Design and Development Executive Information System Application with Drilldown and What-If Analysis features

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Abstract. Indonesia has a big potential in the agriculture sector, paddy is the leading commodity in the food crop sub-sector. To achieve food self-sufficiency, the availability of paddy commodities information is needed to support stakeholders in making decisions. The problem presented in this paper is how to develop executive information system software that provides summarized information related to production, land area and productivity of paddy. To answer the question above, the following steps are needed: a. design and b. develop the Design process from this paper using the iconix process and result from the build process is an application Executive Information System (EIS). The application developed uses the drill-down graphics and what-if analysis facility to display land area, production, and productivity, the information displayed provides valuable insights into the industry and helps in decision making.

1. Introduction

Executive Information System (EIS) is a module in decision support systems (DSS) supported for the board of directors and senior manager [1], the EIS application can support management level to make decision. EIS is not a new technology or new scientific of technology. In other side, it is software that includes a compilation from applications, data, and network communications to display important information to management[2].

Paddy is one of the important components of the nine basic necessity of people in Indonesia, it is belong to key commodities and need to monitoring of growth a production, land area and productivity. the problem is how to develop system that summarize of information from the paddy data so the stakeholders can provide the appropriate decision. To answer this question a system of software was built that could supply data with features of drilldown graph.

To develop the application of EIS paddy production required following step an analysis and design then proceed with the process application development. In this paper a process analysis and design using iconix process with Unified Modeling Language (UML) approach, the advantages of using iconix process is a robust and simplified approach that concentrate on that area in between use cases and code. The focus is on what require to occur in lifecycle. The second process, application development using Programming Hypertext Processor (PHP). The Iconix processes use a dynamic and static approach, this process can be used for small to complex scopes[3]. Therefore, the iconix process is very useful for agile projects and requires fast feedback, and usecase driven approach [13]. Iconix process is a based-storyline approach [6]. The main rule mechanism for break down process and
modeling the system is on a scenario-by-scenario basis. The EIS includes capabilities for graphic presentation and doing “what-if” scenarios, the EIS features make executives easy-to-use the application [5]. The Executive will use all available resources. The EIS is built for the information needs of senior management, and it depends on graphic and data[15].

2. Methodology

In this paper using iconix process with UML approach for analysis and PHP for programming language. Driven object modelling is a potential to increase productivity and upgrade quality of software systems are the key reasons for the adopted [7,14], iconix process is a based on driven object modelling. Iconix process has been applied in various case studies such as the Library [7], E-Commerce[8], real-time oriented system-the Digital Loop Carrier(DLC)[9], and describe of business processes and user requirement of systems[10].

Methodology in this paper use to solve problems, the step as following: 1st is a collecting data, 2nd analysis and design using iconix process, 3rd implementation of analysis in code, and 4th result and discussion and the last step is a conclusion(Figure.1).

3. Result and Discussion

3.1. Domain Model Diagram

Domain Model is a dictionary of term used in a project, the benefit is to make unite of perception everyone in the project and understands of scope so that reduce an unambiguous from user requirements. The domain model used to define the scope of project and forms basic from construct your use case.
3.2. Use Case Diagram

Use case is a collection of some user activity when in the system, this model an elaborate between the system requirements and relation with user. In iconix process, use case has 2 processes, namely use case text and use case diagram. The guidance for describes a use case text using two scenario, a basic course (successful scenario) and an alternate course (failed scenario). Use case text can be found at use case model, robustness model and sequence model.

1) Use Case Text

**Figure 3. Use Case Text Login Application of EIS Paddy Production.**

| Basic Course: | Alternate Course: |
|---------------|-------------------|
| User manager: user input username and password, if successful login then show menu view data, drilldown and what-if analysis. | If login unsuccessful then back to login page, and show error “Username or password undefined, please contact your administrator.” |
| User IT Staff: user input username and password, if successful login then show menu edit data, view data, drilldown and what-if analysis. | |

**Figure 4. Use Case Text View Data.**

The basic course in use case text using to scenario if the stages in system are running-well. whereas, the alternate course use when the scenario are not fit. In Figure 3 represent use case text for login condition, when username and password is correct and then system will redirect to dashboard menu(basic course) and when unsuccessful to login show message “username or password undefined, please contact your administrator”(alternate course)

2) Use Case Model

**Figure 6. Use Case Model Login**

Figure. 6 describes use case model for login, if user (Manager and IT Staff) want to using EIS Application, it must access login page. Relationship between EIS Application and login is a “include”,
relation "include" in use case has meaning; one use case must be preceded by the process/form/function that is owned by another use case. After login, user can access process view data province, drilldown, what-if analysis and update data [see Figure 7].

3.3. Robustness Diagram

![Robustness Model of process drilldown of chart](image)

**Figure 8.** Robustness Model of process drilldown of chart

3.4. Sequence Diagram

Sequence diagram describe a communication and feedback among internal object and system (model, view and controller), interactions inter-object depicted sequentially based on time[11].

![Sequence Model of process drilldown and show data with chart](image)

**Figure 10.** Sequence Model of process drilldown and show data with chart
Figure 10 describes about step by step process drilldown graphics, beginning from a method view_Chart_production (Figure. 11) until displayChart; basic course. When, data cannot load, system will redirect to controller dataCan’tLoad() after that system will show the message; alternate course.

```javascript
function view_chart_production()
{
  $('#dataprovince').removeClass("active");
  $('#drilldown').addClass("active");
  $('#whatif').removeClass("active");
  $('#pp_padi').removeClass("active");
  $.ajax(
    type: "POST", url: "proses/chart.php?production",
    dataType: "html", beforeSend: function(e) {
      if(e && e.overrideMimeType) {
        e.overrideMimeType("application/json;charset=UTF-8");
      },
      success: function(response)
      { $('#content').html(response);
        document.documentElement.scrollTop = 0;
      });
  });
}
```

**Figure 11.** Implementation of view_chart_production() function.

### 3.5. Implementation System

The implementation from system analysis (Figure. 12 & Figure 13) and depicted in graphical form, Java Island (West Java, Central Java, and East Java) has a large contribution to the supply of paddy in Indonesia (Figure.12), some regions exposure to shortages in the amount of paddy production. Increasing and decreasing in yield of production caused by many factors, so that the paddy yield becomes unequal. In this application, some regions maximized in agricultural potential yet, especially paddy production. The results of this application can be used as a reference by decision makers to plan strategies to increase rice production in Indonesia. The data in this study were taken from the Ministry of Agriculture of the Republic of Indonesia [12].

### 4. Conclusion

Data collection is a key process in this research, if the production data in several regions not inputted yet, the results displayed by the system will not be optimal. Further research development and discussion is an analysis of disparities the rice production in unequal areas. Requirement analysis is important thing in software development, and adjusted to user requirement. This paper recommends an effective requirement analysis method using iconix process and the system successfully developed. Modelling a system using the iconix process requires practice and experience from the person who is modelling it. The more experienced a system analyst, the more detailed the results of his analysis, in this paper result from system analysis are a use case text, use case, robustness diagram and sequence diagram.

**Figure 12.** Form Drilldown paddy production before click detail
Figure 13. Form Drilldown detail of paddy production in East Java

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