

Development of Enterprise Resource Planning (ERP) for the Indonesian Marine Security Agency

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Development of Enterprise Resource Planning (ERP) for the Indonesian marine security agency

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Abstract. The Indonesian maritime security agency called Bakamla is an institution that has the duty to carry out safeguards, oversight, prevention and prosecution of violations of law in the territorial waters and jurisdictions of Indonesia by synergizing and monitoring the implementation of patrols in the waters by relevant agencies. Bakamla is a manifestation of the realization of Indonesia's concept as a maritime axis, as the newly established institution Bakamla must be able to regulate and manage institutions that have authority in the sea. The problem with Bakamla is that it does not have an integrated system that is able to manage resources in several institutions, especially institutions that have legal authority at sea. Enterprise Resource Planning (ERP) is a system that can overcome the problem of resource management in several institutions, ERP is a system that integrates several institutional tasks so that it can streamline institutional activities, facilitate interaction between institutional units and provide easy access to information. This study aims to develop an ERP application for the planning, assignment, supervision and control processes in each of Indonesia's marine security areas. This ERP is developed with the Waterfall method which is a sequential process design which in the process looks like a waterfall flow from the concept design process, project identification, analysis, design, coding, testing, implementation and maintenance. The results of this study have been able to regulate all supervisory activities, control and assignment of resources of each institution under the coordination of Bakamla so as to improve marine security in Indonesia.

1. Introduction

The Indonesian Marine Security Agency (Bakamla) has the task of conducting security and safety patrols in the territorial waters and jurisdictions of Indonesia. Bakamla has duties and functions such as (a) formulating national policies in the field of security and safety in the territorial waters and jurisdictions of Indonesia, (b) organizing early warning systems for security and safety in the territorial waters of Indonesia and the jurisdiction of Indonesia, (c) synergizing and monitoring the implementation of water patrols by relevant agencies, (d) providing technical and operational support to relevant agencies, (e) providing search assistance and assistance in the territorial waters and jurisdictions of Indonesia and (f) carrying out other duties in the national defense system [1, 2]

The formation of the Indonesian Marine Security Agency (Bakamla) is a mandate of Law Number 32 of 2014 concerning Marine Affairs. Bakamla has the authority to synergize the implementation of security, safety and law enforcement patrols at sea. The formation of Bakamla is a form of the seriousness of the Indonesian people in order to strengthen the supremacy of sovereignty and law in the Indonesian sea region [3]. The formation of Bakamla has changed the government's paradigm in managing security, safety and law enforcement in the sea which has been considered ineffective and



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inefficient. Furthermore, the formation of Bakamla is an answer to the needs of the international community and Indonesian sea users towards legal certainty in the Indonesian sea territory [4].

Bakamla has a National Picture Compilation (NPC) information technology system. This system is a system developed by Bakorkamla by optimizing the access of two satellites, namely Inmarsat and Vsat. Both satellites are also used by the Ministry of Transportation and the Ministry of Maritime Affairs and Fisheries. This NPC system works by combining weather forecast data, basic maps of the earth's appearance, current patterns, maps of fishing grounds, and information from the Vessel Monitoring System (VMS). All data and information is collected in the Bakamla Integrated Information System (BIIS) which has been developed since 2007. In addition, Bakamla has a Maritime Regional Crisis Center (MRCC) and Regional Crisis Center (RCC), which are monitoring stations spread throughout Indonesia, especially to monitor the Indonesian Archipelago Sea Flow. The station is equipped with radar, AIS, Long Range Camera, and other communication equipment that is placed in almost all of Indonesia [5].

Bakamla's problem in carrying out maritime security operations along with other institutions is often overlapping because they do not have an information system that is able to access the resources of each institution and plan resources to carry out joint tasks to monitor and secure the Indonesian sea. This study aims to develop Enterprise Resource Planning (ERP) to coordinate all the resources, information and activities needed for the Indonesian maritime security process. ERP is software that is able to integrate all institutions into one computer system that can serve all the needs of the institution starting from patrol boats, personnel, fuel requirements and operational costs [6, 7]. The results of this study will provide a positive contribution to the implementation of marine security and safety in the territorial waters and national jurisdictions. This makes the implementation of safeguarding sea security and safety more effective and efficient.

2. Materials and Method

2.1. Enterprise Resource Planning

Enterprise Resource Planning (ERP) is a corporate / institutional information system designed to coordinate all the resources, information and activities needed for a complete business process. ERP is a software that integrates all departments and functions of a company / institution into a computer system that can serve all the needs of companies / institutions, both from the sales, human resource development, production or financial departments. ERP combines the various needs of one software in one logical database, making it easier for all departments to share information and communicate [8, 9].

ERP technology in Bakamla can integrate assignment functions, operating functions, logistics functions, finance functions, resource functions, production functions and other functions (Figure 1). ERP has developed as an integration tool that has the aim of integrating all enterprise applications to the center of data storage easily accessible to all parts that need it, data integration on ERP technology is done with single data entry [10, 11].



Figure 1. Bakamla ERP

The implementation of ERP will provide significant benefits for companies / institutions. The first is to improve the quality and efficiency of internal business of the company / institution which results in significant improvements in quality and efficiency in customer service, production and distribution. Second, it is able to reduce costs. The third can be used as a decision support quickly, accurately and accurately. Fourth, increasing the agility of companies / institutions to produce organizational structures, managerial responsibilities, and a more flexible work role [12].

2.2. Indonesian Marine Security Agency

The Indonesian Marine Security Agency, called Bakamla, is the mandate of Law No. 32 of 2014 concerning maritime affairs and presidential regulation Number 178 of 2014 concerning Bakamla. Bakamla was present to replace Bakorkamla which has a legal basis for Presidential regulation number 81 of 2005 concerning Bakorkamla which is a derivative of Law number 6 of 1996 concerning Indonesian waters. Substitution was carried out because Bakorkamla was deemed no longer able to adjust the environmental needs according to the time [1, 2, 4].



Figure 2. Bakamla with 12 institutions that have legal authority ¹ at sea

The formation of Bakamla is a form of the seriousness of the Indonesian people in order to strengthen the supremacy of sovereignty and law in the Indonesian sea territory. The formation of Bakamla has changed the government paradigm in managing security, safety and law enforcement in the sea which has been considered inefficient and effective. Furthermore, the formation of Bakamla is an answer to the needs of the international community and Indonesian sea users towards legal certainty in the Indonesian sea territory.

As stipulated in Law No. 32 of 2014 concerning maritime affairs, Bakamla has command and control over the implementation of security, safety and law enforcement operations in the territorial waters of Indonesia and the jurisdiction of Indonesia. One of Bakamla's functions is to synergize the implementation of patrols carried out by twelve agencies that have authority in the sea (Figure 2)

The synergy between institutions starts from the planning, budgeting, implementation and legal process of security, safety and law enforcement patrols conducted by all patrol units owned by Indonesia. Thus, that synergy will not cause overlapping of the operational area and authority. This will make all operations carried out under the command and control of Bakamla a "one for all operation" or no longer a sectoral operation. It must be understood that the formation of Bakamla will not eliminate the authority possessed by the existing institutions because the executors of Bakamla are all stakeholders who have a patrol fleet. The handling of the legal process caught by the Bakamla operation will be given to the authorized agency [12, 13].

2.3. Indonesian Marine Security

The concept of security has become very widespread in relation to the development of conceptions and threats that arise in human life which ultimately requires handling to eliminate these threats with the aim of creating security. Maritime Security is interpreted differently by each individual or organization depending on various interests included in it. However, on the other hand maritime security is part of expanding the debate about the meaning of security. Maritime security itself has never been identified as an independent issue sector. From a military perspective maritime security has traditionally referred to national security attention in the sense of protecting a country's territorial integrity from the threat of the armed forces or the use of armed forces and protecting the national interests of the country wherever they are (in the oceans) [14].

The UN provides identification of activities in general which are considered a threat to maritime security. In the UN secretary general's report, there were at least 7 threats specific to maritime security. First, piracy and armed piracy against ships that specifically endanger the welfare of seafarers and the security of navigation and trade. Second, terrorism activities that target ships, offshore installations, or maritime interests that provide broad effects including economic aspects of the attacks carried out. Third, illegal trade in weapons and weapons of mass destruction. Fourth, drug trafficking, psychotropic substances where almost 70% of these goods are carried out by sea. Fifth, smuggling and human trafficking. Sixth, Illegal Fishing, Unreported Fishing, Unregulated Fishing are a threat to fish availability related to international peace and security. Seventh, intentional and unlawful damage to the marine environment that threatens the security of one or more countries related to social and economic impacts on the surrounding countries [15].

2.4. Research methods

Figure 3 shows that the framework of this research starts from problem identification, data collection process, data analysis process, ERP design process, application of the waterfall method and the application of Bakamla ERP.

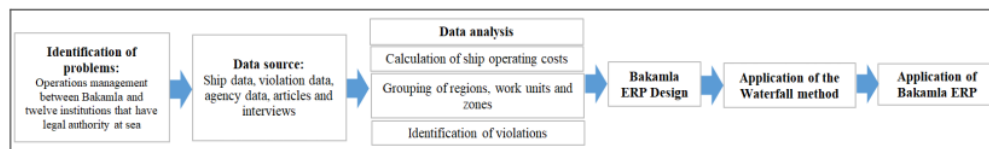


Figure 3. Research framework

The research method applied in this study is the waterfall method. The waterfall method is a systematic and sequential information system development model [16, 17]. The waterfall method has stages as shown in Figure 4. The study begins with a literature study and then continues with the system development stage. The system development phase begins with the analysis and definition of needs followed by system design, implementation, testing and maintenance.

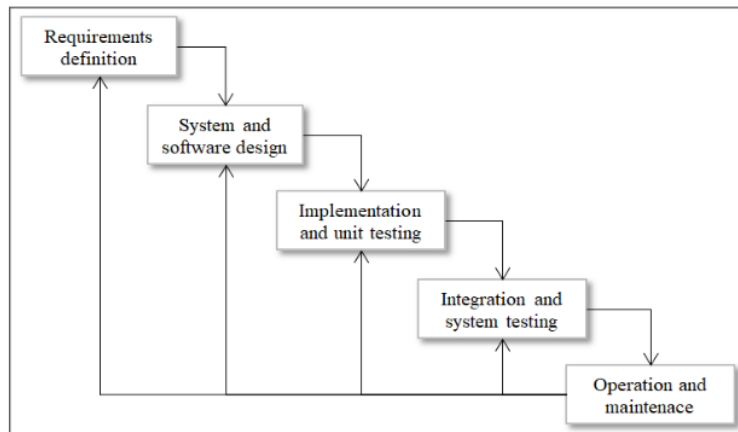


Figure 4. Waterfall method

In its development the waterfall method has the following stages:

1. *Requirements analysis and definition*
System services, constraints and objectives are determined by the results of consultation with users which are then defined in detail and function as a system specialization.
2. *System and software design*
The system design stage allocates the needs of hardware and software by forming the overall system architecture. Software design involves identifying and describing basic software system abstractions and their relationships.
3. *Implementation and unit testing*
At this stage, software design is realized as a series of programs or program units. Testing involves verifying that each unit meets specifications.
4. *Integration and system testing*
Individual program units are combined and tested as a complete system to ascertain whether or not they meet the needs of the software. After software testing can be sent to the customer.
5. *Operation and maintenance*
This stage is the longest. The system is installed and used real. Maintenance involves correcting errors that are not found at later stages, improving the implementation of the system unit and improving system services as new needs.

The superiority of the software development model approach with the waterfall method is a reflection of engineering practicality, which keeps software quality maintained because of its structured and supervised development. On the other hand this model is a complete document type model, so that the maintenance process can be done easily.

3. Results and Discussion

The ERP system is an integrated and web-based system. The system developed in this study consists of five main modules, namely:

- a. Ship module
This module is a module that regulates the inventory of surveillance or patrol vessels from several institutions that have legal authority at sea.
- b. Human resources module
This module is a module that regulates human resources that will be assigned to each ship by several institutions.
- c. Cost Module

Based on the results of the Bakamla ERP development stage, it can be seen in Figure ¹ the next step is ERP implementation to regulate security operations at sea by involving 12 (twelve) institutions that have legal authority at sea. The results of the trial of the Bakamla ERP application can be seen in Figures 7, 8 and 9.

Nama Kapal	Kecepatan	Endurance	Radar	BBM	Action
KRI Nuku	15	4	45	12.200	[Add] [Edit] [Delete]
KRI Untung Suripati	14	4	45	12.200	[Add] [Edit] [Delete]

Figure 7. Ship module

The ship module in Figure 8 shows that the specification data and vessel status can be traced. Each institution functions as a user and Bakamla as an admin in this ERP application. Users can carry out activities of adding, deleting, editing and searching for ships owned, the admin can carry out activities to add users, able to assign a vessel owned by the user to join a joint sea security operation carried out by Bakamla. With this ship module, the Government is able to analyze its strengths to improve Indonesia's marine security and be able to minimize the operational costs of Indonesia's marine security.

Nama Wilayah	Luas Wilayah	Action
Jawa Barat	299 hectar	[Add] [Delete]
Jawa Timur	200 hecter	[Add] [Delete]

Figure 8. Regional and work unit modules

Regional and work unit modules as shown in Figure 9 show that this ERP application can add and delete work unit areas according to the data in each institution. Based on government regulations in the area of law enforcement in the sea divided into 2 (two) parts, first is the Indonesian territorial waters, namely the territorial sea which has a distance of 12 Neautical Miles (NM) from the mainland, the second is the Indonesian jurisdiction namely the additional zone (24 NM), Zone Exclusive Economy (200 NM) and high seas (above 350 NM).

The joint operation module by Bakamla as shown in Figure 9 shows that this ERP application is capable of managing and managing several vessels owned by several institutions to carry out joint operations according to a set schedule. With the module application, the government is able to regulate

the power of defense equipment, regulate state finances, regulate the placement of ships to each region or work unit.

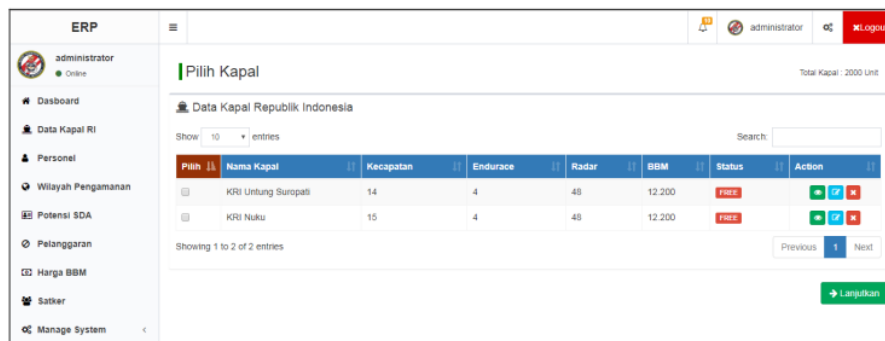


Figure 9. Bakamla operating module

The successful application of Enterprise Resource Planning (ERP) for the Indonesian Marine Security Agency has been able to solve several system data and information problems related to the sea area, the use of marine space and its utilization that has not been integrated. As for some ERP achievements that have been implemented are able to integrate (a) vessel data owned by 12 (twelve) institutions, (b) data on supervision areas in 12 (twelve) institutions, (c) area vulnerabilities in each work unit, (d) the need for operating costs, (e) the needs of personnel in each institution, (f) the process of scheduling joint operations. For the perfection of ERP applications, it is necessary to validate according to user needs, namely Bakamla and involve 12 (twelve) other institutions that have legal authority in the Indonesian sea.

The results of the Bakamla ERP trial were to identify violations in 3 (three) zones namely the western zone, the first was the smuggling of goods, the second was fish theft, piracy and the third was a documentless vessel. Middle zone, first is smuggling of fuel oil, second is fish bombing, ecosystem destruction, people smuggling and third is fish theft, drug smuggling, smuggling of goods. The eastern zone, is a documentless vessel and theft of fish, the second is the smuggling of fuel oil and the third is the smuggling of alcohol, arms smuggling and piracy.

4. Conclusion

This study has succeeded in integrating institutional resources, use and utilization of marine space, operating budget requirements ¹ and identification of violations in each region. This research will help the Government implement Law number 32 of 2014 concerning maritime affairs and RI Presidential Regulation No. 178 of 2014 concerning Bakamla.

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