International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2014): 5.611

Warehouse Management System

Noor Dhia Kadhm Al-Shakarchy

Computer Science Department, College of Science, Karbala University, Karbala, Iraq

Abstract: ***Inventory or Stock is one important and major object that can't dispense of it in most companies and organization. Mechanical organizations stockpile of crude materials and generation necessities and Service foundations need of a few materials utilized as a part of these administrations, for example, sustenance for eateries and dress to attire stores et cetera. Inventory management is very important issues which have interest of managers and capitals Because of its impact on the organization performance. Such that increasing or decreasing the inventory causes a problem. Proposed inventory management system fulfill the organization requirements and deals with them problems and solved it in addition to save all materials information and process in privet system data base . It' s used to determine the balance of existing materials warehouse at the moment demanded to know these stocks balance, Controls the levels of materials and daily movements to materials.***

Keywords: manager, keeper, ER, DFD, entry document , importation document analysis phase and design phase

1. Introduction

Any organization or companies have one or many warehouses. These warehouses considered most important and complex part which responsible for:

- Minimizing costs.
- Increasing the customer service level.

Therefore this part required to planned, managed and controlled to achieve the main purposes. Warehouse management needs to work synchronous with other company department with the inter-related activities [1]. To achieve the two basic functional objectives related to investment cost and service level, the warehouse system should be designed with the following points [4]:-

1. Represent the quantitative strategies to achieve operation consistency.
2. Select the least complex viable to ensure performed normal estimations.
3. Provide fitting levels of data to be accessible to test, and where suitable, override framework choices.

The warehouse management system purpose is the materials arrangement, management and controlled. the logical and financial levels of inventory is presented, the service level provided to customers, finally the control parameters and all the decision related processes[2].

Warehouse management is generally looked upon as a day to day operation concerned with meeting indicated transient targets. The organization developments have short, medium and long term and the business planning cycle should be an integral part.

1.2 System Life Cycle [4]

Breathing life into a new system requires a step- by – step process known as the systems life cycle. The participants in this process are the systems analyst and the employees of the organization needing the system. The following list represents the steps of life cycle:

- Preliminary investigation which determine the problem.
- Analysis which understanding the existing system.
- Design which plan the new system.
- Development which doing the work to bring the new system into being.
- Implementation which convert to the new system.

In this project we study the warehouse management life cycle. We applying the first three steps only because its presented as research and prepared to marketing.

1.3 Preliminary investigation

The initial step in a systems project is define the problem by study the nature of the problem and determines its scope and aimes. In this step we determine the impetus change, the management authorization, create suitability opportunists, and built recommendations and forwarding [3]. The structure diagram of this phase is shown in figure 1 below.

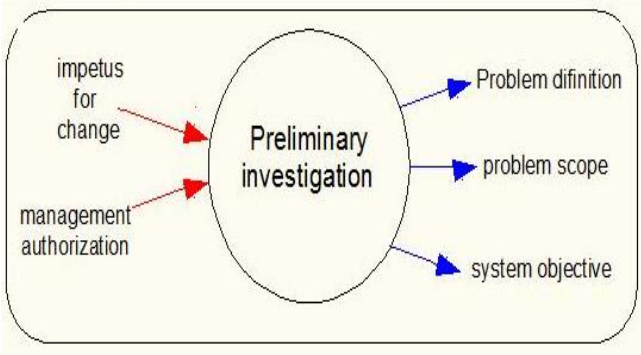

Figure 1: The preliminary investigation

1.4 Proposed System Aims

The goal of a warehouse management framework is to give a situated of modernized strategies for administration of distribution center stock, space, hardware and individuals with the objective of minimizing expense and satisfaction times. This includes [4]:

- Each warehouse or product type individualized a standard receiving process when a shipment arrives.
- The ability of recorded receipt (received document) of stock and returns into a warehouse. Which be able to minimize the amount of unnecessary parts and products in storage. It also minimum lost sales by having enough stock on hand to meet demand (request).

- Physical storage representation and ability of managing it. Such as by grouping the sold or popular products and speed up the process of picking, packing and shipping by putting these product near the delivery area.
- Products time managing, where products are stocked, then determined the length of time they are stored. Analyzing products data also to determine the expired products and applying discount concept.

Figure (2) illustrates the main architecture of warehouse management system and the determine trhe main component involving deals with.

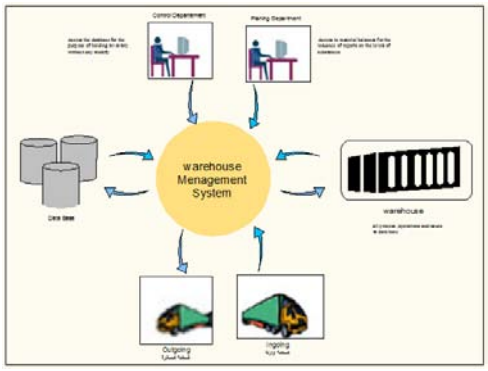

Figure 2: The architecture of warehouse management system

1.5 Proposed System Scope

This project presented the warehouse and inventory management system, which are more important to any organization. The warehousen departement in any organization needs deals with many issues and departement such as the planning departement which responsible for determining the maximum, minimum and threshold limit for material to be taken into consideration. The other important departement wich considerd the controlled on all stock transmission is Financial Supervision. Warehouse keeper is the person (employ) who's responsible for warehouse process. the figure-3 below illustrate the scope of the proposed system[5,6].

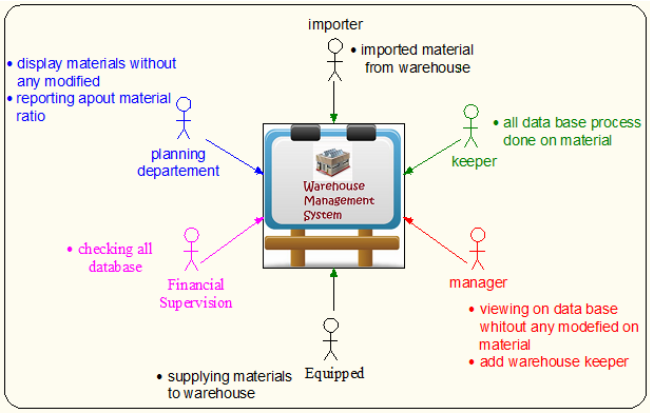

Figure 3: Warehouse management system scope

1.6 Proposed System Functions

Generally, every warehouse performs the basic functions:

- Receive Product depending on inventory incoming document from suppliers.
- Store product and raw materials from suppliers
- Exchange material (outputs) product by promissory notes
- System management by data base management.
- Planning by checking the ratio of the material and what product need to supply or which product have maximum range to stop the import.
- Controlling which responsible for inventory the total amount in warehouse and create the report.
- Inventory the daily transitions by adopted on incoming and promissory document.

1.7 Inventory Management Principles and Techniques

The main principle has been providing in inventory management system are:

- Controlling each individual item, through its acknowledged characteristics, on a day to day basis.
- Ensuring the effective use of personnel involved in the management process.
- Providing information and feedback on the effectiveness of the inventory system.

Familiarity with the normal advancement of the business as far as future creation, suppliers, clients, volumes and so on are all fundamental to empower warehouse management to make suggestions, measure the effect and arrangement the essential activities to meet the long haul necessities. Choices on what product offerings to stock, where to stock them and the type of the circulation system, to accomplish the proceeding with advancement of speculation cost and administration level is an on-going procedure in which warehouse management should be involved[6].

2. System Analysis

The systems life cycle is deliberately a step by step process. before design can begin, the analyst must have a thorough understanding of the current system. The purpose of the systems analysis phase is to understanding the existing system and based on that understanding prepare the requirements for the system. The analyst then works closely with the users to analyze the existing system and define the users need.

The main jobs must be done during this phase are:

- Data gathering.
- Data analysis.
- Prepare system requirements.

The warehouse management system (proposed system) is related system, which linked, related and interaction with most other systems in organization. As shown in figure 4 bellow.

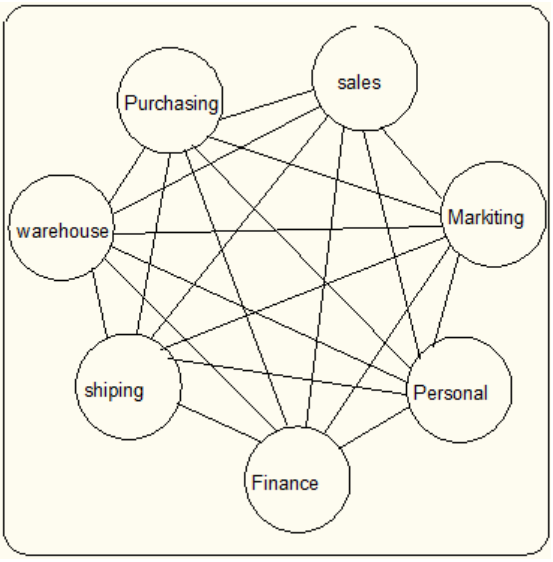

Figure 4: The top drawing representation of major systems in organization

2.1. Data Gathering

Data gathering is a common industry phase for the process of finding out everything about the existing system. There are certain techniques that are commonly used such as written materials, interviews, questionnaires, observation and sampling. The data gathering techniques chosen will depend on the nature of the system, time constraints, and minimum impact on the system users. The data gathered must pass two testing:

- Validity: means that the questions asked were appropriate and unbiased.
- Reliability: means that the data gathered is dependable enough to use.

The data must be collected from several sources to ensure data integrity and credibility. Therefore many ways the analyst implemented, in the other word the analyst depending on many persons. Those persons displays in figure 5.

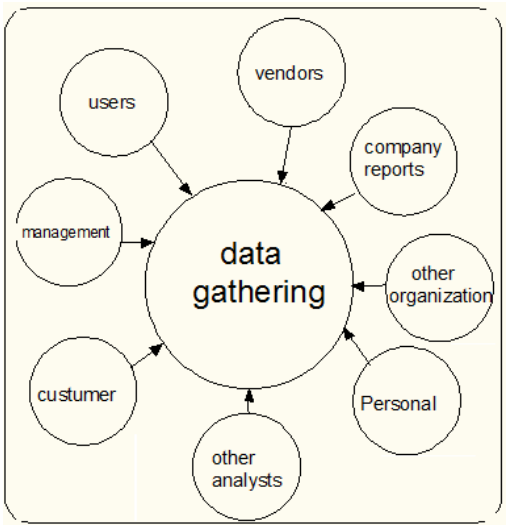

Figure 5: Source of data gathering

In this project we use many techniques and ways to gathering. Because this project is a research system and no any fund provider or marketing side, there is no certain side responsible for the system or data supplying. We used many source of data gathering.

2.2. Data Analysis

Data analysis is a procedure for recording you're comprehension of a present framework issue and can be utilized to recognize regions of progress. It permits impart/affirm you're understanding with different frameworks experts and additionally with clients/management. It permits adding to a model of a framework, underlining the stream and handling of information inside of a framework. The fundamental charting instrument utilized as a part of data analysis is the data flow diagram. The reasons for data analysis are related to the basic functions of the analysis phase:

- Assemble data gathered in a meaningful way.
- Show how the current system works.
- Provide easily accessible reference material.
- Set forth the current system as a basic for future comparisons with the new system.

2.3. Data Flow Diagram (DFD)

The main point of data analysis is supported a set of data flow diagrams. The data flow diagram explains the detail of data dictionary documents. A series of DFDs is delivered starting with an outline of the framework then getting more detailed, in doing as such concentrating on littler parts of the framework. Four elements are presented in data flow diagrams processes, files, sources and sinks, and labeled vectors. Figure 6 represent the data flow diagram for warehouse system.

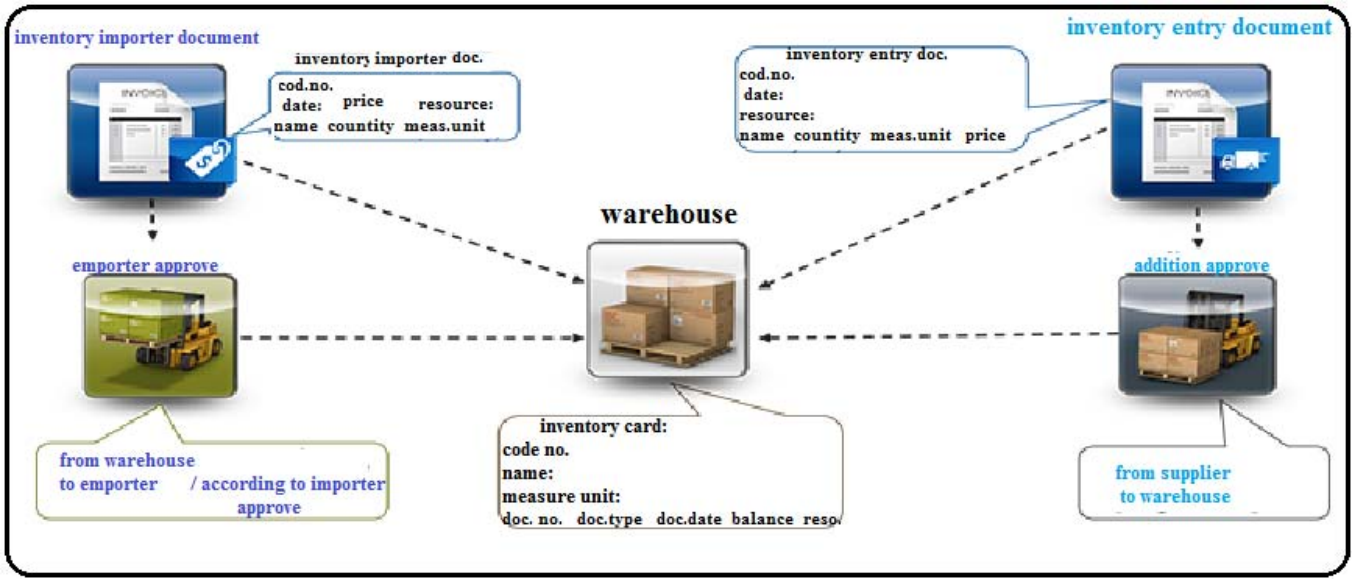

Figure 6: Data Flow Diagram of warehouse management system

2.4. System Requirements:

The main requirement must be process by warehouse management system is determining the needs, conditions and relationship in products or project. The conflicting requirements are determining also in the various stakeholders, analyzing, documenting, validating and managing software or system requirements.[2]

The success of a systems or software project depending on perfect determine of requirements analysis.[3] The requirements should be recorded, significant, quantifiable, testable, traceable, identified with recognized business needs or opportunities, and characterized to a level of subtle element adequate for framework outline.

After collect all data and analysis them the requirement must be determined. These requirements represent the requirement of all system and the requirement of each part. These parts are inputs, daily transmission and outputs. These requirements can be listed as:

a) Warehouse management system requirement:
- Define infinite number of materials and warehouses.
- Dealing with materials by key number.
- Management warehouse of all company branch.

b) Inputs requirement:
- Definition warehouse and all its data.
- Definition materials and all its data.
- Create category tree and linked material with the specific category to can be able presented a reports as each category or each material.
- Determine coding method used to code the inventory documents.

c) Daily transmission:
- Inventory document to added material.
- Inventory document to import material.
- Inventory process to specific material.
- Inventory process to all warehouse.
- Add new material.

d) Outputs requirement:
- Presented the material reports.
- Presented the daily transmission reports for material.
- Presented the material ratio reports, which explain the quantity of material.
- Determine the critical material by report.

2.4. System Users

The users that deal with the warehouse management system can be defined with main jobs can be done in this system. Those users can be illustrate be figure 7 bellow.

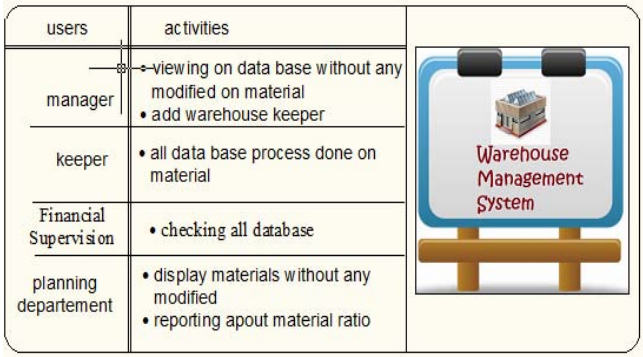

Figure 7: Warehouse management system users role

3. Design Phase

After the requirements identified in the previous phases the system is designed according to these requirements. These requirements are transformed into a System Design Document which describes the design of the system and that can be used as an input to system development in the next phase. The aime of the Design Phase is to transform the requirements into complete and detailed system design specifications. Once the design is approved, the Development Team begins the Development Phase. Successful completion of the Design Phase should comprise:
- Transformation of all requirements into detailed specifications covering all aspects of the system

- Assessment and planning for security risks
- Approval to progress to the Development Phase

3.1 User's Activity Design:

The authority to each user can be designed in this step. This step determine the security levels as well as the authentication to each one, figure 8 illustrate the users authority design

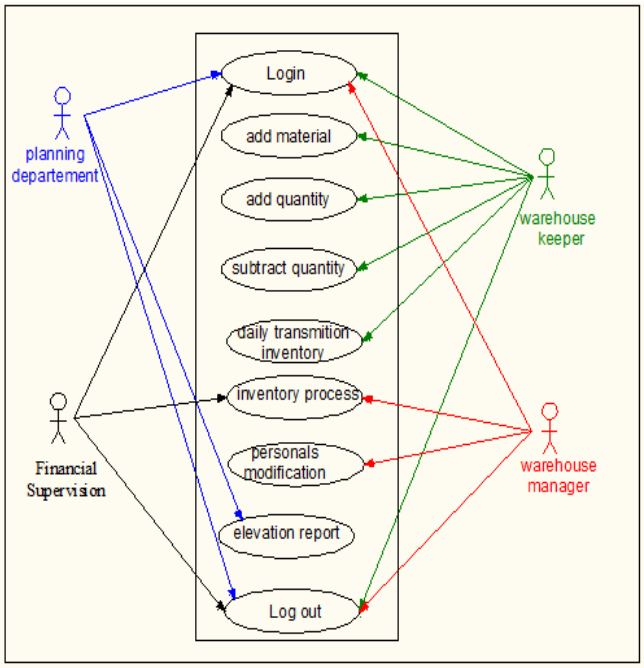

Figure 8: The users authority design

3.2 Data Base Design

Database configuration is the development an itemized database model. This model incorporates all decisions and parameters that are expected to produce a database from an information definition dialect. Point by point properties for every element contains in a completely ascribed information model. A wide range of parts of the outline can be portrayed of a general database framework. Connection model is introduced amid database plan, which contained the tables and perspective. The other model introduced is an item database, which give the elements and connections delineate named connections. On the other hand, the database outline used to apply to the general procedure of planning, for example, the database structures, the structures and questions utilized as a feature of the general database application inside of the database management system (DBMS)[7]. Changing over the database outline to various steps is completed by the database planner. Ordinarily, the fashioner must:

- Determine the connections between the distinctive information components.
- Superimpose a logical structure upon the data on the premise of these relationships [8].

3.3 Entity-Relationship data model (ER model)

Graphical documentation for application displaying is (ER charts). Its give Independent semantic data model (going for the significance of ideas in true). Additionally to a great degree fruitful as a method for „pre-design" of social DBs. The ER model offers couple of exceptionally basic and essential ideas:

- Entities (objects), portrayed by characteristics (properties).
- Binary or n-ary relationship between entities, potentially portrayed by properties also

Regularly not said expressly, but rather imperative and essential:

- Values: printable symbols as estimations of attribute; assume a subordinate part (portraying items).
- Roles: Names for the uncommon significance an element has inside of a relationship.

The warehouse management system ER diagram illustrates by figure 9 bellow.

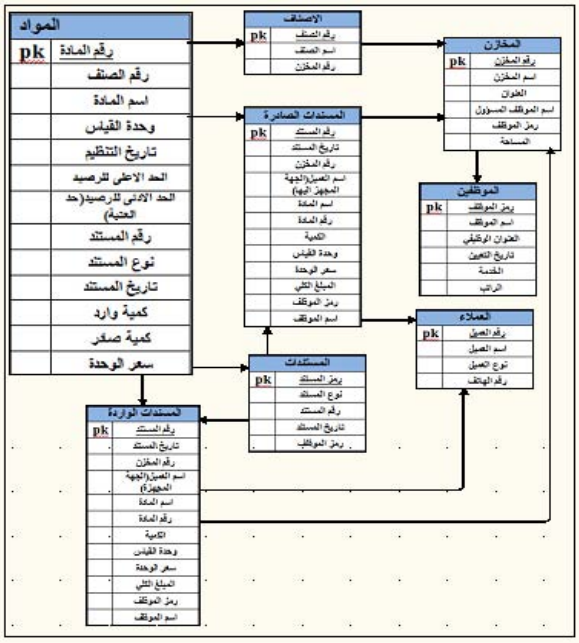

Figure 9: The warehouse management system ER diagram

4. System Implementation

In this stage, the creation framework is introduced, introductory client preparing is finished, client documentation is conveyed, and the post usage survey meeting is held. At the point when this stage is finished, the application is in relentless state generation. Once the framework is in consistent state generation, it is checked on to guarantee that we met the greater part of the objectives in the venture arrangement for an acceptable result.

4.1 System interfaces

When implement the system the main interface shown which represent the first step of project and contain the project name and students done. As shown in figure 10

Figure 10: The entry (first) interface (a) before log in (b) after log in

The figures 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 represent the process interfaces in the system.

Figure 11: Log in interface

Figure 12: Adding new material

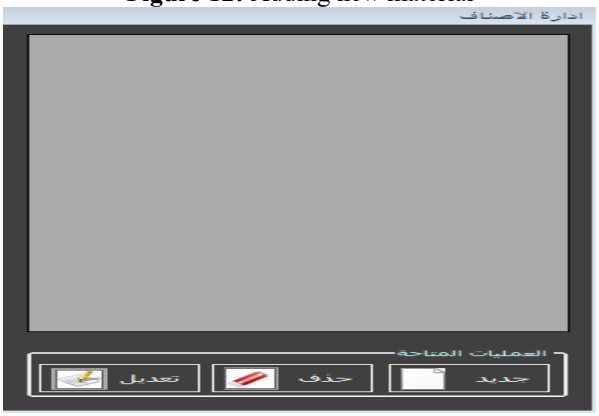

Figure 13: Material management (new, add, delete, modify)

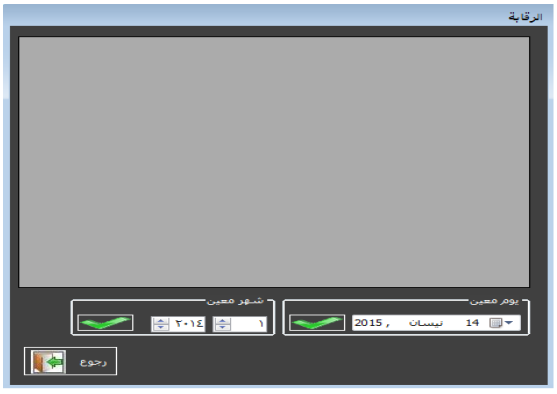

Figure 14: Financial interface

Financial interface interface presented the ability to material inventory to determine day or determine month.

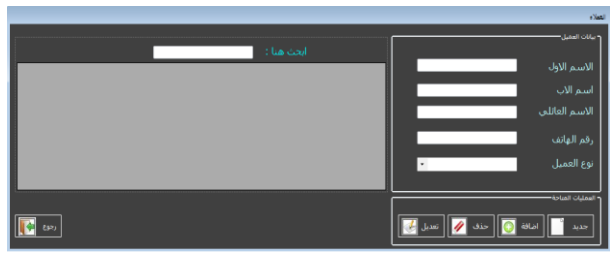

Figure 16: Customer (equipped/ importer) management interface (Add, delete, modify)

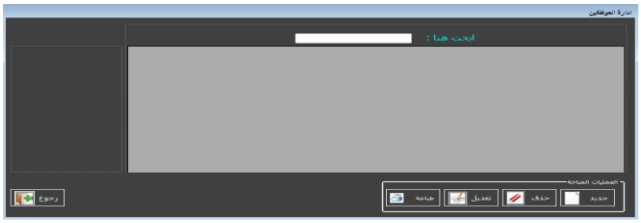

Figure 17: Employer management interface (Add, delete, modify)

Figure 18: Adding new employer interface

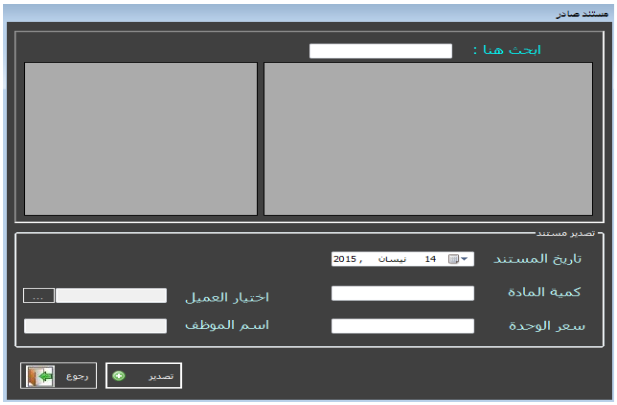

Figure 19: Inventory document outer interface

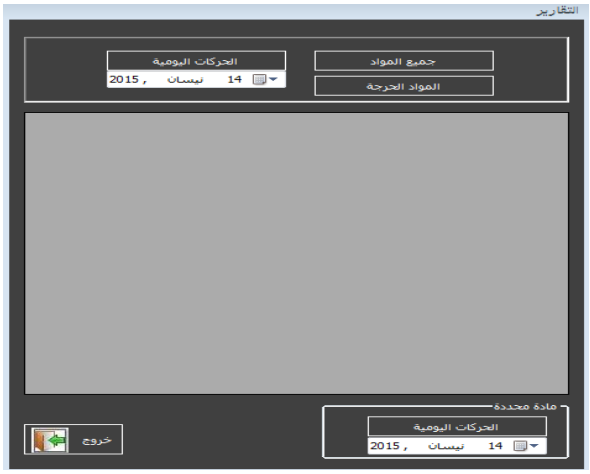

Figure 20: Reporting interface

Figure 21: Inventory interface

Figure 22: Adding new user interface

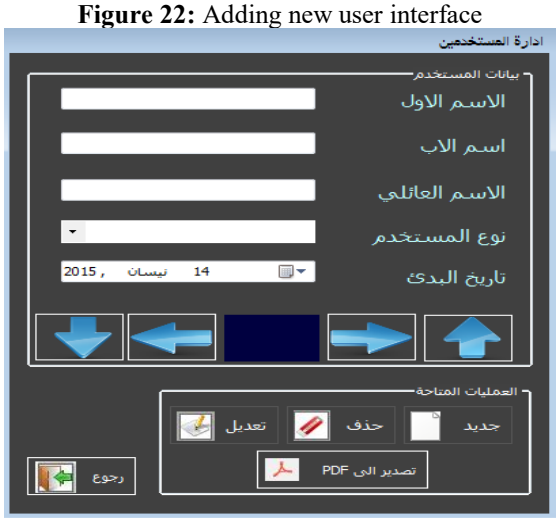

Figure 23: User management interface

Figure 24: Inventory entry document management interface

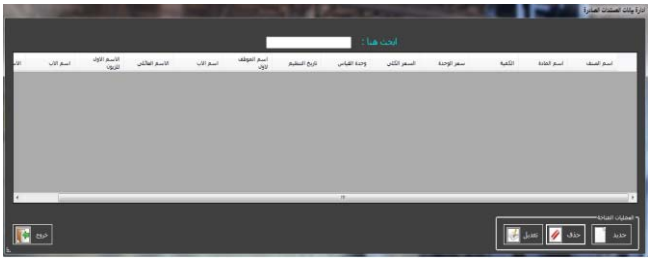

Figure 25: Inventory outer document management interface

5. Conclusion

During the implementation of the system, the following conclusion notice:

1) Ability to define an infinite number of items.
2) Ability to deal with part number.
3) strengthen the possibility of inventory valuation in multiple ways, such as the possibility of inventory to assess their last purchase price or inventory evaluate their last sale price or assess the stock price to buy or sell the basic price.
4) Strengthen the possibility of using units of measurement for the class. As it is in some of the activities to be dealt with product quantity.
5) Strengthening the possibility of more than one sale price class definition. As, in some cases it is possible to be selling the same product in different outlets but at different prices.
6) Strengthen the possibility of unified numbering of documents.
7) Strengthen the possibility of defining a minimum and demand (reorder point) and a maximum for each class. As the system is doing automatically alert at any point from the previous points. With a report showing the quantities required during a specified period.
8) Ability to Advanced Search for items set multiple tools most important code, name, part number, classification and type and supplier.
9) Ability to export reports to PDF.

6. Suggestion

1) The possibility of strengthening the work of the compound item.
2) Strengthen the ability to display data and images items on the Internet.

3) Strengthen the possibility of make more than one name for the item that in some cases the product has a name within the company is different from the well-known trade name for customers.
4) Strengthen the possibility of using a specific number (Serial Number) for each unit of product.
5) Ability to deal with items using barcode.
6) Strengthen the ability to make an inventory of the items using barcode devices.
7) Strengthen the possibility of using dual units of measure for the item. As it is in some of the activities to be dealt with product quantity and number as well. For example, textile companies need to know the number of yarn boxes when inventory the warehouse (number) in addition to the number of meters (quantity).
8) Strengthening the possibility of dealing with various foreign currencies. With the possibility of strengthening the treatment of exchange the differences.
9) The possibility of sending an e-mail report from within the program.

References

[1] Pharmacy Unit (GHS) & Procurement & Supplies Directorate (Moh), Principles and Techniques of Managing Inventory, Training Manual, October 2008
[2] T. Arsan , E. Bas_kan , E. Ar _ Z. Bozkus, A Software Architecture for Inventory Management System, DOI: 10.1007/978-1-4614-3535-8_2, _ Springer Science+Business Media New York 2013.
[3] Raghu Ramakrishnan, Johannes Gehrke Jeff Derstadt, Scott Selikoff, and Lin Zhu, Data base Management System Solution Manual, third edition, Cornell University Ithaca, NY, USA
[4] H. L. Capron, System Analysis and Design, the Benjamin/Cumming Publishing Company, Inc, 1986.
[5] Steven Alter, Glenn J. Browne, Abroad View of Systems Analysis and Design Implications Research, Communications of the Association for Information Systems (Volume 15, 2005) 981-999.
[6] Avinash N Bhute and B B Meshram, System Analysis and Design for Multimedia Retrieval Systems, the International Journal of Multimedia & Its Applications (IJMA) Vol.5, No.6, December 2013.
[7] Carlos Castro Zuluaga and Diana Cecilia Uribe Cadavid, A framework for decision support system in inventory management area, Engineering for a Smart Planet, Innovation, Information Technology and Computational Tools, Ninth LACCEI Latin American and Caribbean Conference (LACCEI'2011 August 3-5, 2011, Medellín, Colombia. 9th Latin American and Caribbean Conference for Engineering and Technology
[8] Jason Gilmore W, Beginning PHP and MySQL: from novice to professional, 4th edn. Apress, Berkely, 2010.

Author Profile

Noor Dhia Kadhm Al-Shakarchy is awarded her B.Sc, and M.Sc, at University of Technology, Department of Computer Science and information systems- information systems in 2000 and 2003 respectively. She is a lecturer at Karbala University, Collage of Science, Computer Department. Here research interests include: Object Modeling, Image processing such as Segmentation and Steganography, Data Security, Artificial intelligent, artificial intelligent applications and information systems.