ISSN: 1412-3339

ANALYSIS OF INVENTORY SPARE PARTS SYSTEM AT UPT BALAI YASA PT. KAI

[1]Irwan Sukendar, [2]Brav Deva Bernardhi, [3]Ares Pambudi
[1,2,3]Jurusan Teknik Industri Fakultas Teknologi Industri Universitas Islam Sultan Agung Semarang
irwan@unissula.ac.id
deva@unissula.ac.id
arx.pambudi@gmail.com

Abstrak

Penelitian ini memusatkan perhatian pada Analisis Sistem Inventori pada Unit Pelaksana Teknis (UPT) BALAI YASA PT. KAI Tegal. UPT ini bertugas sebagai penanggung jawab perawatan bidang sistem informasi kereta dan gerbong PT KAI area Jawa Tengah.

Pada UPT ini catatan inventory dan maintenance spare parts masih manual dan belum terintegrasi sehingga history penggunaan spare parts tidak terdatabase dengan baik, Permintaan Layanan teknis Maintenance unit IT(Information Technology) masih dilakukan secara lisan dan belum terdokumentasikan dengan baik sehingga laporant harian tidak real dan tidak rapi. UPT ini belum menetapkan jumlah pemesanan optimal, jumlah safety stock dan reorder point sebagai variable penting dalam system inventori. Penerapan sistem informasi di kegiatan bisnis perusahaan adalah salah satu cara agar kegiatan bisnis dapat berjalan lebih cepat, tepat, dan efisien.

Rancangan perbaikan system inventori adalah dengan menetapkan jumlah pemesanan optimal, safety stock (SS), dan reorder point (ROP). Selain itu, fitur inventory juga dilengkapi dengan menu barang masuk, barangkeluar dan kalkulasi siaga barang, yang memudahkan unit IT untuk memonitor kondisi safety stock yang ada.

Kata kunci : inventori, jumlah pemesanan, safety stock, reorder point.

Abstract

This study focuses on the Analysis of Inventory Systems at the Technical Implementation Unit (UPT) BALAI YASA PT. KAI Tegal. This UPT has the duty as the person in charge of maintenance of the PT KAI train and car information system in the Central Java area.

In this UPT the inventory and maintenance records of spare parts are still manual and not yet integrated so that the history of the use of spare parts is not well-databaseed, Technical Service Requests for Maintenance of IT (Information Technology) units are still done verbally and have not been well documented so that daily reports are not real and not real neat. This UPT has not determined the optimal number of orders, the number of safety stock and reorder points as important variables in the inventory system. Application of information systems in the company's business activities is one way for business activities to run faster, more precisely, and efficiently.

The design of an inventory system improvement is to determine the optimal order quantity, safety stock (SS), and reorder point (ROP). In addition, the inventory feature is also equipped with a menu of incoming goods, items out and standby calculations, which makes it easy for IT units to monitor the condition of existing safety stock.

Keywords: inventory, order quantity, safety stock, reorder point.

I. INTRODUCTION

UPT BALAI YASA TEGAL is in the Board of Directors Division of PT. INDONESIA TRAIN, which is responsible for the repair, maintenance and modification of trains and carriages in Central Java, located in Tegal.

This UPT has not determined the optimal number of orders, the number of safety stock and reorder points as important variables in an inventory system.

It also requires an information system to support its business processes. It has the responsibility to coordinate, provide and guide the course of all forms of IT activities. It does not yet have a web-based information system to support IT

ISSN: 1412-3339

activities in the regions. This web-based information system needs to be in place to tidy up documents, administration and make it easier to control activities and display work processes.

At this UPT there is also no information system for the availability of spare parts and the process of maintaining IT equipment. Data in the form of physical files and maintenance forms that are still used as a reference for analyzing and designing this information system.

Some weaknesses and problems that exist are document data collection is still manual. Meanwhile, hardcopy files require more space or space, cupboards or cabinets, while the available space is relatively small so space efficiency is needed. On the other hand document files are easily lost and damaged. irregularity and improper placement of files results in loss of documents and damage. When data is needed, the data cannot be found. In addition, there is also no treatment history.

It still records IT spare parts inventory manually using books. Therefore enough time to make a report. In addition, inaccurate recording of goods transactions has also taken place.

Based on these problems, a better inventory system is needed. First, the UPT needs to set important variables in the inventory system, namely: the optimal order number (Q), safety stock (SS) and reorder point (ROP).

Adding an information system design to the inventory system is believed to make the UPT inventory system better so that the flow of goods in and out can be recorded more quickly, more precisely and more accurately.

In addition, implementing an IT system can secure purchasing data, data on sales of goods, control inventory, and record inventory costs.With this improved design, it is believed that the UPT inventory system will be better.

II. RESEARCH METHODOLOGY

The steps undertaken in this study consisted of several stages, as follows:

1. Determination of research objects. The object of this research is the IT unit Balai Yasa Tegal.
2. Data collection. As for the data taken from the UPT Balai Yasa Tegal, namely: RAB data for the procurement of IT spare parts,IT Spare Part Inventory data, and Troubleshooting and Testing data sufficiency and uniformity of data.
3. Method of analysis. The analysis conducted is:a) Identification of Current Business Processes, b) Business Process Design improvement, c) Conduct Business Process Improvements
4. Discussion. The discussion was carried out to increase the depth of the analysis results.
5. Drawing conclusions and suggestions

III. DATA AND RESULTS

3.1. Data Collecting

3.1.1. Identifying Current Business Processes

The UPT is tasked with helping the company achieve its goals, namely maintenance of trains and carriages. UPT Duties and responsibilities for all work in the field of inventory information systems including hardware and software. At

ISSN: 1412-3339

present there is no information system that accommodates inventory and maintenance of spare parts and IT equipment maintenance activities.

At present UPT does not have an integrated spare parts inventory system, this has an impact on the inventory process of goods and equipment maintenance is less efficient because it is done manually.

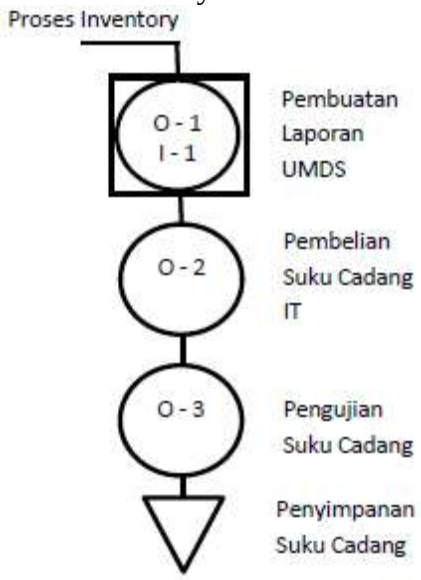

Figure 1. Identification of the inventory process

3.1.2. The process of purchasing spare parts

The process of purchasing spare parts starts with physically estimating the parts that need to be replaced without any mathematical calculation. On that basis, UPT made the submission of Provisional Service Advances (UMDS) as a basis for submission to the Human Resources and Finance Manager.

The submission was subsequently corrected by the staff of the manager. If approved, the funds needed will be disbursed to the IT unit to be spent according to the UMDS report. However, if the submission is not approved, UPT IT must revise the submission.

Accountability report on purchases of goods can be done after completing the memorandum and receipt with a stamp accompanied by the store's signature and the signature of the employer.

3.1.3. Storage spare parts

The process of storing spare parts or parts that have been purchased, starts with checking the specifications of the parts and physical checking of the parts. This needs to be done so that the parts purchased are in accordance with those ordered with new conditions. After that testing is done.

The benefit of testing is that we can use the goods purchased and if there is damage we can immediately make a warranty claim on the goods. After the parts have passed the test, the parts are placed in the parts cabinet.

ISSN: 1412-3339

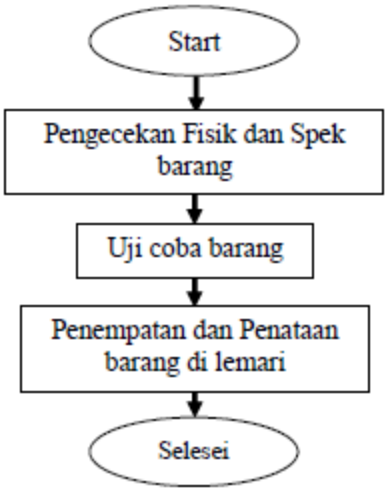

Figure2. Storage process

3.2. Identification of System Business Process Deficiencies

UPT IT business processes so far have not determined the optimal number of spare parts ordering (Q), safety stock (SS) provisions, and reorder point (ROP) provisions. These three things are the main variables in building and modeling the inventory system so that it becomes a good inventory system.

In addition, all this time, inventory and maintenance have been carried out separately. The separation of inventory and maintenance business processes causes both of them not to integrate business processes so that the process becomes slow.

3.3. Identification of Inventory System Improvement Design

The inventory system improvement plan is to determine the inventory system variables, namely; optimal order amount (Q), total safety stock (SS), and number of reorder points (ROP). The determination of these variables is determined based on mathematical methods.

In addition, the design of the UPT IT inventory business processimprovement also designed the IT system at the UPT which is believed to make the inventory system at the UPT IT better.

IV. ANALYSIS AND DISCUSION

4. Analysis of Inventory Variable

a. Order Fees

The cost of the message is the sum of the communication costs and transportation costs, where the communication fee is Rp. 2,000, and the transportation fee is Rp. 8,000, so the message fee is Rp. 10,000, -

b. Save Cost

The saving cost comes from the monthly electricity payment. The monthly electricity payment is IDR 73,000,000. The percentage for the need to store IT inventory is 0.25% or as much as Rp.182,500 divided by 120 bottles to Rp.1,520

c. Optimal order quantities

$$Q^* = \sqrt{(2ds/h)} \text{.....(1)}$$

Notasi :

d = Need

s = Message Fee

h = Save Cost

ISSN: 1412-3339

Q * = optimal order
Q*=√(2DS/H)=√((2
=(19)x(10000))/((1520)))
= 15,81

d. Safety Stock

The raw material for the Original Black Ink is a bottle of 70 ml. Maximum usage 1 month 8 bottles. Use an average of 6 bottles. bottle. Waiting Time (M): 2 days
Safety stock = (Maximum Usage - Average Usage) x waiting time (L)
SS = (8 bottles - 6 bottles) x 2 days
= 2 x 2 days = 4 bottles

e. Reorder point (ROP)

$$ROP = (dL) + ss / 30 \text{……..(2)}$$

Notation:
d = needs
SS = safety stock
d = 19 bottles
L = 2 days leadtime
ROP = ((dL) + SS) / 30
= ((19 x 2) + 4) / 30
= 1.4 botol

Based on the analysis, the optimal order number is 15.81; the number of fety bottles is 4 bottles and the reorder point is 1.4 bottles

4.2. Analisis Perancangan Sistem IT

a. Context Data Flow Diagram (DFD)

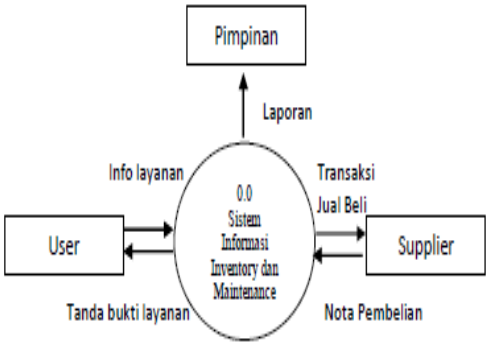

Figure 3. Context DFD

ISSN: 1412-3339

b. Inventory flow chart

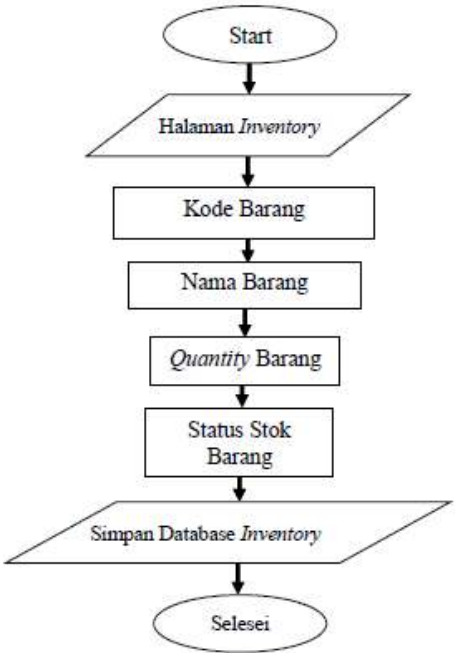

Figure 4. inventory flowchart

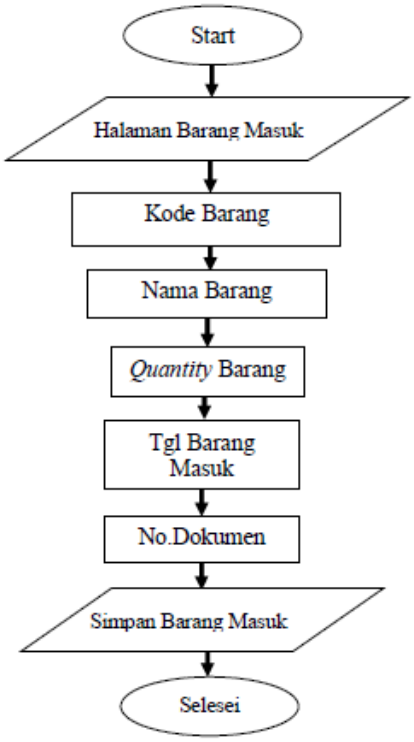

Figure 5. Flowchart of incoming parts

V. DISCUSION

In this discussion it can be compared that the new inventory system design is better because in the new IT UPT inventory system the variable value of the optimal ordering number (Q), the number of safety stock (SS), and the number of reorder points (ROP) is mathematically. With that determination, UPT IT in the future can place orders with a more optimal amount and make inventory with a

ISSN: 1412-3339

more optimal SS and ROP as well. So it is believed that inventory costs will be reduced and services will be better.In addition, the following is a comparison between the old inventory system and the design of the new inventory system at UPT IT:

Table 1. System improvements

Indikasi	Sebelum	Sesudah
Program Kegiatan	Manual	Otomatis
Dampak Lingkungan	Penggunaan kertas	Tidak lagi menggunakan banyak kertas
Kalkulasi Siaga Barang	Belum dilakukan	Menggunakan Rumus EOQ dan ROP
Pendataan Inventaris Perangkat IT	Manual	By Sistem Informasi
Dokumentasi	Manual dengan menggunakan kertas	Data dan informasi tercatat dalam database aplikasi
Akurasi	Data, dan barang rentan hilang dan terjadi ketidaksesuaian	Data terakumulasi otomatis

V.I. CONCLUSIONS ANDSUGGESTIONS

6.1. Conclusion

The results showed that the design of the new UPT IT Balai servicesystem was better because the variable value of the optimal ordering number (Q), the number of safety stock (SS), and the number of reorder points (ROP) was mathematically so that the future UPT IT could place an order with a more optimal amount and make an inventory with a more optimal SS and ROP as well. So it is believed that inventory costs will be reduced and services will be better.

Based on the analysis, the optimal order number is 15.81; the number of safety bottles is 4 bottles and the reorder point is 1.4 bottles

6.2. Suggestions

UPT IT Balai Yasa should be able to apply the results of this study in terms of determining the number of orders, determining the safety stock, and determining the reorder point.

REFFERENCES

Afyenni dan Rita,(2014),"*Perancangan Data Flow Diagram Sistem InformasiSekolah*",Jurnal Teknoif, Vol. 2 No. 1.

Alfian danHelmi, M.,(2013),"*IMPLEMENTASI DESKTOP SISTEM INVENTORI PADA MOTOR HUDI*",Fakultas Ilmu Komputer UDINUS

Annisaa, Fathara, 22 Agustus 2014. Macam Metode Pengembangan Perangkat Lunak. Diambil dari : https://fatharaannisaa.wordpress.com/2014/08/22/macam-macam-metode-pengembangan-perangkat-lunak. Diakses pada tanggal 19 Mei 2017

ISSN: 1412-3339

Eschinger, C., Warner J., and Miklovic, D.,(2000),"The explosion of ERP : COM-10-9065, 26th June 2000", Gertner Grup, Inc.

Krismiaji, (2002),"SistemAkuntansi", Yogyakarta : UPP AMP YKPN

O'brien, J.A., (2005),"Management System: 6th ed New York: McGraw Hill.

Rifki, Haikal, November 2011, "Perancangan Terstruktur Perancangan html", http://haikal-rifki.blogspot.co.id/2011/11/perancangan-terstruktur-perancangan.html. Diakses pada tanggal 18 Mei 2017

Suryana, T., (2007),"*E-commerce menggunakan PHP dan MSQL*", Graha Ilmu, Yogyakarta

Susanto, E., dan Heru, (2006),"*Mendefinisikan Critical Bussiness Proses*", Diambil dari: https://heru.wordpress.com/2006/08/31/mendefinisikan-critical-business-proces. Diakses pada tanggal 18 Mei 2017