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Usability Aspects to Create Inventory Information System Model:

Systematic Literature Review

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**Abstract**

This research aims to explain usability aspects in create inventory information system model to make easier search of inventory data, and to transform the currently manual inventory system in the effort of having more efficiency for the staff and a systematic computerized environment in general. This research uses a Systematic Literature Review (SLR) method consideration usability aspects on inventory information system model. The result of this research is inventory information system model based on existing inventory model.

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*Keywords: Usability Aspects; Inventory Information System; Systematic Literature Review*

# Introduction

Advances in information technology has facilitated in the management of data such as inventory in a company, for example to know the location of an inventory does not need to open the archive book one by one that takes a long time compared to using information systems more effectively and quickly to be able to know the location [1].

A suitable inventory information system model is one of the major concerns for an industry [2]. However, a good inventory information system must be understandable and appropriate to the needs of users, based on research [3] should be noted that usability aspects such as ease of use, learnability, effectiveness, flexibility, and attitude of users, so it is very important to meet the desires of users who are components of the information system. Meanwhile, research result [4] recommeded to improve the user interface and to increase confidentiality and security of inventory information system.

This paper proposes a conceptual model that integrates usability aspects in creating a model of inventory information system model based on existing inventory model. This paper begins with a brief discussion on the research methods. It continues with a review of literature on usability aspects, inventory information system model, and discussing the usability aspects into design inventory information system. The paper wraps with a brief conclusion and salient points for further research.

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# Research Methods

# This research adopted a methodology proposed [5] is the Systematic Literature Review (SLR), in order to understand the usability aspects to design inventory information system. The SLR aims to present and evaluate literature relating to research topics by utilizing a comprehensive and auditable methodology [5], [6], [7]. The SLR have three main phases : phases planning the review, phases conducting the review and phases reporting the review [8].

* 1. *Phase 1: planning the review*

Planning the review have 2 phases are (i) identify the need, The introduction section mentioned that there is a need to study usability aspects and information should be available within inventory information system. Therefore, two research questions were developed to assist the literature review process. (ii) Research questions, The research questions this research are: RQ1. What usability aspects needs to create inventory information system model and RQ2. What is like good inventory information system model based on existing model ?

* 1. *Phase 2: conducting*

Conducting have 4 phases are (i) conduct the review, this phase researcher conducting literature review from relevant articles identified from reputable online databases including Scopus covers the fields of science, technology, medicine, social sciences and arts and humanities, analyse and visualize the research (www.elsevier.com/onlinetools/scopus) and IEEE Covers the professional association for the advancement of technology (www.ieee.org/index.html) using keyword phrases “Usability Aspects”, “Inventory Information System” and “Inventory Model”.

The literature has been obtained then in to (ii) inclusion and exclusion phase, researcher make inclusion categories are the literature is indirect or directly answer one or all of research questions, focus of usability aspects, inventory information system, inventory model and has many citation, while exclusion categories literatur not relevant, not related to the research undertaken and only has abstracts there is no full text available.

(iii) Quality assessment phase, this phase researcher do it during conducting phase of SLR. Researcher make quality assessment categories based on rigor, which has a comprehensive approach and in accordance with the research undertaken, credibility, what the findings are presented well and meaningfully from the literature and relevance, how useful the findings are for people. Lastly, data collection phase, the literature valid, researcher shown two part of fig 1. usability aspects and table 1. inventory information system model.

# Result

# Researcher conducting literature review from reputable online databases includingScopus and IEEE using keyword phrases “Usability Aspects”, “Inventory Information System” and “Inventory Model” as reference to create inventory information system.

# So we can get as many as 87 literature, literature obtained, check again abstrack, content, many citation, rigor, credibility and relevance literature that for answer research question so get as many as 30 literature which is used data consist of two part, 7 literature for the first research questionand 23 literature for the second research question.

# *The first research question: what usability aspects needs to create inventory information system model ?*

# Several researchers define usability differently. For example, ISO 9241-11 defines usability as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction, in a specied context of use [9]. But according [10] that effectiveness, efficiency, and satisfaction had weak correlation and should be measured separately, but did not develop any specific models. Another researcher [11] defined as measurement of the quality of a user’s experience when interacting with a product or system. Some of the models investigated from existing research such as [12] model extends the ISO 9241.

# Synthesis summary of 7 literature about existing usability model from researcher perspektive can be seen on Fig. 1. then adjust to the research do.

# 

# Fig. 1. Comparisons of Existing Usability Models

# *The Second Research Question: What is like good inventory information system model based on existing model ?*

This section explaning models on Table 1 Inventory Control Classification Models, so we can get some researches about classification models as many as 23 literature.

According to [13], inventory is the stock of any item or resource used in an organisation. While, [14] define inventory or stock as ‘the stored accumulation of material resources in a transformation system. Meanwhile [15] made inventory control classification model based on purpose, period, type of inventory monitoring and quantity of items. Table 1 shown the inventory control classification model.

**Table 1**

Inventory Control Classification Models

|  |  |
| --- | --- |
| Classification by | Inventory Model |
| Purpose | * Economic order quantity models * Economic production quantity models * Joint economic lot sizing models |
| Period | * Single period models * Multi period models |
| Type of inventory monitoring | * Continuous review system models * Periodic review system models |
| Quantity of items | * Single item models * Multi item models |

# In models of inventory that is explained [2] in his paper, the following inventory control classification models such as (i) Single Versus Multiple Items, this dimension considers whether a single item can be used in isolation or whether multiple interdependent products should be taken into account, as a result of collective budget and coordinated control. (ii) Time duration*.* In some inventory management situations, the selling season for products is short, and excess stock at the end of the season cannot be used to satisfy the demand of the next season. (iii) Number of Stocking Points*.* Sometimes, it is appropriate to treat a single stocking point in isolation, and (iv) The Nature of Product. The product type dimension identifies and considers certain product characteristics.

(i) Economic order quantity models (EOQ model). The basic EOQ model is a formula for determining the optimal order size that minimizes the sum of carrying costs and ordering costs. The EOQ model was presented originally by Ford W. Harris, in a paper published in 1913 in Factory, The Magazine of Management (Harris, 1913). Many researches were made on the base of this model such as [16] [17] [18] [19] [20]. The EOQ model have model input parameters consists of (i) order quantity, (ii) order cost, (iii) holding cost and (iv) annual demand.

(ii) Economic Production Quantity model (EPQ model) determines the quantity a company to minimize the total inventory costs by balancing the inventory holding cost and average fixed ordering cost. The EPQ model was developed by E.W. Taft in 1918 (Taft, 1918). This method is an extension of the EOQ model. Modified Economic Production Quantity models with different schemes of fuzzy input parameters have been proposed by [21]. [22] considers the production inventory model in which the product quantity is a fuzzy number. Also, based on the numerical example, he compared fuzzy and crisp approaches for solving this problem. [23] treat the optimal solution for the fuzzy case of economic production for production inventory model. [24] introduced two fuzzy production inventory models with fuzzy parameters for crisp production quantity.

(iii) Joint economic lot sizing models (JELS model). Inventory models that address issues of inventory coordination between a buyer and a seller have been extensively studied in the literature. This class of inventory models is commonly referred to as JELS model. The objective of these models is the development of a jointly coordinated buyer-seller inventory strategy that is more beneficial to each member’s individual non-coordinated inventory strategy. One of the first attempts was made by [25], extending the existing model of Dolan. They applied fuzzy mathematical programming to solve the joint economic lot size problem with multiple price breaks. Single and multiple incremental price discounts are modelled as fuzzy numbers. [26] proposed a buyer-seller fuzzy inventory model for a deteriorating item, where deterioration is subject to discount. A fuzzy goal programming methodology is used to solve the model. [27] introduced defective items into the JELS model. [28] presented a stylized model to find the optimal strategy for integrated vendor-buyer inventory model with fuzzy annual demand and fuzzy adjustable production rate.

(iv) Single-period models. The news vendor model is a single-period, probabilistic inventory model, which objective is to determine the order quantity that minimizes expected underage costs and overage costs. First single-period inventory models were designed by [29], who has formulated a conception of second level fuzzy set, methods of s-fuzzification and arithmetic defuzzification. [30] introduced fuzziness of shortage cost explicitly into the classical newsboy problem. They investigated the so-called fuzzy newsboy problem where its shortage cost is vague and given by an L shape fuzzy number. Then, the total expected profit function was considered to be a fuzzy number. An optimal ordering quantity realizing the fuzzy max order of the profit function was found and compared with the optimal ordering quantity of the non-fuzzy newsboy problem. [31] proposed a single-period inventory model with fuzzy demand. For each order quantity Q, a fuzzy total cost composed of the procurement cost, shortage cost and holding cost is associated with it. [32] present a single-period inventory problem in an imprecise and uncertain mixed environment.

# (v) Multi-period models. The main difference between the single-period model that the multi-period model may involve stock leftovers from previous periods, which makes the optimal choice of order quantities more complicated. Many researches were made on the base of this model such as [33], uses fuzzy dynamic programming to determine optimal inventory and production levels in a real-world integrated multi-period inventory and production scheduling problem for an organization engaged in a planned withdrawal from a market. [34], applies fuzzy set theory to determine an optimal aggregate inventory replenishment strategy subject to a set of long-term management objectives. [35], introduces fuzzy logic into material requirements planning (MRP) by defining period demand as a fuzzy number. A fuzzy part period balancing algorithm is developed. [36], extends their previous research on multi-period fuzzy lot sizing and introduces fuzzy versions of the Wagner–Whitin and Silver–Meal lot sizing models. Lastly, [37], applies fuzzy decision making to investigate optimal inventory policy for a multi-period inventory system with partial back orders.

# Conclusions

# Based on fig 1. and table 1, that to make good inventory information system usability aspects must attention (i) efficiency, features accordance with the needs of the user (ii) ease of use, users can use the system and understand well every feature available and (iii) security, must have security so as to maintain the confidentiality of data in addition to that inventory model include (i) multi-period because involve stock from previous periods and makes be optimal, (ii) economic production quantity minimize the total inventory costs by balancing the inventory holding cost and fixed ordering cost and (iii) that time duration in the short sales season and excess stock at the end of the season can be used for next season.

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**Conflict of interest**

The authors declare that there is no conflict of interest in this paper.

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