

FEASIBILITY STUDY OF REVERSE LOGISTICS FOR END-OF-LIFE/SECOND HAND MOTORCYCLE IN THAILAND*

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1. Introduction

Thailand is one of the countries that have the most population of motorcycles and the number still keep growing. Nevertheless, when the motorcycle become End-of-Life vehicle, the number of damped or scraped motorcycle is yet still unknown and some motorcycle is end up as a dispose regardless its potential to be able to recycle. The purpose of this paper is to explain the feasibility of reverse logistics for End-of-life/second hand motorcycle in Thailand. Currently, there is no regulation about motorcycle recycling in Thailand but if the law is implemented this reverse logistics will be suit. In addition, in term of business, reverse logistics offer more added values to the product since the material is returned to re-manufacture and reverse logistics also enhance the quality of after-sell service.

2. Research background

(1) Current situation of motorcycle industry in Thailand

In Thailand, as seen in figure 1, motorcycles are delivered by a truck directly from factory/cargo to each dealer without using DC (Distribution Centre). At the end of usage, customer can sell the motorcycle back to the dealer or sell to any person privately. Besides, some of customer also sell motorcycle to spare part market then the spare part marker will dismantle the motorcycle and keep it as a spare part and the part that cannot be used is sold as a scrap metal however some motorcycle that already become End-of-life vehicle are disposed illegally and cause a problem to environment regardless the material in the disposed motorcycle can still be re-used. Figure 2 shows number of second hand motorcycle compared with mileage. As seen from the figure, the most number of second hand motorcycles is motorcycle that has mileage around 7500km. Nonetheless, the condition is still a good condition for motorcycle. One of the reasons is that some customer has a financial problem so they need to sell the motorcycle. Another reason is that after using motorcycle around 7500 km, they sold the motorcycle to buy new one.

(2) About reverse logistics

Recently, issue about environmental problem has become more attended. Value recovery from product returned also becomes more attention. The following main factors influence the implantation of reverse logistics: 1) Legislative initiatives from governments, 2) Increasing awareness from consumers and 3) Companies' perception on new business opportunities. Most of studies focus about location decisions that are made only for facilities supporting forward activities so there is no network design that supported the reverse flows. The cost for reverse flow is hence high and also considered as unprofitable activity. However, reverse logistics recover the value from the product that is disposal or end-of-life. Reverse logistics do not only save the inventory carrying cost, transportation cost and waste disposal cost due to returned products, but also improve customer loyalty and future sales and also referred as a post sale service. Business processes in most companies are efficiently designed for forward flows only because reverse logistics has been recognized as an unprofitable activity.

*Keywords: reverse logistics, recycle, motorcycle, facility location, facility network, end of life vehicle

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From the previous studies²⁻³⁾, integrated forward and reverse loop are approached. Reynaldo Cruz-Rivera, *et al*¹⁾ established closed-loop supply chain for the collection of End-of-Life Vehicles in Mexico. The results are varied depended on the scenario that how many End-of-Life vehicles are collected. It is also indicated that if the number of collected vehicle is low, it required more transport costs which hence cause a burden to customers.

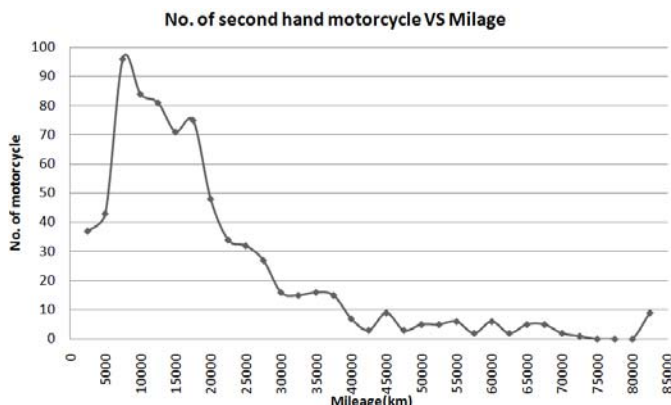
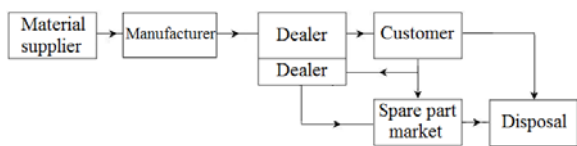


Figure 1: Current product flow of motorcycle in Thailand

Figure 2: Number of second hand motorcycle compared with mileage⁴⁾

3. Proposal of reverse logistics to Thailand motorcycle industry

Based on the referred studies, the system is designed as a closed-loop system, in figure 3. Apart from system in Japan, second hand motorcycle is also collected at collection centre. At collection centre, it will be decided that the collected motorcycle will be sent to maintenance then sell again or sent to dismantle centre for spare part or material extraction. The motorcycle can be collected from both dealer and collection centre.

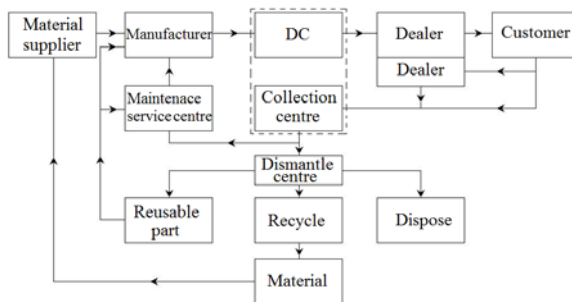


Figure 3: Proposed diagram of reverse logistics for motorcycle in Thailand

4. Further study

In order to design the network for reverse logistics of motorcycle, the demand of second hand motorcycle and number of End-of-Life vehicles are hence needed to be estimated. For more details about second hand motorcycle demand, survey by using questionnaire and interview will also be conducted. In addition, cohort study will also be introduced to estimate the number of End-of-life vehicles in the future. Last but not least, for more detailed about proposed diagram, more data and information will be investigated. The results will be presented during presentation.

References

- 1) Reynaldo Cruz-Rivera and Jürgen Ertel: Reverse logistics network design for the collection of End-of-Life Vehicles in Mexico, *European Journal of Operational Research* 196, pp.930-939, 2009.
- 2) Der-Horng Lee, Meng Dong: A heuristic approach to logistics network design for end-of-lease computer products recovery, *Transportation Research Part E* 44, pp.455-474, 2008.
- 3) Hyun Jeung Ko, Gerald W. Evans.: A genetic algorithm-based heuristic for the dynamic integrated forward/reverse logistics network for 3PLs, *Computers & Operations Research* 34, pp.346-366, 2007.
- 4) Department of Land Transport (Ministry of Transport), Thailand.