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Requirement analysis of e-library application using Mandatory Desirable Inessential (MDI) and Technical Operational Economic (TOE) method

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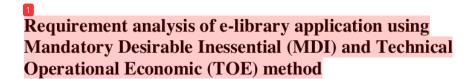**AR Putera***, **S Riyanto, M Arianto**

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Abstract: The purpose of this study was to find out the requirement analysis to build e-library applications that will be managed by the Informatics Engineering Study Program at the University of PGRI Madiun. The focus of this study was requirement analysis using the Mandatory Desirable Inessential (MDI) method and Technical Operational Economic (TOE) methods. The analysis of online library information system requirements in this study was based on functional and non-functional needs analysis. This requirement analysis is based on functional requirements analysis that resulted 23 strategic information items to be done technically and operationally and resulted 4 non-functional items. Analysis of functional requirements based on feasibility resulted 12 technical items with middle or capable risks, and 9 operational items with middle or capable risks and 2 operational items at low risk or easy to do.

1. Introduction

Information technology that is growing rapidly must be used to support educational and learning activities in educational institutions. One of the needs of the education filed is the existence of a library or collection of books and research journals. The procurement of books and journals collection in fiction requires considerable costs and space, so a breakthrough is needed to provide a collection of books and journals effectively and efficiently that are used by users quickly and easily. To realize the existence of an effective and efficient library, it can utilize information technology in the form of e-library applications that can be accessed quickly and easily by its users. The use of e-library applications is a breakthrough to save the cost of procuring books and journals, where a collection of books and journals in e-libary can be in the form of e-book and e-journal[1].

The e-library application will make it easier for users to find and access the references needed. Users can download ebooks or e-journals in e-library applications as reference material for learning activities or scientific article writing. Users are also facilitated to find references quickly and easily by using keywords. In addition, this e-library application will also be connected to other e-library and e-journal applications, so that the available library availability is more complete and facilitate user[2].

The existence of e-library application also provides positive benefits in maintaining environmental balance, because the use of references is done by paper less. The use of paper to print reference books can be reduced because it is enough to use electronic media as a reference support. Reducing paper usage can be done significantly because e-library administrator and users do not have to print referenced books or journals.

E-library application is the future solution to solve problems related to the provision of references in the learning process from elementary school to college level[3]. The existence of a well-managed e-library will make it easier for users to access the ebook needed, so users can learn easily through their laptops and cellphones without having to visit a conventional library. The use of information technology for e-library activities is important to be carried out and well managed and also responds to the needs of users for learning references and scientific writing.

The results of the study related to information system requirements analysishave been carried out by many previous researchers. For instance research from Yasin, *et al.,*They stated that in the requirement   analysis using PIECES analysis framework, analysis of Causality and Root problems with solutions using Fishbone analysis[4]. Research by Setiawan, *et al.,* This requirement analysis used an experimental method with reference to the System Development Life Cycle.This research started from preliminary studies, literature studies, problem formulation, and system requirements analysis[5]. Gumelar *et al.*Used Ripple Methodology for analysis and design that will produce definitions of requirements and design artifacts, then design testing process using Consistency Analysis to determine the consistency of the design and Litmus Test Service to find out the compliance of SOA criteria by the design[6].

The objective of this study was to find out the needs analysis to build e-library applications using the Mandatory Desirable Inessential (MDI) and Technical Operational Economic (TOE) methods that will be managed by the Informatics Engineering Study Program at the University of PGRI Madiun.

2. Literature

Concept of Requirement

Need (*requirement*) is the characteristics of the system or product that will be developed in accordance with the wishes of customers. Requirement is classified into functional requirement and nonfunctional requirement.

a. Functional requirement is needs that explain the interactions between system and environmentthat are separate from implementation. The system is a set of elements that are interrelated and influence each other in carrying out activities to achieve goal.

b. Non functional requirement is user aspects that can be seen on a system that is not directly related to functional behavior. Response time must be less than one second and accuracy

must be within a second. This requirement is forced by the client or the environment in which the system will operate[7].

Elicitation

Elicitation is a design made based on a new system desired by management and is carried out by researchers to be executed. Elicitation is obtained by interview method and carried out in three stages[7] as follows:

a. Elicitation Stage 1

At this stage, the elicitation contains all new system designs proposed by the management proposed through the interview process.

b. Elicitation Stage 2

This stage is the result of class 1 classification based on the Mandatory Desirable Inessential (MDI) method. The MDI method aims to separate the important system design and must be presented in a new system of designs that are capable of being executed by researchers. The MDI method includes three things, namely:

1) Mandatory the requirement must be exist and cannot be removed when creating new system.

2) Desirable, the requirement is not too important and can be removed but if the requirement is used in the form system, the system will be more perfect.

3) Inessential ,the requirement is not part of discussed system (outside of the system)

c. Elicitation Stage 3

This stage of this elicitation is the result of shrinkage from elicitation stage 2 that is carried out by eliminating all needs with the innessential option on the MDI method. Then all the remaining need is re-classified through the Technical Operational Economic (TOE) method, as follows:

1) Technical, how to create requirement proposed in the system ?

2) Operational, how to use need in the system to be developed ?

3) Economic (ekonomis), how much the cost needed to build the need in new system.

TOE method is divided into some options:

1) High (H), difficult to do because the manufacturing techniques and usage are difficult, the cost is expensive and these needs must be eliminated.

2) Middle (M), able to do

3) Low (L), easy to do

d. Final draft of elicitation, is the final result achieved from the eelicitation process and can be used as the basis for making a system to be developed[7].

3. Methodology

The discussion in this study was only emphasized on requirement analysis, where the analysis of this need will be the material or step of further research in building and designing system, implementing system, integrating and testing the systems created and applying and maintaining the system that has been running[8].

Requirement analysis in this study was carried out by some stagesand the system requirements analysis stage is the stage of determining all components needed by the system to be built. The researcher determines the system requirement that is expected to meet user need and determine the limits of the software. Information needed in conducting a requirement analysis was carried out byobservation and interview to   competent

stakeholders[9].This study was conducted at Informatics Engineering Study Program at the University of PGRI Madiun, Campus 3 Floor 3 Jl. Auri No.14 Madiun.

4. Results

The following is the elicitation of the Requirement of the online library information system that will be managed by the Informatics Engineering Study Program at the University of PGRI Madiun, the elicitation is based on interviews with stakeholders:

1. Elicitation Stage 1 and Stage 2

Table 1. Elicitation Stage 1 and Stage 2

	Functional Strategic Information	M	D	I
	This system is expected to :			
1	Integrated well	√		
2	Show master home menu	√		
3	Show master profile menu	√		
4	Show master catalog menu	√		
5	Show virtual reading room (RBV) menu	√		
6	Show master menu of IT discussion room	√		
7	Show e-resource master menu	√		
8	Show IT News		√	
9	Show announcement		√	
10	Show Television Informatics		√	
11	Show login facilities for admin	√		
12	Show admin menu	√		
13	Show edit home menu for admin	√		
14	Show edit profile menu for admin	√		
15	Show catalog edit menu for admin	√		
16	Show RBV edit menu for admin	√		
17	Show IT discussion room edit menu for admin	√		
18	Show e-resource edit menu for admin	√		
19	Show IT news edu for admin		√	
20	Show announcement edit for admin		√	
21	Show TV informatics TV for admin		√	
22	Show visitor data		√	
23	Show complete address for online library		√	

2. Elicitation Stage 3

Table 2. Elicitation Stage 3

Feasibility	T			O			E		
Risk	L	M	H	L	M	H	L	M	H
Requirement Analysis									
The system is expected to :									
1 Integrated well		√							
2 Show master home menu		√							
3 Show master profile menu		√							
4 Show master catalog menu		√							
5 Show virtual reading room (RBV) menu		√							
6 Show master menu of IT discussion room		√							
7 Show e-resource master menu		√							
8 Show IT News		√							
9 Show announcement		√							
10 Show Television Informatics		√							
11 Show login facilities for admin		√							
12 Show admin menu		√							
13 Show edit home menu for admin					√				
14 Show edit profile menu for admin					√				
15 Show catalog edit menu for admin					√				
16 Show RBV edit menu for admin					√				
17 Show IT discussion room edit menu for admin					√				
18 Show e-resource edit menu for admin					√				
19 Show IT news edu for admin					√				
20 Show announcement edit for admin					√				
21 Show TV informatics TV for admin					√				
22 Show visitor data				√					
23 Show complete address for online library				√					

3. Final Elicitation Requirement Draft

Table 3. Final Elicitation Requirement Draft

Functional
Requirement Analysis
This system is expected to :
1 Integrated well
2 Show master home menu
3 Show master profile menu
4 Show master catalog menu
5 Show virtual reading room (RBV) menu
6 Show master menu of IT discussion room
7 Show e-resource master menu
8 Show IT News
9 Show announcement

Functional Requirement Analysis This system is expected to :	
10	Show Television Informatics
11	Show login facilities for admin
12	Show admin menu
13	Show edit home menu for admin
14	Show edit profile menu for admin
15	Show catalog edit menu for admin
16	Show RBV edit menu for admin
17	Show IT discussion room edit menu for admin
18	Show e-resource edit menu for admin
19	Show IT news edu for admin
20	Show announcement edit for admin
21	Show TV informatics TV for admin
22	Show visitor data
23	Show complete address for online library
Non functional This system is expected :	
1	To Have interested display and user friendly (easy to understand by user).
2	To Have accuracy and speed in displaying data wanted by user
3	Available of site visitor buttons as feedback
4	Registered application in creative commons license.

5. Conclusion

The requirement analysis of the online library information system that will be named informaticslibrary.com. This is an online library that will be managed by the Informatics Engineering Study Program. This requirement analysis is based on functional requirements analysis that resulted 23 strategic information items to be done technically and operationally and resulted 4 non-functional items. Analysis of functional requirement based on feasibility resulted 12 technical items with middle or capable risks, and 9 operational items with middle or capable risks and 2 operational items with low risk or easy to work.

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