact on the success of the projects is a complex task. Project Management Institute found that project management information systems are tools and techniques for the distribution of all the information in projects [10].

Similar to other information systems (IS), a successful PMIS should also have individual impact on the satisfied user and practical use. Nevertheless, a successful PMIS should also have organizational impacts, that is, impact on project success in terms of respecting budget, schedule, and specifications. At the same time, PMIS is increasingly used by project managers in all industries, contributing to project success [11].

ISO 9126 is a necessary standard and is used by every researcher for Quality Assurance software. The idea is to renew and determine each software product's internal and external quality and supported by quality attributes. In ISO 9126, the totality of attributes into the tree structure of tree characteristics and sub-characteristics. It determines six characteristics: Function, change, Use, Efficiency, Maintenance, Portability, which are further divided into 21 sub-characteristics [12], [13], shown in Fig. 1.



Fig. 1. The ISO/IEC 9126 Model [14]

3. Method

The study involves end-users and the development team, Quality Assurance (QA), top management, and business analysts. The purpose of the UAT is to increase the trust of software users according to their functions. UAT is the solution approval process used for users, is not about verifying that the software did not crash, and meeting its function requires ensuring that the solution will work for the user [15], [16].

The method used in this study is ISO 9126. Researchers use quality characteristics and sub-characteristics to evaluate PMIS, there are six characteristics but this paper only focuses on functionality. Functionality is all functions; system attributes to meet user requirements. There are 4 types of sub-characteristics of functionality: suitability, accuracy, interoperability, security. From the suitability, we know whether PMIS can run according to the needs of existing users. Accuracy, we know whether the function of PMIS is by the needs of existing users. Interoperability, whether the system can interact with other systems. Security, whether the system can protect their own data/ can unauthorized user access the system. All characteristics and sub characteristics have been summarized in Table 1.

Table.1 ISO 9126 Functionality Characteristics

Characteristics	Sub-characteristics	Description
Functionality	Suitability	Can PMIS run according to the needs of existing users?
	Accuracy	Are the function of PMIS is by the needs of existing users
	Interoperability	Can PMIS interact with other systems?
	Security	Can PMIS protect their data/ can unauthorized users access the system.

4. Results and Discussion

It can be seen from Fig. 2 shows the General Process Project Management Information System. The first step in the primary process is working with the company. Collaboration with companies is carried out through auctions. Contracting companies will compete to get their customers. When the company has got its customers, the company will immediately build an existing project. Through PMIS, the owner will immediately input all existing customer data. In addition, the owner will immediately take care of all existing permits starting from construction, land, etc. The owner will immediately schedule after the permission is available. Scheduling will be carried out on all existing processes, starting from the design to the field. After the scheduling is done, the owner will input the needs of all project owners through the application. The owner will check the warehouse for project needs. If the goods are not enough, the warehouse will immediately notify the supplier that the company needs the goods for the project. The supplier will immediately respond to the notification and send all goods to the warehouse. If the warehouse has received all the goods, the warehouse will immediately input the items that enter the warehouse. The owner will immediately check whether it is as ordered. If it is suitable, then the owner will input all employees in each division. After inputting all needs, the owner will be able to find out the profit in the project

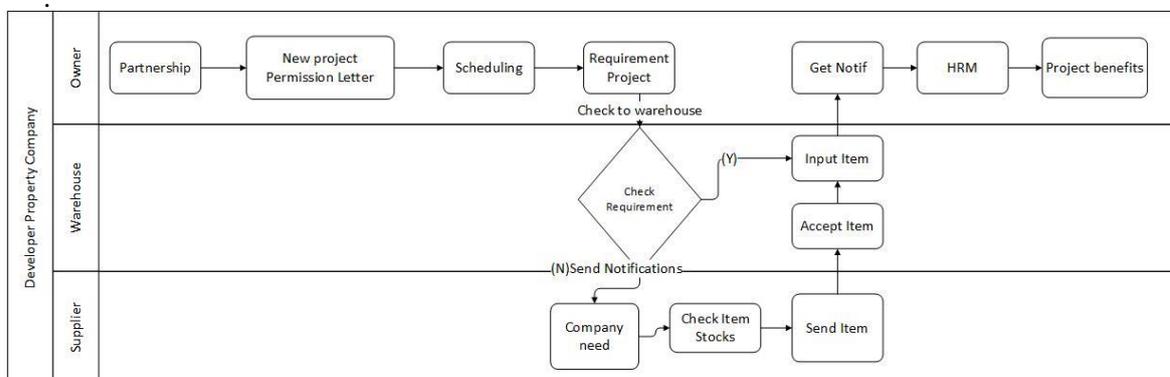


Fig. 2.General Process Project Management Information System

Based on the needs of the organization of the general process and use cases and activity diagrams that have been conveyed before, the application project management consists of Account Module, Stock Module, Project Module, Project Material module, Project Profit Module, and Order Module

The account module contains all the master data accounts in the application, consisting of a data warehouse and supplier parts. The stock module contains all the stock in the warehouse, but the warehouse person fully manages all goods in the warehouse. The owner only gets notifications of items in and out. The project module contains the new project to be created, schedule, and requirements. The project material module contains all materials used in a project. The project profit module contains all the profits that exist in the project that has been done. The order module is all data in the project that has been done.

The account module starts with the owner checking all master data; the owner can make two types of accounts: warehouse and supplier. The owner can CRUD all account data, like e-mail, and phone numbers. The owner can make the record of the account by pressing report print.

The inventory module starting from all items in the warehouse will be deleted. The warehouse owner and can update all items. However, all goods in the warehouse are managed entirely by the warehouse. The owner can check all items and can make a report. This module will connect to the warehouse. Every warehouse updates incoming/outgoing goods may update the connected module.

The project module starts with entering the project name and project date. All project data is fulfilled in this module, from the schedule, employees, and issued design. The owner inputs all data needed for the project. The final result of this module is the reports and profits that exist on the project.

The project material module starts with all the materials used in each project. The proposed module consist of projects that have been carried out and have already been carried out. The owner can correct the material added during the module project.

The project profit module starts with all profits earned by each project. The proposed module will consist of projects that have been carried out and have already been carried out. Profits and published will be written entirely in this application.

Table.2 Evaluation of Login Module

Test Case	Test Steps	Expected Result	Actual Result
The login page appears when the PMIS application is run	Input to the textbox: asdfgh or ASDFGH 12345678 !@#%\$^&*()_+(+ Space)	The textbox can show capital, number, and special character.	The textbox succeed show capital, number, and special character.
Login as owner after PMIS run, ID: hadisan Password: 123123 Admin account already registered in the system	Input hadisan to ID textbox Input "123122" to password textbox Click OK	The textbox can show "Wrong password"	The textbox succeed show "Wrong Password"
Login as owner after PMIS run, ID: hadisan Password: 123123.	Input hadisan to ID textbox Input "123123" to password textbox Click OK	User "hadisan" as owner go to main menu module and change mr/mrs... to Mr. Hadi	User "hadisan" as owner succeed go to main menu module and change mr/mrs... to Mr. Hadi
User hadisan exit from main menu page, click button "logout" and back to login page.	Click button "Logout"	Back to login page.	Succeed go to login page.

After doing the test planning, the next step is to implement it with a mechanism or process that has been established. The software testing process is one part of the software development process in outline. There are 4 test cases in the login module, input textbox, message error, login account, and logout. All four test cases are successful and match the actual result. Test cases are carried out according to the four sub-characteristics of functionality.

First suitability, PMIS can run according to the needs of existing users. As in Table 2, PMIS succeeds runs according to the user's textbox type. Second, accuracy, can the function of PMIS is following the needs of existing users. As in Table 2, PMIS shows "wrong password" because the user entered the password is incorrect. Third interoperability, can PMIS interact with other systems. As we can see in Table 2, PMIS succeed in changing Mr./Mrs. ... to Mr. Hadi depends on the user who is logged in. Fourth security, can PMIS protect their own data/ can unauthorized user access the system. As we can see in Table 2, PMIS succeed to logout account.

5. Conclusion

In this era, there is much competition between companies and other companies. One of them is information systems, which are critical in the company today—information systems needed by the company to make it easier in the company's business processes. If a company not using information systems, companies will be inferior to companies that use information systems. However, testing is needed for the application to convince the company to get a sound information system. The method used in this study uses ISO 9126 with approval for function characteristics, with four sub characteristics of conformity, accuracy, interoperability, and ultimate safety. The module tested is a login module hoping that the company will get higher knowledge about the application and know its quality.

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