

# Promotion bureau warehouse system design. Case study in University of AA

N Parwati<sup>1</sup> and M Qibtiyah<sup>2</sup>

<sup>1,2</sup>Industrial Engineering Department, Faculty of Science and Technology,  
University of Al Azhar Indonesia, Masjid Agung Al Azhar, Jalan  
Sisingamangaraja Road, Kebayoran Baru, South Jakarta 12110, Indonesia

<sup>1</sup>niken\_parwati@yahoo.com

**Abstract.** The warehouse becomes one of the important parts in an industry. By having a good warehousing system, an industry can improve the effectiveness of its performance, so that profits for the company can continue to increase. Meanwhile, if it has a poorly organized warehouse system, it is feared there will be a decrease in the level of effectiveness of the industry itself. In this research, the object was warehousing system in promotion bureau of University AA. To improve the effectiveness of warehousing system, warehouse layout design is done by specifying categories of goods based on the flow of goods in and out of warehouse with ABC analysis method. In addition, the design of information systems to assist in controlling the system to support all the demand for every bureau and department in the university.

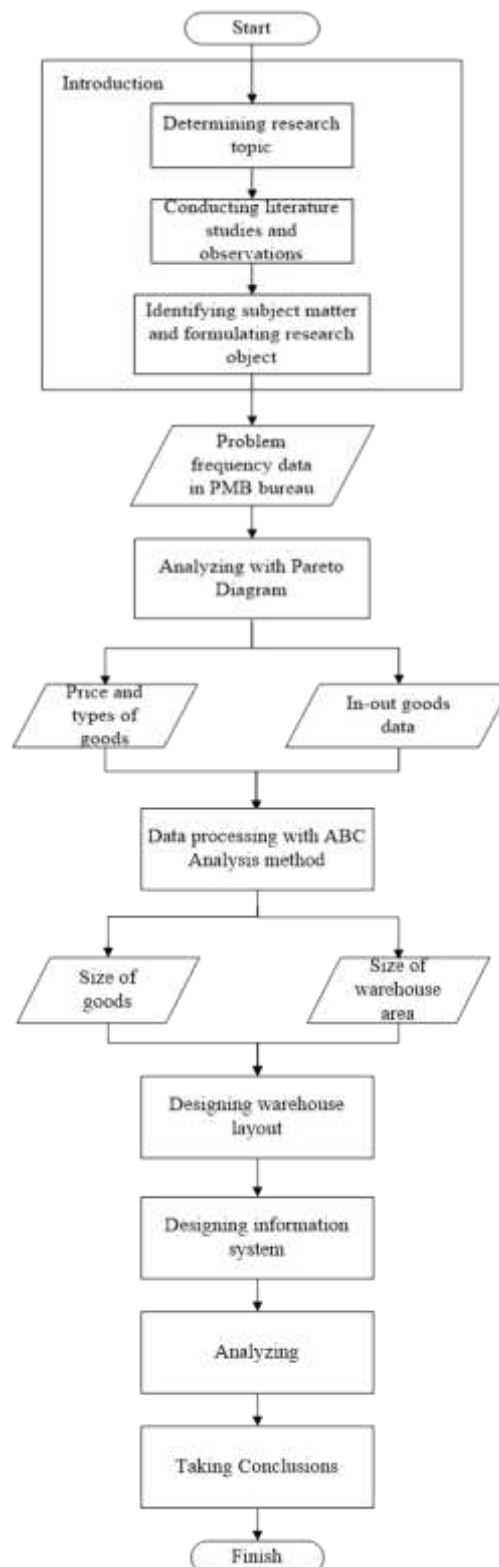
**Keywords:** warehouse, ABC analysis, layout, information systems

## 1. Introduction

In a service company such as university, it is required to have a warehouse to store all goods that supporting the business activities. Warehouse is a place to store various goods ranging from raw materials, production goods, production tools, work-in-process goods, to finished good [1]. The Promotion Bureau in University of AA, has an objective to have targeted number of intake college student, through sales and marketing activities such as exhibitions, high school visits, and events (open house, teacher seminars, and others). In supporting this objective, the bureau warehouse has to guarantee that the merchandises are always available when needed. In this case, the warehousing system at the Promotion Bureau had not been arranged systematically and properly. Especially in inflow outflow system that need an arrangement of warehouse layout and IT support system. In this research, the layout arrangement was using ABC Analysis method. IT system was also designed for the warehouse so that the good inflow and outflow could be record and done properly.



## 2. Methods



**Figure 1.** Research Methodology

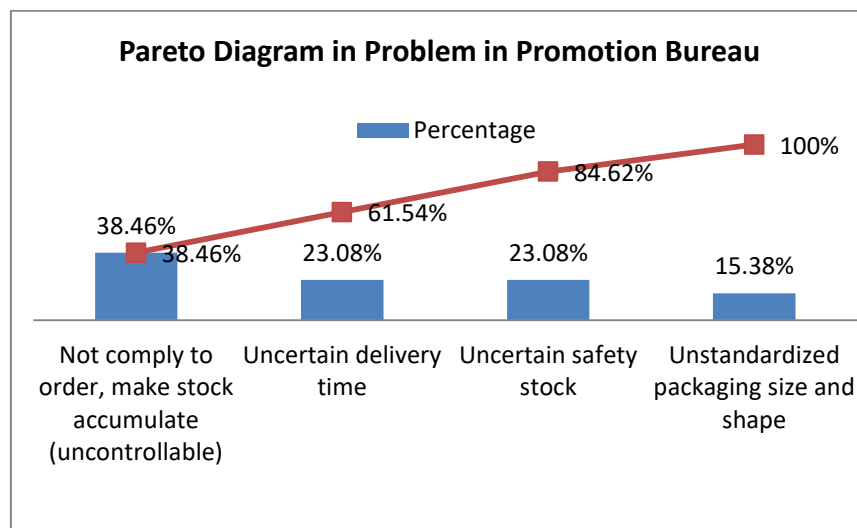
### 3. Result and Discussion

#### 3.1. Data Collection

Data collection was done by conducting interviews and observations at the research sites. In addition, the data collected also comes from the recapitulation of data on the receipt and demand of goods, delivery order, the price of goods, as well as data warehouse and size of goods in the warehouse.

#### 3.2 Pareto Diagram Analysis

Pareto diagram analysis is conducted to find out the causes of problems that often occur in the Promotion Bureau associated with inventory or inventory. In this pareto diagram analysis, the researchers conducted interviews with Mr. Nurfadillah, S. Kom as the Promotional Officer who have access in control of inventory and warehousing. Interviews were conducted to determine the types of problems that often occur as well as the frequency of occurrence of the problem.



**Figure 2.** Pareto Diagram Analysis Results

#### 3.3 Data Processing

##### 3.3.1 ABC Classification

ABC Classification is a method of group creation or classification based on the rank of value from the highest value to the lowest value, and is divided into 3 major groups called groups A, B, and C [6]. In ABC method classification, was done by making a list of inflow and outflow during one period from January 2016 - January 2017. After that, the list of goods was ranked based on demand quantity.

Because of different supplier and different time of order, each type of goods, the price is not fixed, so we use average price. Then we calculate the total price in every category.

From the processing by using ABC classification method, it can be concluded that there are 7 types of goods that fall into category A with the total product price of Rp 285,916,875, -, 9 types of goods that fall into category B with the total product price of Rp 55,081. 025, -, and 30 types of goods that fall into category C with total product price of Rp 19,378,000, -. From these results it was known that the total of goods included in the categories A, B and C there are 46 items with the total price of the product as much as Rp 360.375.900.

**Table 1.** Classification of Goods on Promotion Bureau Warehouse with ABC Method

ABC Classification	Number of Goods	Total Price	Total Price Percentage	Cumulative Percentage
Category A	7	Rp285,916,875	79.34%	79.34%
Category B	9	Rp55,081,025	15.28%	94.62%
Category C	30	Rp19,378,000	5.38%	100.00%
TOTAL	46	Rp360,375,900		

After grouping of goods in the warehouse by the ABC classification method, the researcher did the design of the warehouse layout based on the result of ABC classification. Goods in Category A are placed near the exit / entrance of the warehouse to facilitate the operator in the process of expenditure and the entry of goods, it is because Category A has a high intensity in the outflow / incoming goods in the Promotion Bureau warehouse. Goods in Category B are placed not so far from the entrance / entrance of the warehouse, it is because the goods in this category have the intensity of being in the outflow / incoming goods on the warehouse of Public Relations Bureau and PMB. Goods in category C are placed away from the warehouse entrance / entrance, this is because the goods in this category have a low intensity in the outflow / incoming goods in the Promotion Bureau warehouse

This re-arrangement expected to assist the staff, especially the operators, in the process of taking the needs or in filling stock.

The area in the warehouse was divided into 3 areas, namely area A, which belongs to the category of Golden Zone, area B which belongs to the category of Silver Zone and area C which belong to Bronze Zone category.

**Figure 3.** Proposed Layout of Promotion Bureau Warehouse

After designing the layout, the collection of category A items from the warehouse was simulated, to calculate the efficiency and effectiveness level of the layout changes in the warehouse. The simulation results show that the improved layout design can decrease the collection time of goods up to 50% from the previous one. The calculation results can be seen in Table 2.

**Table 2.** Simulation of Goods Taking Time

Taking Goods Process	Before Layout Designing	After Layout Designing	Efficiency Percentage
Goody Bag	15	6	40%
Notes	20	5	25%
University Brochure	20	10	50%
Pen	15	7	47%
Blocknote	15	7	47%

### 3.3.2 Information System Design

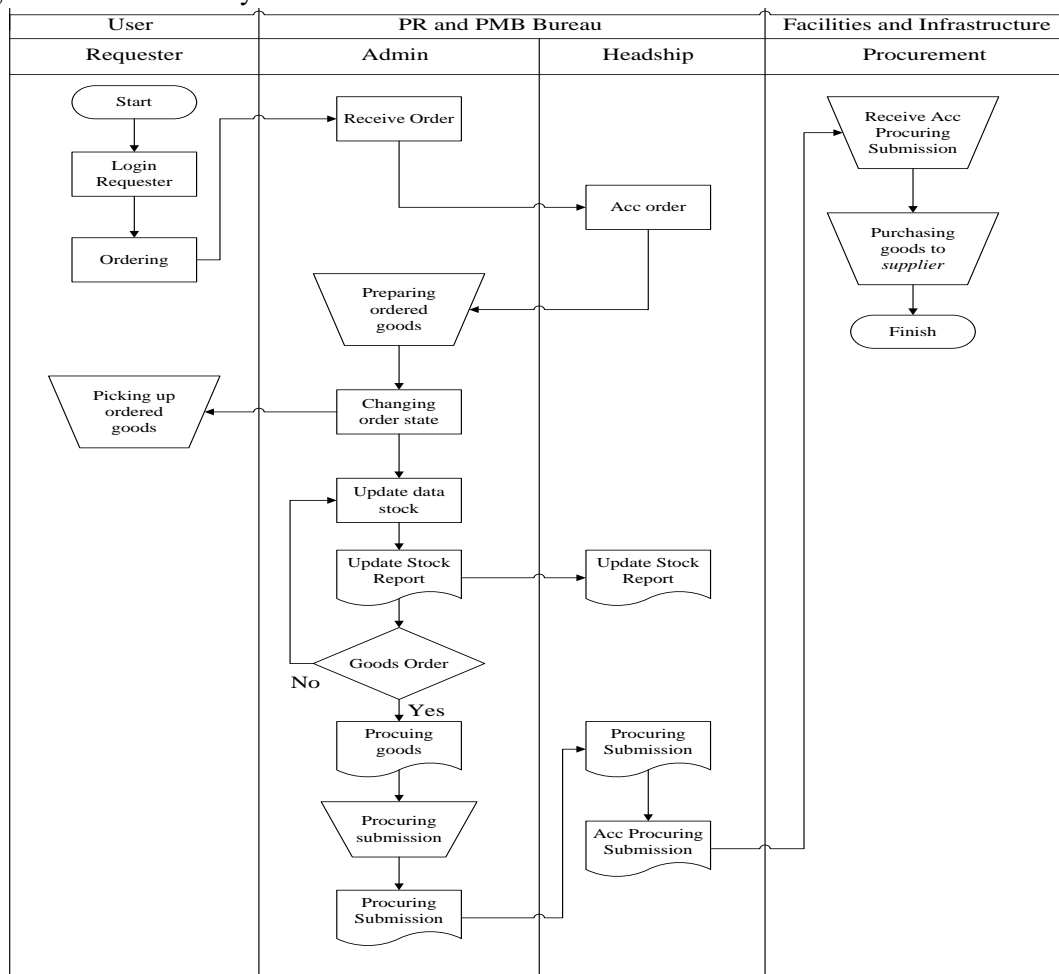
Information systems can be defined as a systems made by humans in general composed of a set of integrated computer-based components as well as manual components established to collect, store and organize data and provide output information for its users [3]. In this study, besides proposing the warehouse layout design, the researcher also made the proposal of information system design. The objective was that employee can locate goods efficiently, also could control all goods in the warehouse effectively and efficiently.

#### 3.3.2.1. Identifying Actors

In the design of information systems, first identification of actors involved in the information system. In the warehouse information system of Promotion Bureau, it is designed to have 2 actors directly involved in the information system. The actor is Requester and admin. In addition, there are also two actors who are not directly involved in the information system, namely the leadership and the procurement department.

#### 3.3.2.2. Mapping Chart of System Information Design

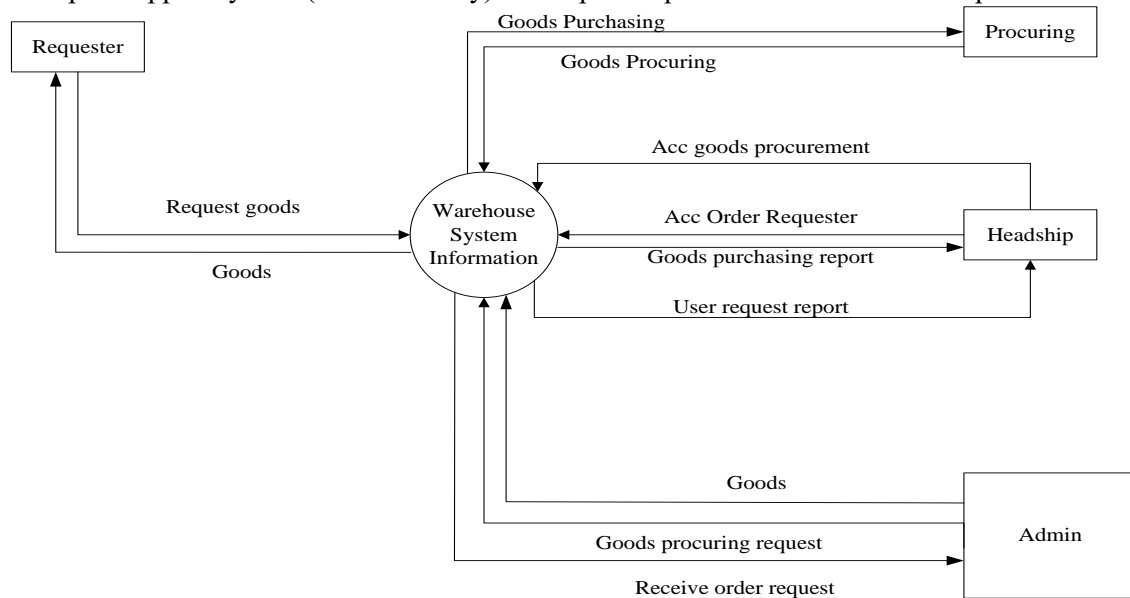
In the design of information systems, Mapping Chart serves to describe the flow of documents, data and information that will run on the system. The design of Mapping Chart warehouse information system was made based on the flow of documents, data and information that goes in the process running in the information system.



**Figure 4.** Promotion Bureau Warehouse Mapping Chart Information System Design

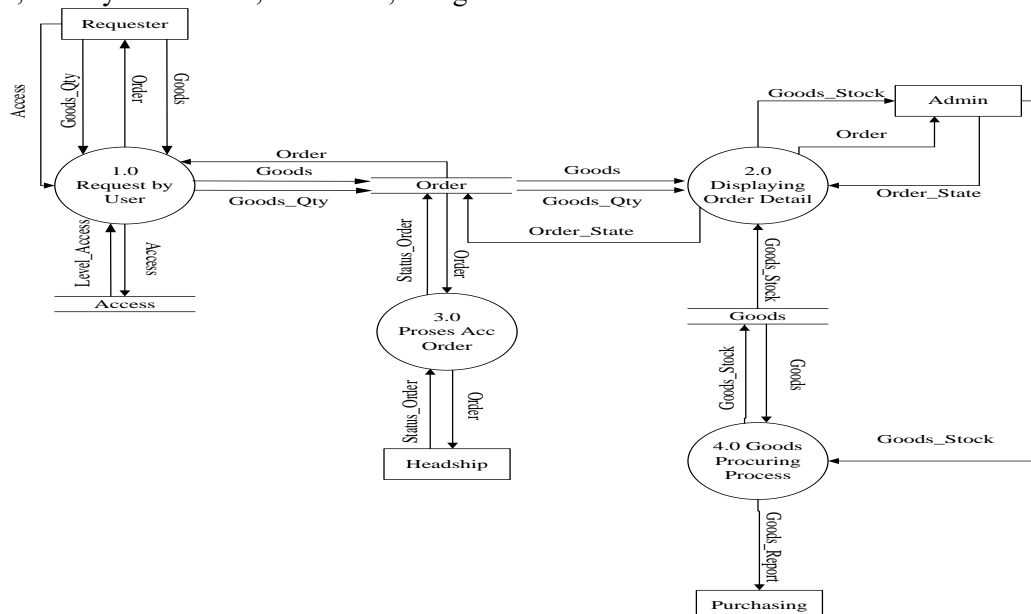
### 3.3.2.3. Data Flow Diagram

Data Flow Diagram (DFD) is a tool used to describe the flow of existing data in the system and a process performed by a system. To be able to make DFD required symbols to describe the flow of data [4]. In this study, DFD is described to be 3 levels: level 0, level 1, and level 2. At DFD level 0, the data flow in the information system is described thoroughly. In the picture above can be seen that DFD has 2 entities that are directly related to the system that is Requester and admin and there are 2 entities that become part support system (external entity) that is part of procurement and leadership.



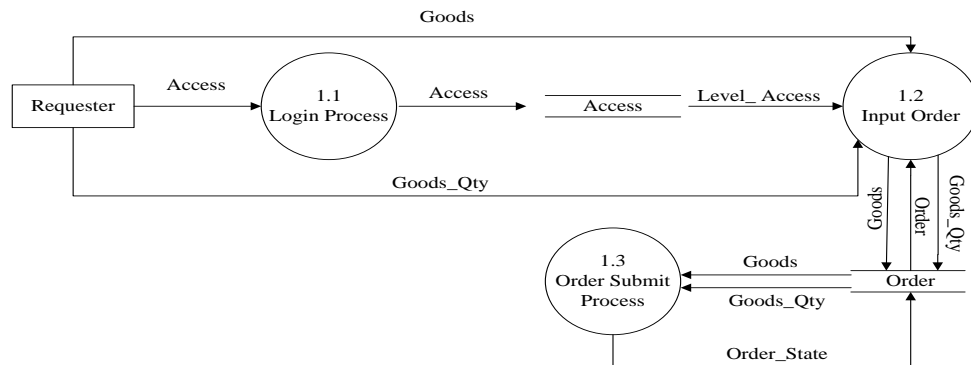
**Figure 5.** DFD Level 0 Design of Information Systems for Promotion Bureau Warehouse

In the DFD level 1, described the flow of existing data in the warehouse information system. It can be seen in that the DFD level 1 has 4 process data flow with 2 entities that directly relate to information systems and 2 external entity as a support system information. In addition, there are 3 databases that are used, namely data access, order data, and goods data.



**Figure 6.** DFD Level 1 Information Systems Design

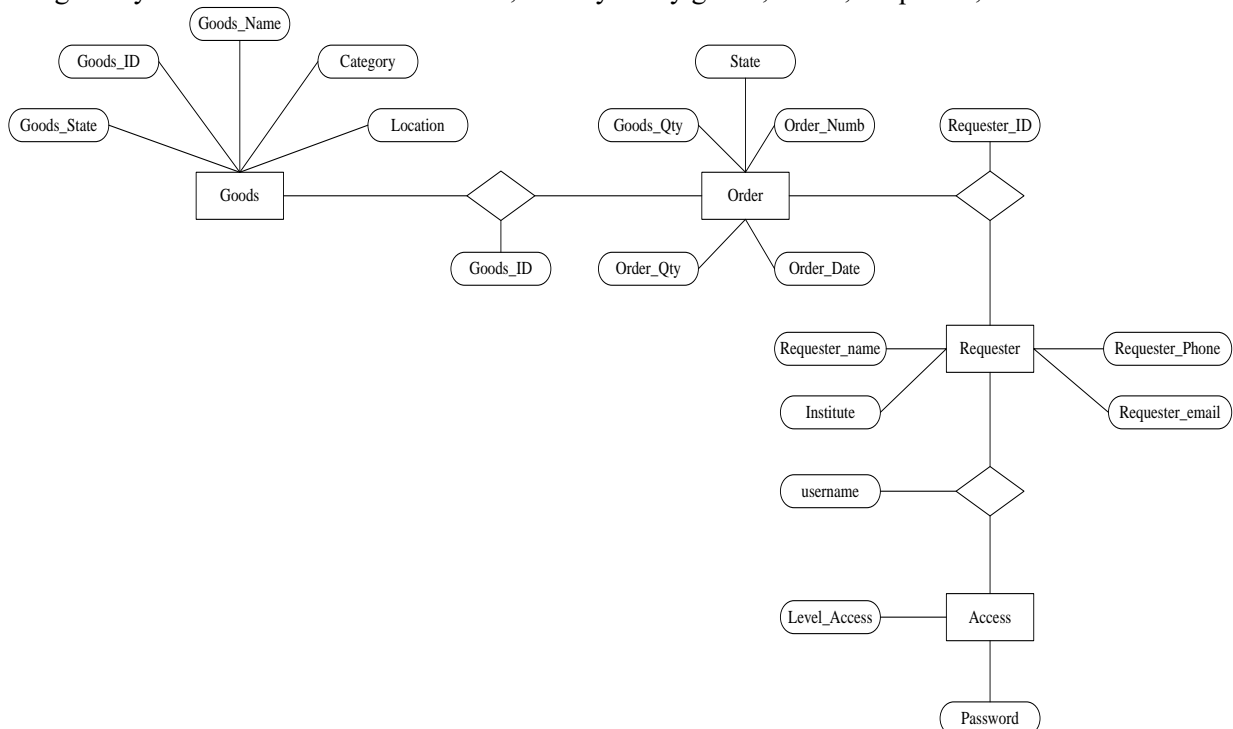
DFD level 2 describes the process that exists in level 1 DFD more specifically. In this case, DFD level 2 describes the Request by User process in DFD level 1. In the figure can be seen DFD level 2 has 1 entity that is Requester with 3 interconnected processes, and the database used is data access and order data.



**Figure 7.** DFD Level 2 *Request by User*

#### 3.3.2.4. Entity Relationship Diagram (ERD)

Entity Relationship Diagram (ERD) is a set of ways or tools to describe data or objects created based on and derived from the real world called entities (entities) and relationships between entities using several notations [2]. In information systems, Entity Relationship Diagram (ERD) is made to see the relationship between entities contained in an information system. Entities in information systems designed by researchers that divided into 3, namely entity goods, Order, Requester, and Access.



**Figure 8.** ERD Warehouse Information System of Public Relations and PMB

#### 3.3.2.5. User Interface

[5] argued that the interface consists of 2 kinds of interface system and user interface. The interface system is a display for other systems, while the user interface is the view for the user. From the design that had been built, the user interface were created. For access as a requester, users can directly order.

In the order menu there is information that must be filled by requester to order goods, such as name, need, and due date or the required date of the goods. In the order menu, requester can also choose their own items needed and see the amount of goods provided by the Admin. In the order menu there is also a sign submit to submit order if the requester has finished doing the selection of goods for the order. Display menu order on the information system can be seen in Figure 9.

The screenshot shows the 'Order' page for a requester. It features a header with a title and subtitle, and a sidebar menu with options like Home, Profile, Order, and Order Bag. The main content area has a form with fields for 'Nama', 'Keperluan', and 'Due date', followed by a 'Submit' button. Below the form is a table with columns: 'No', 'Id barang', 'jenis', 'ketersediaan', and 'Jumlah order'.

**Figure 9.** User Interface Layout Page *Order For Requester*

The screenshot shows the 'Input Stock' page for an admin. It features a header with a title and subtitle, and a sidebar menu with options like Home, Profile, Input Stock, Order Request, and Order List. The main content area has a form with fields for 'Admin' (with a dropdown menu) and 'Date' (with a date picker). Below the form is a table with columns: 'No', 'Id barang', 'jenis', 'Stock sebelum', 'Stock Sesudah', and 'Update Stock'. An 'Update' button is located at the bottom right of the table.

**Figure 10.** User Interface Layout Page *Input Stock For Admin*

Figure 10 shows the input page for the admin. When going to input, admin must first write the name and date of input stock. After that the admin can do input stock on the system. After the input is complete, the admin then selects the update menu to include stock updates on the system.

#### 4. Conclusion

Based on the analysis and discussion on the warehousing system of Promotion Bureau, the conclusion was below:

1. The more effective system for Promotion Bureau warehouse can be built by changing the layout and develop information system to facilitate the staff in controlling the warehousing system.
2. From the results of ABC Analysis can be concluded that:
  - a. From 46 types of goods, there are 7 items included in category A, 9 items belonging to category B, and 30 types belonging to category C.
  - b. Proposed layout were made Warehouse layout changes can decrease the retrieval time up to 50% of the load time before the layout changes.
3. To ease the control of goods in the warehouse, the information systems was design by making ERD and DFD for information system.

#### 5. References

- [1] Apple J M translated by Nurhayati Mardiono 1990. *Tata Letak Pabrik Dan Pemindahan Bahan* (Bandung: ITB Press)
- [2] Edi D and Bethsani S 2009 Analisis Data dengan Menggunakan ERD dan Model Konseptual Data Warehouse *Jurnal Informatika*, Bandung **Vol.5**, No.1, 71 – 85
- [3] Gelinas UJ and Dull R B 2010 *Accounting Information Systems* (Ohio: South-Western Cengage Learning)
- [4] Whitten J L, Bentley L D, Dittman K C, and Translated Team 2004. *Metode Desain dan Analisis Sistem* (Yogyakarta: Andi)
- [5] Mathiassen L 2000 *Object Oriented Analysis and Design* (Denmark: Makro Publishing)
- [6] Vollmann T E, Berry W L, Clay Whybark D, and Jacobs F R 2004 *Manufacturing Planning and Control Systems for Supply Chain Management* (New York: McGraw Hill)