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DESIGN AND DEVELOPMENT INFORMATION SYSTEM CODIFICATION OF THE NAVY INSUPPORT PLANNING MAINTENANCE SYSTEM (PMS)

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ABSTRACT

Republic of Indonesia warship is one of the main elements in the Integrated Fleet Weapon System (SSAT) owned by the Indonesian Navy. Republic of Indonesia warship must have combat readiness so that it is always ready to carry out exercises and operations according to its main tasks. Combat readiness can be achieved thanks to good logistical support. The codification information system is an important part of the automation of debriefing at Dopusbektim in providing computerized logistical support. With the codification information system, it is hoped that the user unit will be easier and can shorten the processing time of requests at the depot warehouse. The research objective is the development of existing applications by designing a codified information system application using the Quality Function Deployment (QFD) and System Development Life Cycle (SDLC) methods, so that it is expected to solve existing problems. Through interviews and questionnaires obtained 12 attributes. The 12 selected attributes above are then processed using the Quality Function Deployment (QFD) method in the House of Quality (HOQ) matrix so that the highest technical importance value is obtained, namely the integrated technical response with the Codification Subdistribution with a value of 367.7. This technical response is integrated with the Codification Subdistribution which is used as the basis for developing new application designs according to the stages in the SDLC method. The final result of this research is a new codification application system that is integrated with applications in the KRI and applications in the Codification Sub-Office so that it is expected to facilitate input of request data from ships and can shorten the time for requests to receive (PUT) in the provision support process.

Keywords: *Codification System Application, provision support, Quality Function Deployment (QFD) and System Development Life Cycle (SDLC).*

1. INTRODUCTION

The Navy as one of the defense and security forces in protecting the Unitary State of the Republic of Indonesia has combat equipment and supporting facilities projected in the Integrated Fleet Weapon System (SSAT) in the form of Warships of the Republic of Indonesia (KRI), Aircraft (Pesud), Tactical Vehicles (Rantis), Marine Combat Vehicle (Ranpur), Individual Weapons, and Base. KRI as one of the main elements must have combat readiness so that the ship is always ready to carry out exercises and operations according to its main task. With the increasing number of KRI's presence in the Indonesian seas, they will be able to control the sea area (sea control) and be able to minimize risks and be free from all threats that have existed so far so that stability and balance as well as marine security are maintained.

TNI AL logistics are all activities used in determining the direction of a policy, planning, implementation, and supervision and control through the stages of coaching and using personnel, materials, facilities, and services according to their operational demands and maintaining their readiness during use and providing continuous support to the Navy. combat units and tactical units to achieve strategic objectives. In the logistics of the Indonesian Navy, there are two patterns of coaching in the logistics sector, consisting of material development and provision of provision support.

Material development in the supply has the main functions, among others: determination of needs; study; procurement; storage; distribution; maintenance and removal. Meanwhile, the supporting functions are: inventory control; cataloging; information Systems; treasury administration and demobilization mobilization. Meanwhile, the development of logistical support for the Indonesian Navy is the implementation of logistical support development functions which include the Maintenance System Function, the Provisioning System Function and the Base Facility Function (PUM 1.07, 2010). The two functions are a series in supply chain management with the aim of ensuring a strong support system by providing provision services to the public / units to user units directly. The success of carrying out these tasks is determined by the readiness of the defense equipment system to carry out an operation, so the role of logistics is very decisive.

The Planned Maintenance System according to the Indonesian Navy is a system, instructions and procedures related to the type of Personnel Education, Conditions, Work, Level of Expertise and procedures

aboard the Indonesian Navy ship and maintenance facilities on land. (PUM 7.08.001 Kep Kasal No. Kep/1052/VI/2015). The PMS is used as the standard for assessing the KRI's combat capability for the maintenance program of the entire KRI. In a Planned Maintenance System (PMS) there are instruments and regulations to facilitate the way to act, among others in the form of SPT documents and reporting systems. SPT documents include an index listing all ship equipment, both Platform and Sewaco, Maintenance Schedule, Maintenance Card and TRC (Time Record Card.

The Codification System is a standard system to form a single supply language (Single Supply Language) in identifying, clarifying, numbering and recording manufacturers' sources as well as maintaining up-to-date data from material supplies for completeness of logistics management data. The use of codification in the use of provisions using the NSN system. National Stock Number (NSN) is a unique material code of 13 (thirteen) numeric digits consisting of class group, country code, and identification number determined by the National Codification Bureau (NCB), in this case it has been determined by the Ministry of Defense's Baranahan Codification Center. The Navy Codification System, which is a big data system that contains a collection of briefing documents containing a list of all types of supplies along with stock norms and other information from all KRIs that have been codified using the NSN system. The KRI codification system plays an important role in the process of making reports in the SPT document. In filling out the report, it must be based on the ship's data base that has been codified with the NSN system which contains all aircraft installations, units from each aircraft installation and all parts in the units in the aircraft installation.

The function of debriefing by using the element codification system in each logistics line in the Indonesian Navy is, among others:

a. Making Request To Receive (PUT).
b. Carry out inventory control at Satkai level.
c. Support the implementation of SPT activities at all levels of maintenance.
d. As a tool in preparing plans for OBS level needs.
e. Used as a reference for submitting proposals for updating/updating data on the Satkai level element codification system.

2. LITERATURE REVIEW

2.1 Quality Function Deployment (QFD)

In their writings on QFD as a tool to improve negotiation process, product quality, and market success, in an automotive industry battery components supplier (Fonzeca, Fernandes, Delgado, International Journal, 2020). In 2017, Nurjoko in his journal entitled “Information System of Goods Data Processing for ISO 9001:2008 Certification at PT. Tunas Baru Lampung Tbk”, explained about data processing in its information system adapted to ISO 9001:2008 certification. (Nurjoko, Journal of Information Systems and Telematics, Volume 8, Number 1, 2017).

is a methodology in the process of product or service design and development that is able to integrate the voice of the customer/consumer's voice into the design process. QFD is actually a way for companies to identify and fulfill the needs and desires of consumers for the product or service it produces. Quality Function Deployment is a structured methodology used in the product design and development process to determine the specifications of consumer needs and wants, and to systematically evaluate the ability of a product or service to meet consumer needs and wants (Cohen, 1995).

House Of Quality is compiled based on the combination of data processing starting from determining the degree of importance to the interaction of technical responses. In the Quality Function Deployment chart, the service attributes are depicted vertically on the left and the technical response parameters are depicted horizontally at the top.

Figure 1. Componen *House of Quality*

The steps in making HoQ, as follows:

a. Part A

This matrix contains a structured record of customer needs which is directly translated from the customer's words, also called the voice of customers. The steps for getting customer votes are as follows:

1). Get the voice of customers / voice of customers through interviews, questionnaires for the level of satisfaction and the level of customer importance.

2). Sort customer voices into categories (needs or benefits, quality dimensions, etc.)

3). Enter into the customer requirements matrix.

b. Part B

The Planning Matrix is a tool that can help the development team prioritize customer needs. This matrix contains the importance of each product need / benefit that will be offered to customers based on the interpretation of the development team according to the research data. The situation in this matrix will affect the balance between user priorities and company priorities. The planning matrix includes, namely:

1). The level of customer interest (Important to Customer).

Important to Customer will show the level of importance of the attributes of each consumer need. The formula for Important to Customer, as follows:

$$Tingkat\ Kepentingan = \frac{\sum_s^i Si \times i}{N}$$

..... (2.1)

Description :
Si = number of respondents i
i = weight value (1,2,3,4,5)
N = number of respondents

2). Level of customer satisfaction (Customer Satisfaction Performance).

Customer Satisfaction Performance shows the consumer's perception of how good the current product is in terms of satisfying consumers. The formula used to show the value of Cusomer Satisfaction Performance is:

$$Tingkat\ Kepuasan = \frac{\sum_s^i Si \times i}{N}$$

……(2.2)

Description :
Si = number of respondents i
i = weight value (1,2,3,4,5)
N = number of respondents

3). Competitor satisfaction level (Competitive Satisfaction Performance).

Competitive satisfaction Performance is a measure of the satisfaction performance of competitors. To perform this calculation, use the following formula:

$$CDS = \frac{\sum_s^i Si \times i}{N}$$

.....(2.3)

Description :
CDS = Competitive performance weight
i = weight value (1, 2, 3, 4, 5)
Si = number of respondents i
N = number of respondents

4). Goal, goal is the target of customer satisfaction to be achieved by the company based on the actual level of satisfaction. Goals are usually expressed on the same numerical scale as the level of performance.

5). Improvement ratio, obtained from the distribution of goals / goals with the current condition of the company's products (Imam Djati Widodo, 2003: 60).

$$\frac{Goal\ (i)}{Customer\ Satisfaction\ Performance\ (i)}$$

…....(2.4)

6). Sales Point

The sales point will provide information about the ability of the needs stated by the customer in providing selling value for the product or service that has been planned. Values used to indicate Sales Point include:

1 = no sales point
1.2 = medium Sales point
2.5 = Strong Sales point

7). Raw Weight, the raw weight column contains data values and decisions are taken from the matrix column of a previous plan. This model describes the priority of consumer needs that will be developed by the team. Raw Weight value can be calculated using the formula:

$$(Importance\ to\ Customer)x(Sales\ Point)\ x\ (Improvement\ Ratio)$$

… … … … …..(2.5)

8). Normalized Raw Weight, normalized raw weight is the percentage value of the raw weight of each attribute requirement. Normalized Raw Weight values can be calculated using the formula:

$$(Importance\ to\ Customer)x(Sales\ Point)\ x\ (Improvement\ Ratio)$$

…… (2.6)

c. Part C

In this step, the determination of the technical characteristics of a product is carried out in order to meet the needs and satisfaction of consumers. This matrix contains the technical characteristics which are the part in which the company applies possible methods to be realized in an effort to fulfill consumer wants and needs.

d. Part D

Matrix of the relationship between what (voice of customer) and how (technical characteristics). This matrix serves to determine the relationship between the column of needs and consumer wants (Customer Needs) by using the column of technical response

(Technical Response) which is divided into four symbols.

e. Part E

Technical correlation is a matrix that describes a map of interdependence and interconnectedness of the technical characteristics of a product.

f. Part F

Technical Importance is used to analyze the technical characteristics that have the highest to the lowest points. Determination of Technical Importance is useful for the product development team to focus more on technical characteristics. The technical matrix consists of 3 different types of information. The three types of information include prioritized technical responses, competitive benchmarks, and targets.

2.3 SDLC (Systems Development Life Cycle)

The Systems Development Life Cycle is a stepwise approach to analyzing and designing a system for development through the use of specific activity cycles and user analysts. SDLC or Software Development Life Cycle is a methodology or system life flow that is widely used in the system development process including the following stages : development, maintenance, and use of information systems (Abdul Kadir, 2014:344). SDLC is a pattern in the development of a software that is taken to improve the software feature system, which consists of several stages in the form of planning, analysis, design, implementation, prototype testing and maintenance.

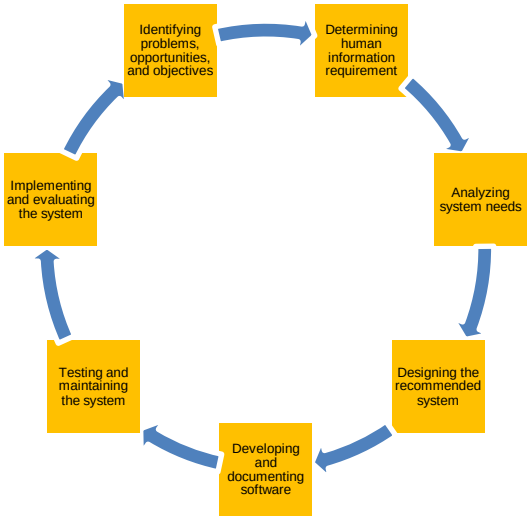


Figure 2. Systems Development Life Cycle

3. ANALYSIS AND DISCUSSION

3.1 Identify Customer Needs

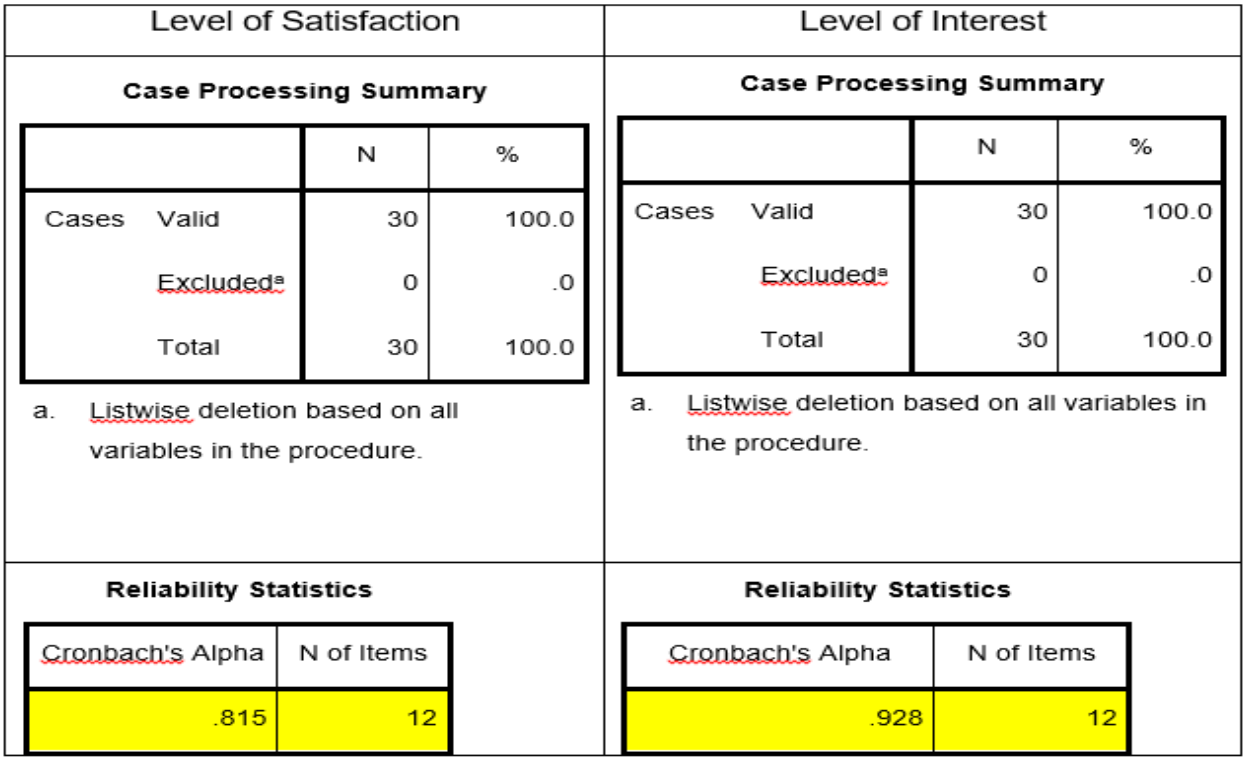
The attributes of the E-PUT information system were obtained from the results of interviews and questionnaires with experts. Making a house of quality begins with compiling the needs and desires of consumers, as well as priority interests for each characteristic desired by consumers. The selected attributes are:

Table 1. Recap of Interview Results and Questionnaires

NO	ATTRIBUTE		LABEL
1	Function	The codification information system helps the request to accept service process	X1
2	Convenience	Codification information system application is easy to use	X2
		The features of the codification information system application are available to support request to	X3
3	Data security	When the request to accept process is running, the input data is vulnerable to change	X4
		When the request to accept process is running, data input is vulnerable to virus interference	X5
4	Interface	The codification information system application has an attractive appearance/interface	X6
		The color display of the codification information system application is attractive and not boring	X7
		Commands on the codification information system application display are user friendly	X8
5	Comfort	The current codification information system application is comfortable to use	X9
		Practical codification information system application in data input	X10
6	Connectivity	Connect with the appropriate unit in the request to accept procedure	X11
		Provides connection in program access	X12

4.2 Validity Test and Reliability Test

Validity test is useful for measuring whether the questionnaire is stable, accurate and has homogeneous elements. According to Ginting (2010), reliability is the level of confidence in the results of a measurement.



Level of Satisfaction

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded[a]	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.815	12

Level of Interest

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded[a]	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.928	12

Figure 3. Reliability Test Questionnaire Processing

Table 2. Results of Questionnaire Reliability Test Decision Making

No	Interval	Criteria	Result	
			Level of Importance	Level of Satisfaction
1	< 0,200	Very low	Cronbach's Alpha = 0.928, it means the level of reliability of the Questionnaire Level of Interest	Cronbach's Alpha = 0.928, it means the level of reliability of the Questionnaire Level of Interest
2	0,200 – 0,399	Low		
3	0,400 – 0,599	Enough		
4	0,600 – 0,799	high		
5	0,800 – 1,00	Very high		

Table 3. Data Processing with HoQ

NO	ATRIBUT	Importance to Customer	Customer Satisfaction Performance	GOAL	sales point	Improvement Ratio	Raw Weight	Normalized Raw Weight
1	The codification information system helps the request to accept service	3.467	2.600	5	1.5	1.923	10.001	0.0889
2	Codification information system application is easy to use	3.433	2.567	5	1.5	1.948	10.030	0.0892
	The features of the codification information system application are available to support request to accept	3.400	2.533	5	1.5	1.974	10.067	0.0895
3	When the request to accept process is running, the input data is vulnerable to change	3.700	2.833	4	1.2	1.412	6.269	0.0558
	When the request to accept process is running, data input is vulnerable to virus interference	3.667	2.800	4	1.2	1.429	6.286	0.0559
4	The codification information system application has an attractive appearance/interface	3.633	2.700	5	1.5	1.852	10.092	0.0898
	The color display of the codification information system application is attractive and not boring	3.567	2.667	5	1.5	1.875	10.031	0.0892
	Commands on the codification information system application display	3.600	2.733	5	1.5	1.829	9.879	0.0879
5	The current codification information system application is comfortable to use	3.533	2.767	5	1.5	1.807	9.576	0.0852
	Practical codification information system application in data input	3.367	2.500	5	1.5	2.000	10.101	0.0898
6	Connect with the appropriate unit in the request to accept procedure	3.333	2.467	5	1.5	2.027	10.133	0.0901
	Provides connection in program access	3.500	2.633	5	1.5	1.899	9.970	0.0887

4.3 Technical Importance

Technical Importance indicates priority options that will be developed first in the process of improving the quality of information systems based on technical interests. From this research, it can be concluded that the first four priorities for quality improvement are the attributes "connected to the Codification Sub-Office, connected to the application in KRI, connected to the application at Dopusbektim and the Display Menu is available according to user needs".
The following is a discussion of the stages used for the development of this application.

4.4 Planning

At this planning stage, several activities were carried out to support the application of the Codification information system in the application-making process, such as conducting interviews and questionnaires as well as direct observations both on the ship, Dopusbektim and at the Codification Subdistribution.

4.5. Analysis (Analysis)

At the Analysis Stage, which is carried out, namely outlining several things related to the scope of work which will later be needed to make decisions in making this system. Analysis of the needs of this information system is carried out through observations on the current system and interviews with system users.

Table 4. Analysis of Old Application Needs and New Apps

NO	ATTRIBUTES	OLD APPLICATION	NEW APPLICATION
1	Ergonomic	Data input Request to receive is still manual KRI Request data is stored in data digitally	Data input Request to receive is still manual KRI Request data is stored in data digitally
		Process Requests to receive takes a relatively long time Shorten the processing time Requests to receive	Process Requests to receive takes a relatively long time Shorten the processing time Requests to receive
		The new web design makes it easier to access data so that it is more effective and efficient in terms of time and cost.	The new web design makes it easier to access data so that it is more effective and efficient in terms of time and cost.
		Requires more paper Reduces paper usage	Requires more paper Reduces paper usage
2	Web Design	The system interface uses a static background image of the Indonesian Navy The system interface uses a dynamic background image of the Navy Attractive color display	The system interface uses a static background image of the Indonesian Navy The system interface uses a dynamic background image of the Navy
			Attractive color display
		It takes a long time to understand and familiarize the application used. The display and features are user friendly so that it is easier to understand Practical in data input	It takes a long time to understand and familiarize the application used. The display and features are user friendly so that it is easier to understand
			Practical in data input
3	Convenience	Lack of involvement of system personnel Socialization of use to KRI	Lack of involvement of system personnel Socialization of use to KRI
		Knowing the general stock of supplies	Knowing the general stock of supplies
		Loading the requested spare parts ration	Loading the requested spare parts ration
4	Access speed	Data input process Requests to receive and manual general stock monitoring process KRI Request data is automatically stored in the application Improvements in general stock access	Data input process Requests to receive and manual general stock monitoring process KRI Request data is automatically stored in the application
			Improvements in general stock access
5	Data security	Input data Requests to receive are easily changed	Input data Requests to receive are easily changed
		Vulnerable to viruses in applications The system implements security for users who will log in	Vulnerable to viruses in applications The system implements security for users who will log in
6	Connectivity	The system is still local access for Logupsdrum is connected to the application on KRI	The system is still local access for Logupsdrum is connected to the application on KRI
		connect with the application at Subdis Codification	connect with the application at Subdis Codification
			Codification integrated into KRI, Codification Subdistribution via wifi, Internet

4.6. Design (Design)

The process carried out after the analysis phase is complete is designing the application. The system design begins with Use Case Diagrams, Activity Diagrams, Sequence Diagrams and Class Diagrams.

Use Case Creation

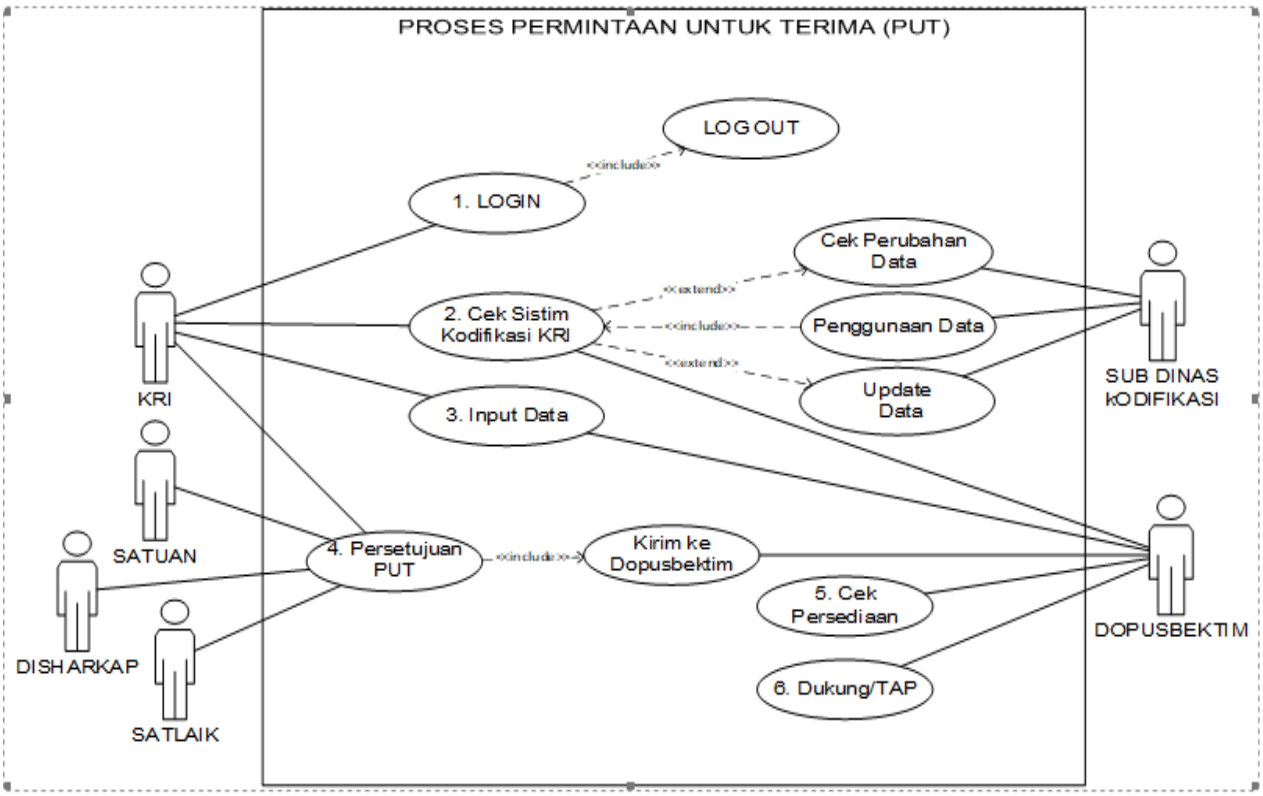


Figure 3. Use Case Request To Receive (RTR)

User Interface Creation

Figure 4. Application Interface at Republic of Indonesia warship

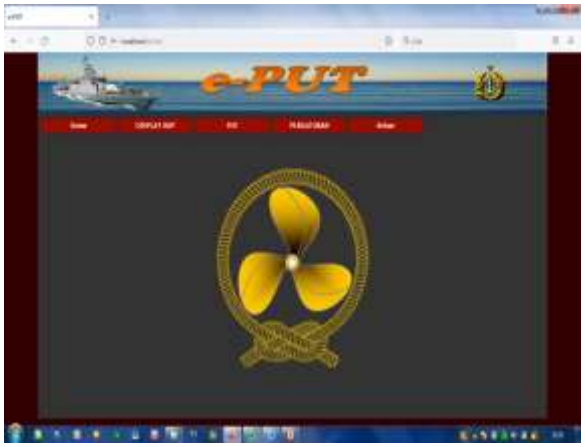


Figure 5. Application Main Page at Republic of Indonesia warship

Figure 6. Service Requests to receive at Dopusbektim

Figure 7. Codification Data Change Services in the Codification Subdiscipline

4.7. Research Discussion

After analyzing the data on the codification information system using the QFD method which is used as the basis for selecting attributes in making the design, the next step is to carry out the design to testing using the System Development Life Cycle (SDLC) method. After forming a prototype as well as testing the application that has been successfully created. From the process of designing, manufacturing and experimenting with this codified information application system, a product was obtained that was able to improve the application of Service Requests to receive at Dopusbektim that had been used so far. Improvements implemented can be seen from several aspects, including: ergonomics, web design, convenience, access speed, data security and application connectivity. We can table the improvement of the old application to the new application. The comparison table for old applications and new applications can be seen in table 6 below.

Table 5. Comparison of the Old Design with the New Design

NO	ATTRIBUTE	SATISFACTION LEVEL COMPARATION	
		OLD APPLICATION	NEW APPLICATION
1	The codification information system helps the request to accept service process	2.600	2.933
2	Codification information system application is easy to use	2.567	2.967
	The features of the codification information system application are available to support request to accept	2.533	2.867
3	When the request to accept process is running, the input data is vulnerable to change	2.833	3.000
	When the request to accept process is running, data input is vulnerable to virus interference	2.800	3.000
4	The codification information system application has an attractive	2.700	2.967
	The color display of the codification information system application is attractive and	2.667	2.867
	Commands on the codification information system application display are user friendly	2.733	2.800
5	The current codification information system application is comfortable to use	2.767	2.867
	Practical codification information system application in data input	2.500	3.033
6	Connect with the appropriate unit in the request to accept procedure	2.467	3.233
	Provides connection in program access	2.633	3.133

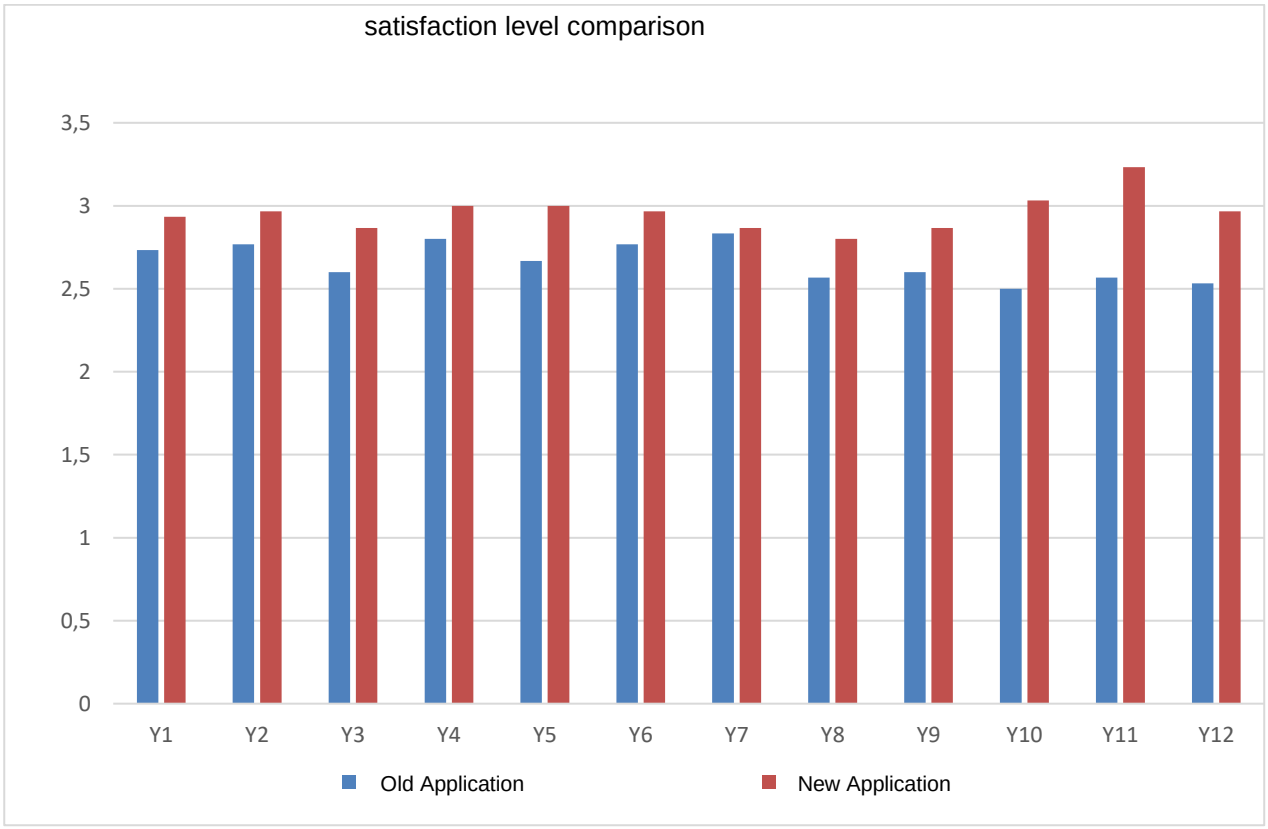


Figure 8. Graph of satisfaction level comparison

4. CONCLUSIONS

Based on the results of the study, the following conclusions can be drawn:

a. The results of the design of a new application for the Indonesian Navy's codification information system digitally are superior to the old system application.

b. Identify the factors that influence the design of the codification information system application through interviews and initial questionnaires with the Expert so that 12 attributes are selected, including: Codification information system attributes help the Service Requests to receive process, Codification information system application is easy to use, Features in the application codification information system is available to support Service Requests to receive, In the Service Requests to receive process, data input is vulnerable to change. During the Service Requests to receive process, data input is susceptible to virus interference. The codification information system application has an attractive interface/interface. The color display of the codification information system application is attractive and not boring. , The commands on the codification information system application display are user friendly, The codification information system application is currently comfortable to use, The codification information system application is practical in data input, Connected to the appropriate unit in the Service Requests to receive procedure, Media transmission connection in program access.

c. The implementation of the stakeholder desire factor is realized by designing a codified information system application using the System Development Life Cycle (SDLC) method by going through several stages starting from the planning, analysis, product implementation and testing stages. From the results of the questionnaire on the level of satisfaction in making new applications, the order of values is obtained, namely: Connected attribute with the appropriate unit in the Service Requests to receive procedure with a value of 3,233, Connecting media in program access has a value of 3,133, Practical codification information system applications in input data value 3,033.

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