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Design of Decision Support System " Reverse Supply Chain Management " based on Android

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ABSTRACT: Reverse supply chain is the backward movement of product in supply chain. This paper proposes a reverse logistics decision support system which can ease product information tracking for customers, company (decision maker), and service center regarding products returned. The model in this paper is inspired by various papers published in the literature and real-life example of repairing smartphone at the authorized service center. The proposed model considers important elements of reverse supply chain which are initial screening process of reverse (gatekeeping), collection, sorting, and recovery (treatment). Activity diagram of each element reverse supply chain is described. Implementation of a decision support system based on android is also presented. The proposed model will help the parties involved in reverse activities and also help academics in developing better decision reverse supply chain model, especially for electronics products that have shorter life cycle.

1 INTRODUCTION

Reverse supply chains (RSC) include collection and reprocessing activities of used manufactured products in order to recover their remaining market value (Filip and Duta, 2015). Due to environmental concerns, RSC now is becoming an important strategy to increase customer satisfaction and also how the material is recovered and who will execute and manage the various reverse operations are important issues (Liao, 2018). Many companies do not manage the flow of goods and materials well, as some assume that reverse is a burden to the company, in addition to these data and related information can not be predicted with certainty. Yet reverse this SCM can provide benefits to the company both economically, socially and environmentally. Reverse supply chain management needs to be done in order to increase the company's competitive advantage in providing services to its customers (Blumberg, 2002).

In every RS system, it is essential to make decisions concerning the returns management, efficient communication between the different parties involved, product identification, handling and treatment (Turki and Mounir, 2014). Based on related literature, the researches seem to focus on the whole process of reverse flow and there is few who have mentioned the DSS. Lamber et al, (2011) proposed decision conceptual framework RSC process in general. There is no single reference model to make their RSC more efficient, each company must find best solution to specific situation. Turki and Mounir (2014) proposed a DSS for reverse logistics uses web-based by adding three more elements to complete the reverse flow management. These elements are (1) the coordinating system, (2) the gatekeeping, (3) the collection, (4) the sorting, (5) the information system, (6) the disposal system. This paper proposes a DSS concept on reverse supply chain process of smartphone product with based on android operation system. The use of android-based information technology will make the application more attractive and easier to use, and can be used by the company that includes some for partnership such as parts production, warehouse, sender, other stakeholders such as distributors, service centers and consumers as the user, without fixated on the availability of computer hardware, because this application is designed with android operating system that can be accessed by using a smartphone. Expected by the creation of this application, both companies and the public can obtain the ease and benefits of reverse process materials or products from consumers to electronics manufacturing companies, in order to achieve the effectiveness and efficiency of reverse services.

2 LITERATURE REVIEWS

2.1 *Closed Loop Supply Chain Management*

Closed loop supply chain (CLSCM) can be defined as a system of design, control and operation to maximize creation the value throughout the product life cycle by recovering the value of the product dynamically, because the type and volume of the returned product is not same at different time (Guide et al., 2003). This activity is a combination of forward and reverse supply chain activities. According to Blumberg, F (2005), CLSCM activity is:

1. *Forward logistics* and *direct supply chain management*.
   Management of activities and overall forward logistics control from material, part and finished product streams to the main warehouse, distributed and up to the end user.
2. *Reverse logistics*
   Coordination activity and control of taking materials, parts, and products that have been used from consumers, sent to the recycling process and then back to the consumer if it can be reused.
3. *Depot repair, processing, diagnostic, and disposal*
   The activity of receiving returned product through reverse logistics process, inspection, recondition and redistribution process through main line, secondary market, and disposed as waste. In general, reverse supply chain activities may include: reuse, repair, remanufacturing, recycling, and disposal. Reverse logisics is the most important part of the CLSC, because without a reverse flow there is no loop in the supply chain.

Furthermore, for high technology products such as smartphones, Blumberg (2005) spelled out a reverse model, from the four CLSC models his presented. The models are shown Figure 1.

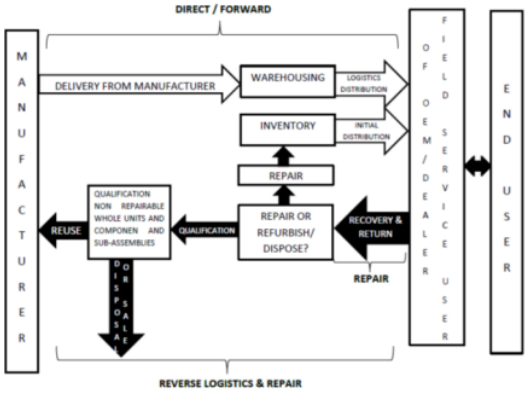

Figure 1. Closed Loop Supply Chain for high tech products (Blumberg, 2005)

In high tech products, original equipment manufacturer (OEM) sells its products to consumers and is directly responsible for the RL process. The product either sub assembly, part, returned component will be recovered by the OEM through a designated dealer as an OEM representative or an OEM service center itself. In this model, direct supply chain and RL are controlled by OEM. However, the reverse process also can be done directly independently without going through an OEM.

2.2 *Reverse Supply Chain*

According to Guide et al (2003), reverse supply chain is a series of activities to take back products that are not used from consumers and whether the products can be reused or become waste later. There are five main reverse supply chain processes: product acquisition; reverse logistics (the activity of transferring / shipping of the acquired product to the handling); inspection and disposition (disassembly), inspection, testing, sorting of returned products to identify quality, choosing appropriate treatment and appropriate recovery strategies); reconditioning (repair, re-furbished or remanufactured); redistribution and sales (sales of products that have been reconditioned and re-usable).

The first step to designing a reverse supply chain is to choose the proper take-back path process from the return product, to return to manufacturing. The process of taking its products is made directly to the consumer; through the intermediary retailers; as well as through third party services. For the latter, there are two collection models namely Centralized, and Decentralized reverse supply chain.

2.3 *Utilization of Information Technology in Reverse Supply Chain Management*

The information technology development provides various positive impacts to increasing productivity of many sectors, including logistics and supply chain management. Bhandari (2016) argues that the latest technologies being used in logistics and supply chain management are segregated into

1. Automatic Identification Technology : Bar coding, Radio Frequency Identification (RFID), Radio Frequency Tags (RFTs)
2. Communication Technology : Electronic Data Interchange (EDI), Very Small Aperture Terminal (VSAT), Geographical Positioning System (GPS), Geographical Information System (GIS), Web Based Tracking, Automated Guided Vehicle System (AGVS) and
3. Information Technology (IT). The IT tools used in logistic and SCM are Enterprise Resource Planning (ERP), Distribution Recurement Planning (DRP) and Automated Inventory Tracking System (AITS).

The more complex a business, make the decision making of its more complicated. Some factors such as the need to markets respond quickly; a rapidly changing environment and the uncertainty of its impact; need for quick and realtime monitoring and informations; as well as need to coordination the decision-makers who are not in the same location, made manual decision making more difficult. It is makes computer-based information system necessary in analyzing and exploring of various alternatives decision.

The instrument in this decision making is said to be Decision Support Systems (DSS). Turban, et al (2005) suggests that the DSS component consists of Data Management, Model Management and User interfaces.

Filip and Duta (2015) who studied the Decision Support System on Reverse SCM in several European countries, exposed the important issues and the attributes of DSS that can be used on Reverse SCM. However, this paper is a literature review and case studies are not explained.

Reverse supply chain research has previously focused on reverse processes as a whole, but few have combined with decision support systems (DSS). There is research on Reverse Logistic DSS, but its still focus on one phase, like recovery process or delivery only.

Turki and Mounir (2014) drafted the DSS model in the RL process by taking issues related to product recovery activities, vehicle routing and end of life product handling issues. The proposed DSS integration on RL activities is used to facilitate tracking product information, shipping, storing, referencing and reporting for managers as decision makers. The Turki and Mounir research adds four main activities: gatekeeping, collection, sorting, and disposal, with three additional activities of coordination, treatment, and information systems are shown Figure 2. Research conducted by Turki & Mounir (2014), create customer value by providing accurate information to customer and provider through web portal.

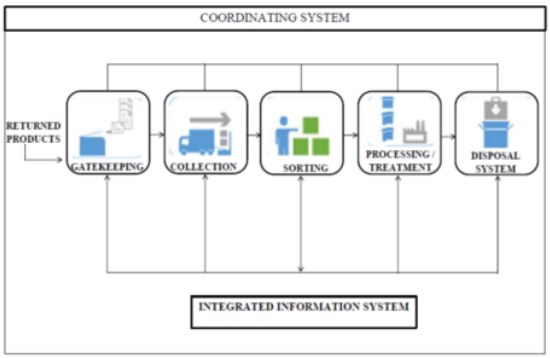

Figure 2. seven RL activities (Turki & Mounir, 2014)

In the current study will be propose a DSS concept on reverse supply chain process of smartphone product with based on android operation system. Step of research include: (1) identify the SCM flow, (2) identify possible reverse activities as indicator of each activities, (3) designing reverse supply chain model, (4) conceptual model validation, (5) designing logic models of the DSS features, (6) logic model validation, (7) designing the simulation model (interface), (8) model validation and verification, (9) trial, (10) implementation.

In this paper, the discussion is limited to DSS conceptual on reverse supply chain element and design the simulation model (interface).

3 PROPOSED MODEL

The proposed model is based on literatur review and interviews with smartphone service centers. From the literature, Lambert et al (2011), RL system consider four step: gatekeeping, collection, sorting, treatment or recovery. The disposal is not mentioned because of the nature of a product. The goal of this model is to propose RL system android-based DSS for smartphone. Activity diagram for each step are presented in the subsections below.

3.1 *Step 1: Gatekeeping*

Gatekeeping is a filtering process which returned products are allowed to enter RL system (Giuntini and Andel, 1995b). For smartphone, activity diagram of gatekeeping adopted from Lambert (2011). A preliminary gatekeeping occurs communication between customer and company whether return authorization should be required, if a return authorization is necessary, and verification should be done. Then, customer receive a return authorization number to service if verification is accepted by company. After company receive the product, the company decide whether recovery is possible or not. Activity diagram DSS for gatekeeping as shown in Figure 3. A customer who was refused through the process gatekeeping may up sending his product back to the company in accordance with the term and conditions apply. Decision need to be taken and may include whether the product should be retuned, if a return authorization is necessary, and which verification should be done.

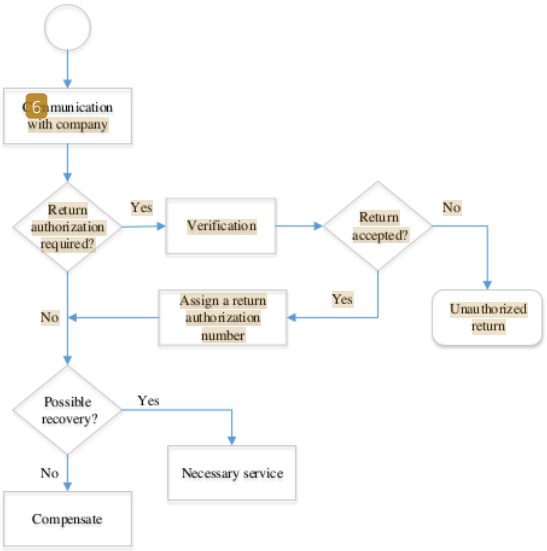

Figure 3. Activity Diagram of DSS: Gatekeeping (adapted from Lambert, 2011)

3.2 *Step 2: Collection*

Collection is a process of receiving returned products from customer, as illustrated in Figure 4. If the company is required to take responsibility for the collection process, pick up product should be done, otherwise customer send the product to the nearest company representative service center based on shipping instruction.

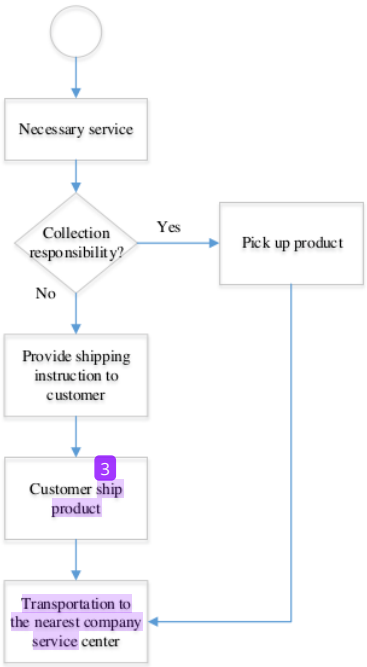

Figure 4. Activity Diagram of DSS: Collection

In the electronics industry, the technician visits the customer to repair on site, if possible. If company is not responsible for returning product, the company must give clear instructions on packaging, return address, etc. Decision need to be taken and may include whether responsibility for collection or not, determine the nearest company service center.

3.3 *Step 3: Sorting*

A preliminary sorting take place after receiving the return products and authorization process is given to the gatekeeper, as illustrated in Figure 5. The company decides which products are acceptable or not. In this step, company must determine the criteria for accepting to avoid differences in decision making. These criteria will be inputted into the database in the DSS. According to Rogers and Tibben-Lembke (1998), returned products have different reason. Decision need to be taken and may include return reason and further handling.

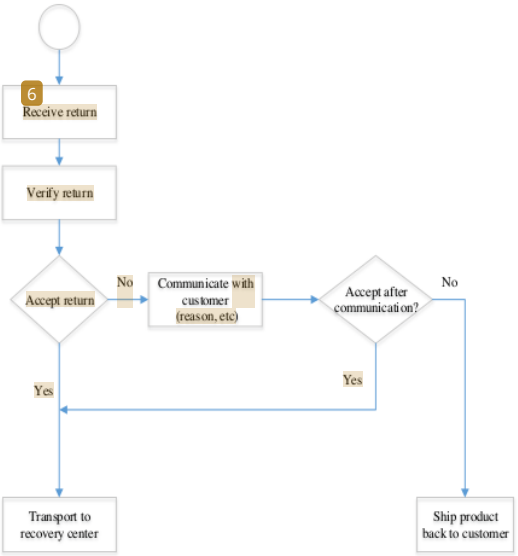

Figure 5. Activity Diagram of DSS: Sorting

3.4 *Step 4: Recovery*

This step involves activities where recovery option such as repair, upgrade, and cannibalization. They are considered for smartphone because proposed RL system until at service center. This activity diagram is shown Figure 6. Determining the initial state of the returned products influence recovery options. According to De Brito and Dekker (2002), several types of recovery can be distinguished. They is separated by product recovery, component recovery, material recovery, and energy recovery. In this model, recovery decision is separated by product recovery and component recovery. Product recovery are repair and upgrade, then component recovery is cannibalization (components are taken off one item and used to repair another unit of the same product).

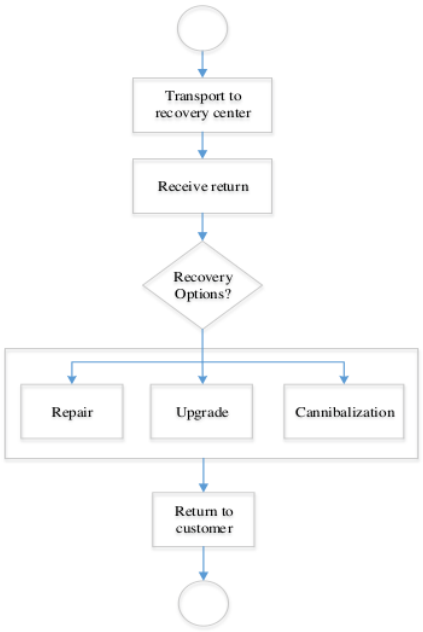

Figure 6. Activity Diagram of DSS: Recovery

3.5 *Android Based DSS of RL system*

After presenting a conceptual RL system for smartphone, this section presents some screenshots from proposed DSS model based android. It shows interface register (Figure 7), return authorization (Figure 8), type of complaint or product return (Figure 9), recovery suggestion (Figure 10) .

Figure 7. Register from screenshot

Interface register is shown in Figure 7 presents initial process in reverse supply chain (gatekeeping). Customers should register before return product. Information required is username, email,and phone number. Based on customer data, company decides whether return accepted or not.

Figure 8. User return authorization from screenshot

If customer data is verified, company will send return authorization number to customer via email. Then, customer completes user return authorization is shown in Figure 8. It is required to know information about product return.

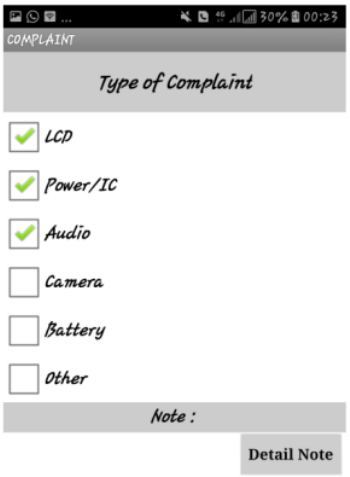

Figure 9. Type of complaint from screenshot

Type of complaint is shown in Figure 9 presents reason return. Reason return for smartphone are LCD, power, audio, camera, battery, etc. According to De Brito and Dekker (2002), product returned because the products is not working properly.

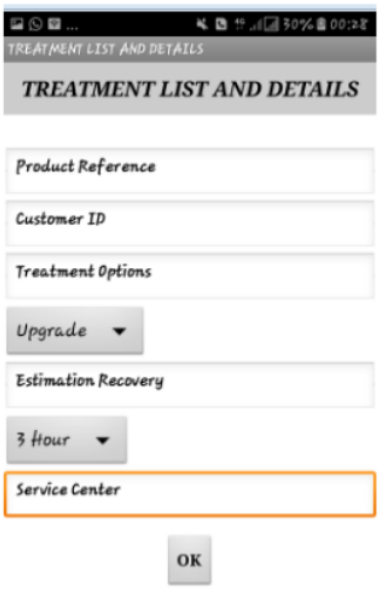

Figure 10. Recovery suggestion from screenshot

Recovery suggestion presents decision from company after product return is examined directly. Customer receives that information through the application is shown in Figure 10. Based on previous explanation, recovery options are repair, upgrade, and cannibalization.

4 DISCUSSION

In proposed DSS model, the parties involved are customer, company (decision maker), authorization service center (recovery center). The main objectives proposed a reverse logistics decision support system which can ease product information tracking to products returned especially smartphone customer using a android based. According to Turki and Mounir (2014), to create a customer value through the return process we make sure that he provides the necessary and the correct information and vise verse. All customer fill-in and send a return request form to the company. A return request form should be available on the application. Only customer who are registered while purchasing the product in the first place send a return request. By this purchase, data both the customer and the product are saved into database. Customers who use this application no need to go to service center.

However in this model, sorting is most crucial issue because the company must determine the criteria for accepting a return. Each type is concerned with specific criteria, which are different from the others (Lambert et al, 2011).

5 CONCLUSION

The conclusion of this paper is that an android-based DSS model can be developed to improve the efficiency and effectiveness of reverse supply chain management.

This model is designed which can ease product returned information tracking to customers in the reverse process. As consumers can know the possibility of damage experienced, know where they should send the product, provide an alternative way to collecting process by looking for delivery without having consumers come to the service center, get estimated treatment time, and the estimated cost if he must pay. So the consumer can decide whether he will immediately make recovery or not.

This model does not include the disposal stage. Also the DSS model in smartphone Reverse SCM designed has not yet reached the manufacturing level. Model is designed to determine the type of recovery/treatment type in service center. In the future, further research is expected to develop a DSS model that covers all reverse SCM activities on smartphone products.

REFERENCES

Bandhari, Rajiv. 2016. Impact of Technology on Logistics and Supply Chain Management. IOSR Journal of Business and Management, p.19-24

Blumberg, D. F. 2005. Introduction to management of reverse logistics and closed loop supply chain processes. Boca Raton, FL, USA: CRC Press.

D.Rogers and R. Tibben-Lembke.1998. Going backwards: Reverse Logistics trend and practices, in Reno, NV, USA

De Brito, M. P., & Dekker, R. 2002. Reverse logistics – A framework. Econometric institute report, Erasmus University Rotterdam, Netherlands, EI 2002-38, pp. 1–19.

.Filip, F.,G., Duta, L. 2015. Decision Support System in Reverse Supply Chain Management. Procedia Economics and Finance 22. pp. 154-159

Giuntini, R and Andel, T. (1995b). Master the six R's of reverse logistics - Part 2. Transportation and Distribution, 36 (2), 73-77.

Guide, Jr., V.D.R., L.N Van Wassenhove (Eds), 2003. Business aspects of closed loop supply chains. Pittsburgh, PA: Carnegie Mellon University Press.

Lambert, S., Riopel, D., Kader, W.A. 2011. A reverse logistics decision conceptual framework. Journal Computers & Industrial Engineering, pp. 561-581.

Liao, Tsai-Yun. 2018. Reverse Logistics Network Design for Product Recovery and Remanufacturing. Applied Mathematical Modelling.

Turban, E., McLean, E., Wetherbe, J. 2005. Information Technology for Management: Transforming Organization in the Digital Economy

Turki, W and Mounir, B. 2014. A proposition of a decision support system for reverse logistics. International Conference on Advanced Logistics and Transport.

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