

Prototype KMS with Quality Function Deployment Method: a Case Study at Z Software House

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Abstract—The management of human resource development in Z software house is done in several ways, starting from new recruitment process, employee training, employee placement, employee development, and employee retention. After the training process, the following issues were found: First, the lack of enthusiasm of experienced senior employees on issues facing new employees. Second, after 1 week of basic training, the challenge faced by the new employee was identified and the impact of client satisfaction was not achieved. And finally, K does not yet have the media to share knowledge. The results of the model research yield the priority of making KMS prototype, such as: background of dominant white website, dominant black base font, preferably available dashboard menu, input your knowledge, approval knowledge, graphics, dominant head blue sea, black dominant menu, sea. The test result using UAT stage 75% with good result. This result is seen based on the criteria of functionality related to menu availability and recording employee knowledge. Menu related efficiency based on authorization level, and ease of progress update knowledge, interesting presentation of graph reports and easy access to various platforms.

Keywords: Knowledge Management System, Model Quality Function Deployment, User Acceptance Test

1. INTRODUCTION

The high competition of Information Technology (IT) business requires companies to implement business processing strategies and business process efficiency. Failure in IT projects, prompted many software development companies to implement project management. The lack of documentation on previous projects requires that the project team re-analyze the problems occurring, which in turn leads to the project timeline and the inefficiency of the project's operational budget (Panjaitan & Lupiana, 2023).

In Indonesia, the number of the labor force based on the National Labor Force Survey (Sakernas) in February 2024 was 149.38 million people, an increase of 2.76 million people compared to February 2023. The Labor Force Participation Rate (LFPR) increased by 0.50 percentage points compared to February 2023. In February 2024, as many as 58.05 million people (40.83 percent) were employed in formal activities, an increase of 0.95 percentage points compared to February 2023. The percentage of underemployment in February 2024 increased by 1.61 percentage points, while part-time workers decreased by 0.73 percentage points compared to February 2023 (BPS, 2024). Of the total percentage of Indonesia slow-importance of the transfer of knowledge. One effort that can be done by the software developers in Indonesia is to apply knowledge management. In the routine that occurred in the company found the following problems: First, not yet optimal transfer of knowledge that is in the company due to low awareness of senior employees in terms of transferring knowledge owned to junior employees. Second, when an employee has exhausted his / her term of office, then the knowledge of the employee will be lost. This will be detrimental to the company because the employee replacement will experience the process starting from scratch again in gathering knowledge and experience. Not a lot of this process takes a long time, which should work on the software project can be completed more quickly. Third, when the occurrence of employee movement, the employees have difficulty in carrying out their duties, because the knowledge of employees who served before when on duty has not been documented and still in the minded employees. Fourth, after the process of providing basic training for 1 (one) week, identified the challenges faced by new employees so that the impact of not achieving client satisfaction.

A Knowledge Management System (KMS) is designed to support the collection, storage, management, and distribution of knowledge within an organization. KMS aims to enhance organizational efficiency and effectiveness by ensuring that relevant knowledge is available to individuals who need it at the right time. According to (Alavi & Leidner, 2001), KMS involves four main processes: knowledge creation, storage/retrieval, transfer, and application (Abu-Alsondos, 2023).

Integrating KMS with QFD in software development aims to leverage existing knowledge to better meet customer needs (Ekastini & Aslamiyah, 2024). In this context, KMS can be used to manage information about customer needs and technical solutions, while QFD helps convert that information into clear and implementable product specifications. This can enhance the final product's quality and customer satisfaction (Damos Yoshua Romario Hutagalung, Argaditia Mawadati, 2023).

In the case study at Z Software House, the implementation of a KMS prototype with the QFD method shows how well-structured and managed knowledge can be integrated into the product development process (Muchamad Bachram Shidiq et al., 2023). This study outlines the steps taken to identify customer needs, manage relevant knowledge, and apply the QFD methodology to develop a software solution that meets those needs (M. R. Kusuma et al., 2023). The study also evaluates the effectiveness of this approach in improving product quality and customer satisfaction.

Based on exposure to the above facts, it can be concluded Z software house not have a medium to share knowledge of the entire process of project management. From the results of identification and analysis, the writer tries to propose a design of KMS prototype model suitable to be implemented in Z software house. In performing KMS analysis and design, the author uses Quality Function Deployment (QFD) model and tested by User Acceptance Test (UAT).

Based on the analysis outlined in the background, it is concluded that the identification of the problems that become the reference and need special attention is as follows: Firstly, not yet optimal transfer of knowledge that is in the company due to transferring knowledge owned to junior employees. Secondly, when an employee has expired his tenure, then the knowledge of the employee will be lost. This will be detrimental to the company because the employee's substitute will experience the process starting from scratch again in gathering knowledge and experience. Thirdly, occurrence of employee movement, the employees have difficulty carrying out their duties because the knowledge of employees who served before when on duty has not been documented and still in the minded employees. Identify the challenges faced by new employees so that the impact does not achieve client satisfaction.

2. RESEARCH METHODOLOGY

2.1 Knowledge Management System

Understanding knowledge management system proposed by (Mubarok & Sasongko, 2023) in the form of dynamically enhanced knowledge from time to time. Knowledge in effective KMS is never completed because changes in the environment and knowledge must be updated to reflect these changes.

2.2 Quality Function Deployment (QFD) Model

QFD is used to improve understanding of customers and to develop products, services and processes in a way that is more customer-oriented (Pasaribu et al., 2023).

The following describes several service quality dimensions in the QFD model (Setia & Nopiyani, 2023):

- a. Tangibles, is the physical aspects of the service, including the appearance of physical facilities, equipment, personnel and communication services.
- b. Reliability, is the ability to provide services as promised, fast and accurate to the customer.
- c. Responsiveness, is the willingness to serve customers by providing services that are fast and responsive.
- d. Assurance, that is the ability, knowledge and courtesy to generate trust and confidence to the customer.
- e. Empathy, is the willingness to give individual attention to the customer.

2.3 Matrix House of Quality

The Matrix House of Quality (HoQ) is the best known form of QFD representation (Septian & Satoto, 2024). This matrix consists of two main parts, the horizontal part of the matrix that contains information and relates to the customer and is called the customer table, the vertical part and the matrix contains the technical information as a response to the customer input and called the technical table.

2.4 Methode Prototyping

Prototyping method is a mechanism to identify the needs of the software to be produced (Evrta, 2023). This prototyping method between developers and customers can interact and exchange ideas during the system development process (Prasetyo & Bindas, 2023).

2.5 Study Overview

The study review contains descriptions of theories, findings and other research materials derived from reference materials to serve as the foundation for research activities.

(Saleh et al., 2023) This research is titled "Planning to improve the quality of public services using servqual and Quality Function Deployment integration". In this research it is argued that customer involvement in infrastructure maintenance activities is a complex process due to various parameters of decision making (Ramadhan et al., 2023). With reference to maintenance basics in manufacturing and other discipline sciences, QFD can help users who have dynamic needs considering changes in the environment around them. The dynamic thing is overcome with repeated surveys and short interviews, indicators that can predict customer response can be valuable tools to help the QFD decision-making process (Zalynda et al., 2023).

2.5 Research Concept

The occurrence of repetition of activities and similar analysis on projects that require the project team to re-analyze the problems that occur so that sometimes leads to the timeline of project and inefficiency of project operational costs. It can be underscored that the initial conditions of each existing problem have an adverse effect on the unorganized science in project management and also some of the problems that often occur in project management in software development firms to be used as research objects (Panggabean, 2021). Then after the initial conditions are identified, a problem is formulated from the problem. To answer the problem formulation, used some research methodology in the form of QFD model with data collection method of Voice of Costumer and interview and questionnaire stage so as to produce requirement and output design system and impact the presence of knowledge management system (D. Kusuma et al., 2024). It is then incorporated in the form of KMS prototype application which is the solution at the root of the existing problem so it is expected to be used in the process of project management so that the result of project implementation can support the creation, transfer and application of KMS prototype application and help improve the effectiveness of employee performance of Z software house(Margaret et al., 2023).

3. RESULT AND DISCUSSION

3.1 Methods

All paragraphs must be indented. All paragraphs must be justified, i.e. both left-justified and right- justified. With qualitative method will condition of knowledge management at K at this time and conducted analysis of the factors that influence the formation of knowledge management. Z software house has 220 employees, and will be surveyed by taking samples. Here's the calculation using Slovin formula:

$$n = N / (1 + N e^2) = 220 / (1 + 220 \times 0,10^2) = 68,75 \approx 69. \tag{1}$$

Information:

n: number of samples

N: number of population

e: limit tolerance error (error tolerance)

Thus, the required number of samples is 69 employees. The number of respondents will be 69 employees will be divided into 64 employees based on questionnaires, and 5 employees based on question and answer by direct interview method in 5 division representatives (implementer, software developer, software designer, software maintenance and quality assurance).

3.2 Discussions

Based on the data that has been collected and Analysis of research techniques, the authors analyzed the data to be made into a prototype model of knowledge management system, then the steps that are defined at the beginning are the characteristics of the respondents. From the data obtained, the characteristics of respondents can be seen in the following table:

Table 1. Profile Knowledge Expert

Based on Profile	Remark
Working Period	>4 Years
Grade	Minimum Supervisor

Table 2. Profile Respondent

Based on Profile	Remark	Total	% From 69 Respondent
Gender	Male	39	56%
	Female	31	54%
Delegation of Division	Implementor	32	46%
	Software Developer	15	21%
	Software Maintenance	18	26%
	Software Desainer	8	11%
	Quality Assurance	11	16%
Working Period	1 Year	16	23%
	2 Years	30	43%
	3 Years	16	23%
	>4 Years	8	11%

After determining the characteristics of respondents and preparing the data of respondents, the authors continue this research to the analysis of the results of observation.

3.3 Analysis of User Needs

Based on the general analysis of the activities undertaken at each stage of the project implementation in the software development company, it can be identified as described in the following table:

Table 3. Analysis of User Needs

No	Requirement	QFD Criteria	Impact of KM
1.	Priority needs analysis of the menu that becomes the basic requirement in making prototype.	Tangible	Discovery
2.	Analysis of the need for classification of the types of knowledge available later.	Reability	Discovery
3.	Requirement analysis of encrypted password encryption access.	Assurance	Discovery
4.	Needs analysis in designing the existing color design template on KMS prototype.	Tangible	Capture
5.	Analysis the availability needs of e-Help in each menu.	Responsive	Capture
6.	Analysis of the need for authority who becomes Knowledge Expert.	Assurance	Sharing
7.	Requirement analysis of presentation of relevant knowledge report.	Reability	Sharing
8.	The prototype needs analysis runs the web version attractively.	Responsive	Application
9.	What is the tolerance of the response you want in this KMS prototype before it is closed automatically?	Emphaty	Application
10.	Time requirement analysis given in KMS prototype work.	Emphaty	Application

From the results above, the authors continue the next stage of research to formulate KMS prototype model made by mapping and convert the results of interviews and questionnaires that have been collected and analyzed. Here are the results of the analysis of questionnaires that have been done using analysis tools Analysis tools available in monkey surveys.

Table 4. Results of Questionnaire Analysis

No	Requirement	Weight
1.	What is the tolerance of the response you want in this KMS prototype before it is closed automatically?	0,69
2.	Needs analysis in designing the existing color design template on KMS prototype.	4,0
3.	Priority needs analysis of the menu that becomes the basic requirement in making prototype.	3,69
4.	Requirement analysis of encrypted password encryption access.	0,88
5.	Needs analysis indicates who becomes Knowledge Expert.	1,05
6.	Time requirement analysis given in KMS prototype work.	1,28
7.	The prototype needs analysis runs the web version attractively.	0,84
8.	Analysis of the need for availability of e-Help in each menu.	1,16
9.	Analysis of the need for classification of the types of knowledge available later.	1.16
10.	Requirement analysis of presentation of relevant knowledge report.	0.88

After getting the result from the survey analysis from the questionnaire, then the writer performs the translation stage of the questionnaire result into priority analysis based on user requirement with QFD model assisted House of Quality (HoQ) calculation to get the result of requirement.

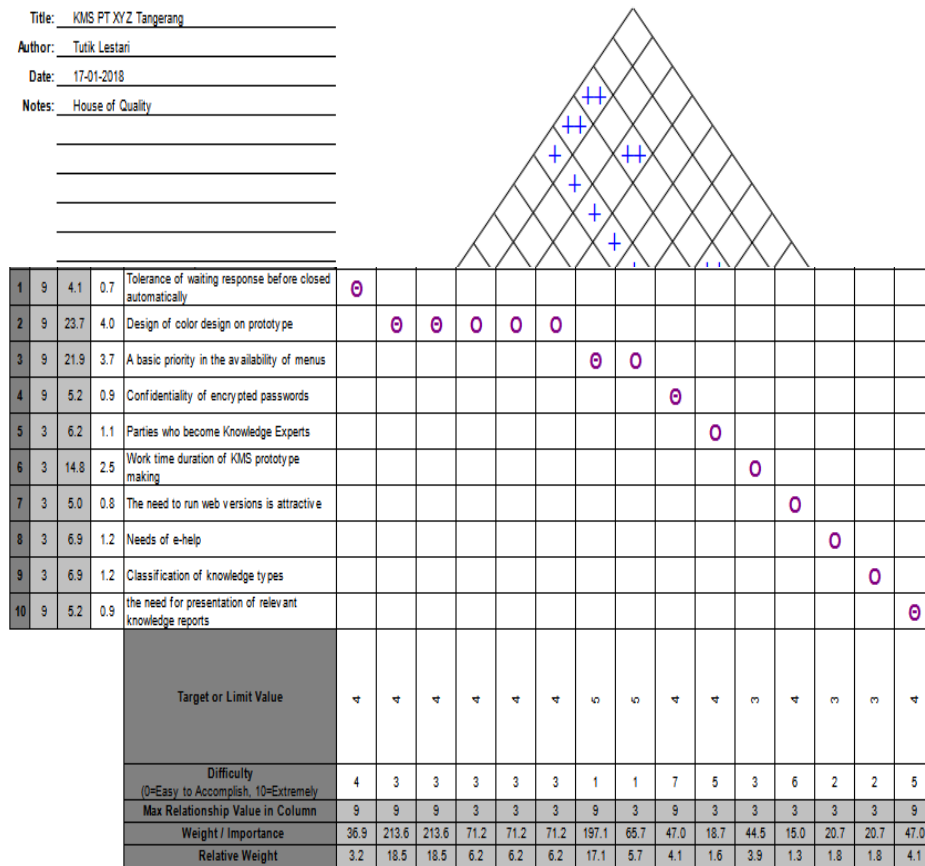


Figure1. House of Quality K software house

Based on the results of House of Quality (HoQ) that has been done calculations, the authors can sort the priorities that can be used as a reference in the development of this KMS prototype, the following results:

Attribute	Relative Weight
Background dominant white base	18.5
The dominant black font is black	18.5
Dashboard menu available, home, input your knowledge, Approval Knowledge, graphics	17.1
Background dominant white base	7.1
Header dominant blue sea	6.2
The dominant menu is black	6.2
The dominant footer is navy blue	6.2
Available menu parameter settings, your reward, change password, info management, announcement	5.7
Encrypted password complex	4.1
Need for KMS Reports in the form of xls and PDF	4.1
Duration of work <3 months	3.9
Tolerance response wait 30 minutes	3.2
Available e-help every menu	1.8
Classification of types of knowledge categories available	1.8
Approver is Administrator	1.6
App access runs web version	1.3

Figure 3. Analysis Results House of Quality

After obtaining the results of the analysis based on House of Quality (HoQ) calculations, the writer can proceed to the stages of system requirement identification which includes the analysis of system needs based on functional and non-functional system.

3.4 Quality of Software

K software house has 220 employees, and conducted a survey. Here's the calculation using Slovin formula:

$$n = N / (1 + N e^2) = 220 / (1 + 220 \times 0,10^2) = 68,75 \approx 69. \quad (2)$$

Information:

n: number of samples

N: number of population

e: limit tolerance error (error tolerance)

Table 5. Overall Software Quality Level

Criteria	% Actual Score	% Score Ideal	Criteria Value
Fungsionalitas			
Does this KMS prototype look appropriate to your needs?	81	100	Good
Are the KMS prototype menus able to support your performance function?	59	100	Enough
What is the rate of this KMS prototype in recording employee knowledge?	57	100	Enough
Usability			
Is the KMS prototype easy to use and understood for the novelty process in knowledge management?	83	100	Good
Efficiency			
Are the menu that appears, is appropriate to be separated based on the level of each user?	81	100	Good
Is this overall KMS prototype efficient enough to support performance improvement?	73	100	Enough
Convenience			
Does this KMS prototype help view updates updates?	82	100	Good
Does this KMS prototype have the ease of presenting interesting graph reports?	84	100	Good
Does this prototype provide easy access to the overall knowledge of various platforms?	73	100	Good
Subtotal Score	673	900	Good
Average (%Score ideal / %Actual Score)	75%		

Thus, the required number of samples is 69 employees. However, after the spreading of the questionnaire, the participation rate of respondents has not met the initial requirements of only 20 employees, in other words the author only managed to get 29% of the 69 employees who the author targets.

3.5 Summary of Software Quality Testing Results

After the prototype is tested its quality using UAT, then obtained a calculation of value on each criterion. To see the results of the test as a whole, can be seen in the following table:

Based on the above test results, it can be concluded that the software quality level to support the process of developing KMS prototype as a whole is included in the criteria of Good value with the percentage of 75%. Results This is seen based on the criteria of functionality related to menu availability and recording employee knowledge. Menu related efficiency based on authorization level, and ease of progress update knowledge, interesting presentation of graph reports and easy access to various platforms. Thus, K can overcome the problems encountered and improve the efficiency of employee performance.

4. CONCLUSION

Based on the analysis in this study, the authors can conclude several things, namely: The research focuses on the approach of Quality Function Deployment (QFD) method of data collection method of Voice of Customer (VoC) in the form of questionnaires survey and information depth stage through interviews with respondents directly related to research in Z.

Research use prototype method to produce KMS prototype this form of view based on web based application. The prototype builds on the results of several research variables in the QFD model that bring together the needs of

employees by prioritizing the technical needs of system infrastructure. The results of the research produce the priority of making KMS prototype, such as: background of dominant white website, dominant black base font, preferably available dashboard menu, input your knowledge, approval knowledge, graphic, dominant head blue sea, dominant menu black. KMS prototype is tested with User Acceptance Test (UAT) stage. The respondents of K are given an opportunity to test the application again, and the results are then documented into the UAT Minutes Form.

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