Reverse Logistics : A Review

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ABSTRACT

The limited amount of natural resources or virgin materials and environmental issues are currently being discussed internationally. Many studies and researches that explore how complexity human needs can be fulfilled with material limitations. Reverse logistics (RL) is one of method that solves this problem and will thoroughly discuss the issue process, planning, strategic, consolidation, internal & external policy, product design, modularity and waste. Reverse Logistics research consists of 5 essential part namely RL Input, RL Process, RL Structure, RL Output and RL System. First, RL Input will analyze the type of raw material, process of disassembling, coordination, supply chain inventory systems, repair and after sales service, remanufacturing, recycling, refurbishing, reusing and production planning. The third, RL Structure discusses about location-allocation problems, inspection & consolidation, integrating manufacturing & remanufacturing, and product modularity. And the fourth is RL Output , research area is pricing after remanufacturing, process & competition and customer relation. And the last part is RL system which discusses more about policy, social and economical aspect and resources. The reasons underlying the existence of reverse logistics research methods are legislation, social responsibility, corporate imaging, environmental concerns, economic benefits and customer awareness. The goal of all reverse logistics researchs is how to minimize all the costs that will be issued by the company so that it can maximize the profit.

Keywords

Reverse logistics, minimize cost, natural resources, review , customer awareness

1. INTRODUCTION

The availability of natural resources are decreasing, while the efforts for recovery or conservation of the existing natural resources, take a very long time and costly. It requires an approach or method for natural resources availability will not be a problem for production process by in spite of lack natural resources. Due to the number of natural resources limitation, companies are required to implement some concepts such as: legislation, social responsibility, corporate imaging, environmental concerns, economic benefits and customer awareness (Mutha,2005)

Several techniques have been developed to response the problem, one of them is how to upgrade the product value by using a small percentage of natural resources, but the value of the product is the same or nearly the same as the new product using the natural resources. The concepts are remanufacturing, refurbishing, reusing, recycling and modularity concepts.

One effort that can be done to socialize the goal is by implementation of reverse logistics method. According to Neto, 2008 the relationship between products improvement and value and process which in line with "the design of sustainable logistics networks balancing the planet and profit", the illustrates that the good design (including process and material usage) will be able to balance between sustainability of our planet and the profit that will obtained by the company.

2. REVERSE LOGISTICS CONCEPTS

The definition of reverse logistics by Rogers and Tibben-Lembke, 1999 from The Council of Logistics Management is *"Process of planning, implementing and controlling the efficient, cost-effective flow of raw materials, in-process inventory,*

finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal".

The concepts above illustrate that the actual reverse logistics is a process of planning, implementation and controlling elements ranging from raw materials, work processes become a finished product with the information as a complement in management system that will provide information about the new product, end of life of a product until the process increases the value. And another concept of reverse logistics is described by The Council of Supply Chain Management Professionals (CSCMP) is: *The process of planning, implementing, and controlling the efficient cost, effective flow of raw materials, in-process inventory, finished goods and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements.* Karen Hawks, 2006, defines reverse logistics as quoted from Rogers and Tibben-Lembke, 1999 is *the process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal. More precisely, reverse logistics is the process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal.*

2.1 REVERSE LOGISTICS SCOPE AND CLUSTERING

The scope of reverse logistics (Dekker and de Brito, 2002), in the supply chain can increase the value of the product and the product must meet several requirements, namely: Manufacturing return, Commercial return (B2B and B2C), Product recall, Warranty return, Service return, End-of-use return and End-of-life return. Reverse logistics also has a larger scope (Rogers and Tibben-Lembke, 1999), reverse logistics discussion not only about the production process but also about how to use energy or sources that are used for its usage to a minimum level. The impact produced by a process and transport that occur also has a very significant impact because its costly. According to Achillas, 2010, the cost product transport from the manufacturing process to the customer is about 10-15% of the total price/ unit. Rogers and Tibben-Lembke, 1999, explains that the activity in the reverse logistics is *"processing returned merchandise due to damage, seasonal inventory, restock, salvage, recalls, and excess inventory. It also includes recycling programs, hazardous material programs, obsolete equipment disposition, and asset recovery".* While Pokharel & Mutha, 2009 through the results of the review between 1992 and 2008 of all studies related to reverse logistics are around 170 journals classified all the researches into four perspectives: Reverse Logistics Inputs and Collection, Reverse Logistics Structure, Reverse Logistics Process and Reverse Processes Logistics Outputs. RL Inputs (Pokharel & Mutha, 2009) discusses many of the raw materials or parts of new modules before the process begins whereas RL Structure and Processes explain about Collection, Processing, Remanufacturing, Inspection and Consolidation, and the last is RL Output which will discuss many issues such as Recycled materials & spare parts and remanufactured products. Explanation of Pokharel & Mutha, 2009 can be described as follows:
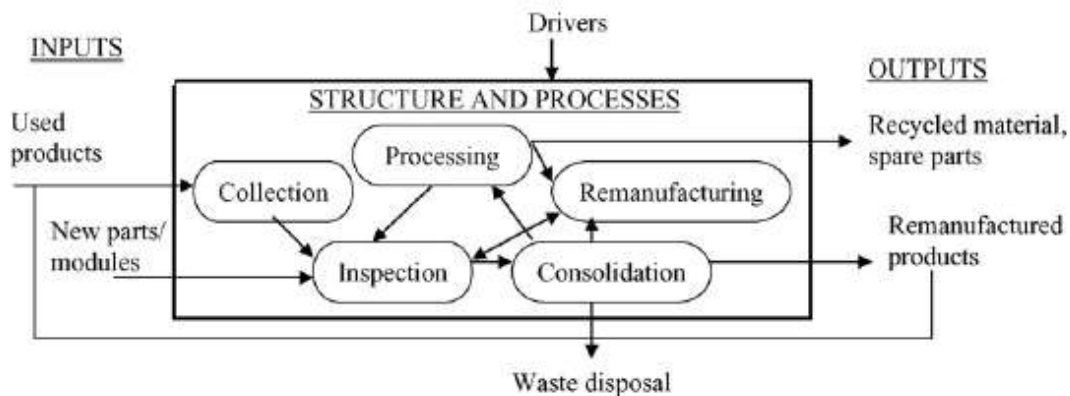

Figure 1 : Content categories for an RL system.
(Source : *S. Pokharel & A. Mutha ,2009*)

2.2 House of Reverse Logistics

From the review carried out by de Brito et.al 2002; Pokharel & Mutha, 2009, Zhang et.al, 2010; Johnson, P. Fraser, 1998; Yalabik, Line et.al, 2005; Liang; Yijiong et.al, 2007; Vadde, Srikhanth et.al, 2010; Mitra, Subrata, 2005; Aras, Necati, 2010 and the research conducted by Mutha, 2009; the perspective can be a house of reverse logistics that consists of 4 pillars, foundation and roof.
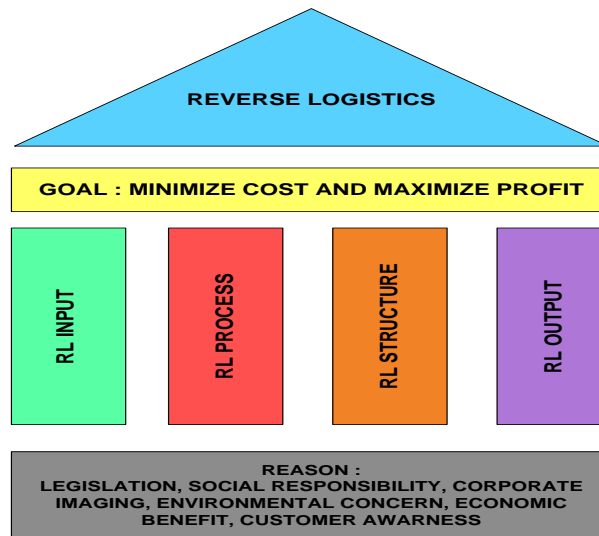
Figure 2 : House Of Reverse Logistics

From the House of Reverse Logistics, RL Systems above can be added in different micro (Figure 2) .On the basis of research by Kumar & Putnam, 2008; Amini, M. Mehdi et.al, 2004; Richey, R. Glenn, 2005; Cheng & Lee, 2010; Genchev, Stefan.E, 2009; Alvarez-Gil., Jose M. et.al, 2007, the RL system related to with policy, innovation, resource based view, SWOT, system approach, stakeholder theory, organizational slack, strategic posture, operations / marketing interface, customer behaviour / habits and leasing, therefore figure 3 can be added to RL System to adopt the methods above.
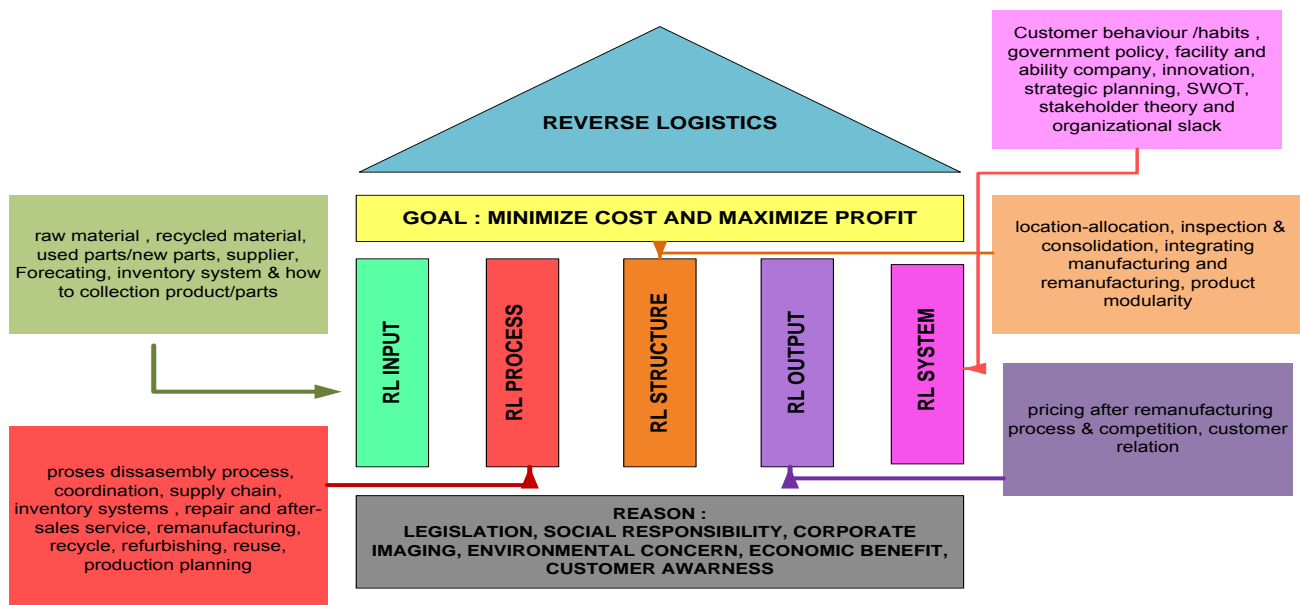

Figure 3 : House Of Reverse Logistics with RL System

3. DISCUSSION

From the figure of the House of Reverse Logistics and also refers to the journal by Pokharel & Mutha, 2009, there are some gaps that can be done for future research that is a problem on customer behaviors or habits, because it is impossible for macro reverse logistics has decapacity to run smoothly if the main actors, customers, governments and companies do not contribute effectively. Many RLs which have successfully been implemented in country like Japan and Europe, due to many factors, have been supported by facilities, the policy of the government, the warranty from the company, places for collecting the goods which have been provided speeded in urban centers and can easily be accessible and satisfy for customers. Product specification factors also must be considered because of the size and weight of product, its measure of implementations reverse logistics can run well and minimize costs.

4. CONCLUSSION

In order to respond the environmental issues, the reverse logistics is one method that can respond the challenge. Reverse Logistics which will be implemented by a company not only a corporate responsibility but also the responsibility of all parties like the government that provides policy, the company that provides services for collecting the goods, either centralized or decentralized and its production processes and customers that have an important role as an end users to be more aware of the goods due to decreasing number of natural resources.

REFERENCES

[1] Achillas, Ch., Vlachokostas, Ch., Aidonis, D., Moussiopoulos, N., Lakovou, E., Banias, G., 2010, *Optimising reverse logistics network to support policy-making in the case of Electronic Equipment,* Waste Management 30, p.2592-2600

[2] Alvarez-Gil,M. José Álvarez-Gil ; Berrone, Pascual ; Husillos, F. Javier ; Lado, Nora , 2006, Reverse logistics, stakeholders' influence, organizational slack, and managers' posture, Journal of Business Research 60 pp. 463–473

[3] Aras., Necati Aras; Gullu., Refik; Yurulmez., Sevil, 2010, Optimal inventory and pricing policies for remanufacturable leased products, Int. J.ProductionEconomics] (]]]])]]]–]]]

[4] Amini.,M. Mehdi ; Roberts., Donna Retzlaff; Bienstock., Carol C. ,2005, Designing a reverse logistics operation for short cycle time repair services, Int. J. Production Economics 96 pp. 367–380

[5] Brito, Marisa P.de., Flapper, Simme D.P., Dekker, Rommert., 2002, *Reverse Logistics: a review of case study ,* May 2002, Econometrics Institute Report EI 2002-21

[6] Cheng., Yung-Hsiang ; Lee., Frank , 2010, Outsourcing reverse logistics of high-tech manufacturing firms by using a systematic decision-making approach: TFT-LCD sector in Taiwan, Industrial Marketing Management 39 pp. 1111–1119

[7] Genchev, Stefan E., 2008, *Reverse logistics program design : A company study,* Business Horizons 52, p.139-148

[8] Johnson, P. Fraser , 1998, managing value in reverse logistics systems, Transpn Res.-E (Logistics and Transpn Rev.), Vol. 34, No. 3, pp. 217±227

[9] Kumar, Sameer., Putnam, Valora., 2008, *Crandle to crandle : Reverse logistics strategies and opportunities across three industry sectors,* Int. J. Production Economics 115, p.305-315

[10] Liang.,Yijiong ; Pokharel., Shaligram ; Lim., Geok Hian , 2007, Pricing used products for remanufacturing, European Journal of Operational Research 193 pp. 390–395

[11] Mutha, Akshay., Pokharel, Shaligram., 2009, *Strategic network design for reverse logistics and remanufacturing using new and old product modules,* Computers & Industrial Engineering 56,p.334-346

[12] Mitra., Subrata, 2005, Revenue management for remanufactured products, Omega 35 pp. 553 – 562

[13] Neto, J.Quariquasi Fronta., Ruwaard, J.M Bloemhof., Nunen, J.A.E.E van., Heck, E.van., 2008, *Designing and evaluating sustainable logistics networks,* Int. J. Production Economics 111, p.195-208

[14] Richey, R.Glenn., Chen, Haozhe., Genchev, Stefan E., Daugherty, Patricia J., 2005, *Developing Effective reverse logistics programs,* Industrial Marketing Management 34, p.830-840

[15] Vadde.,Srikanth ; Zeid., Abe; Kamarthi., SagarV.,2010, Pricing decisions in a multi-criteria setting for product recovery facilities, Omega 39 pp. 186–193

[16] Yalabik., Baris ; Petruzzi., Nicholas C. ; Chhajed., Dilip, 2003, An integrated product returns model with logistics and marketing coordination, European Journal of Operational Research 161 pp. 162–182

[17] Zhang, Yi Mei;Huang, Guo He ; He, Li , 2010, An inexact reverse logistics model for municipal solid waste management systems, Journal of Environmental Management xxx ,1-9