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## AN ANALYSIS OF THE INSTITUTIONAL FRAMEWORK OF THE COMMERCIAL VEHICLE REBUILT INDUSTRY IN MALAYSIA

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### ABSTRACT

Rebuilt industry, also known as remanufacturing, is the practice of taking end-of-life goods and re-engineering them back to as new or better condition. In Malaysia, one of significant remanufacturing activities is the automotive remanufacturing or rebuilt commercial vehicle industry. The industry has begun since 1970s, the time when the construction sector was booming. Despite of its importance in bringing to a sustainable development of a country, no studies have been conducted on the effectiveness of the practice in Malaysia. However, the recent problematic issue surrounding the industry has led to the call for this research. The purpose of this study is to explore the effectiveness of the institutional framework of the commercial vehicle rebuilt industry in Malaysia. The results obtained were based on seventeen interviews. All interviews were transcribed and the data were analysed using the content analysis method. The results demonstrated that with the present practice of the institutional framework allows some loopholes within the industry. These loopholes have led to the production of false document and thus excessive number of rebuilt commercial vehicles registered, far greater than the quota given by the Ministry. This issue arose due to unavailability of effective communication mechanisms among the relevant government authorities. This study provides insights into the strengths and weaknesses of the present governance in dealing with the rebuilt commercial vehicle industry in Malaysia. It is important as it opens up various issues that have been lingering within the implementation of the industry.

Keywords: rebuilt industry, automotive remanufacturing, interviews, governance

### 1. INTRODUCTION

Manufacturers nowadays are more concern with more environmental friendly products. Thus, various ways of production have been created taking into consideration the reduction of environmental harm and at the same time costs reduction (Hammond et al, 1998). Product reuse appears to be more profitable means of product disposition, both ecologically and economically (i.e. save time, energy, costs, etc) (Amezquita et al, 1995a, Berko-Boateng et al, 1993, Navin-Chandra, 1993). Remanufacturing is defined as “the practice of disassembling, cleaning, refurbishing, replacing parts (as necessary) and reassembling a product in such as manner that the part is at least as good as, or better than, new. By remanufacturing a product, the product may be returned to service with a reasonably high degree of confidence that it will endure (at least) another full life-cycle” (Hammond et al, 1998, p.2). Other terms that are frequently used to represent remanufacturing are rebuilding, refurbishing, reconditioning and overhauling. However,

remanufacturing has been the standard term used for the process of restoring used durable products to a “like new” condition (Steinhilper, 1998).

In Malaysia, one of the significant remanufacturing commercial activities is the automotive remanufacturing or rebuilt commercial vehicle industry. The industry has evolved in two eras, i.e. 1970s and late 1990s, the periods when the construction sector was booming. Despite of its importance in bringing a sustainable development of a country, no studies have been conducted on the effectiveness of the practice in Malaysia. However, the recent problematic issue surrounding the industry recently has led to the call for this research. Thus, the purpose of this study is to explore the effectiveness of the institutional framework of the commercial vehicle rebuilt industry in Malaysia.

## 2. LITERATURE REVIEW

Throughout the world, remanufacturing is not a new phenomenon. Especially the automotive industry, the remanufacturing and rebuilding has been practiced for approximately 60 years (Gager, 1998) and the automotive recycling for 75 years (Automotive Recyclers Association, 2008). This is due to the fact that environmental protection and pollution prevention have become an increasingly important in industrialized countries as the natural resources are depleting, landfill and incineration capacities are diminishing and the environmental pollution levels are increasing. Accordingly, governments and environment protection agencies have limited choice except to impose stricter environmental regulations for companies to assume full responsibility for product disposal and reduction of waste (Yoruk, 2004).

### 2.1 Definitions of Automotive Recycling and Automotive Remanufacturing

Several definitions emerged throughout the practice of recycling and remanufacturing. Gungor and Gupta (1999) categorized recycling as material recovery and remanufacturing as product recovery. They put both material and product recovery under recovery process in the area of Product Recovery Management (PRM). Thierry et al (1995, p.114) described PRM as “the management of all used and discarded products, components, and materials that fall under the responsibility of a manufacturing company.” The objective is to recover the economical value of returned products, its components and materials as much as possible to reduce waste. Product recovery could be carried out through several options including repair, remanufacture, refurbish, cannibalize, and recycle depending the need and degree of disassembly.

Yoruk (2004), for example, defined remanufacturing as the restoration of returned product to the same quality level as a new product i.e. to make them ‘as new’. It includes complete disassembly or the returned product and extensive inspection of all its modules and parts, and repair or replacement. Similarly, Seitz (2007) defined remanufacturing as the transformation of an end-of-life product into a product with an ‘as good as new’ condition. According to Hauser and Lund (2003), the word remanufacturing means worn, defective or discarded products are brought to a manufacturing environment, in which they are disassembled, reassembled and tested before getting ready for a second life, performing as new.

Although remanufacturing has been practiced for many years in many countries throughout the world such as Germany, Spain, Thailand, Indonesia etc, however, there seems to be no contradiction in the definition of remanufacturing. The standard procedure has also been clearly explained, in which it involves a process of disassembling, cleaning, refurbishing, replacing parts (as necessary) and reassembling a product in such as manner that the part is at least as good as, or better than, new (Hammond et al, 1998).

## 2.2 Factors Influencing Recycling and Remanufacturing

The drive for an increasing recycling and remanufacturing activities comes in the form of constraints and benefits.

Stricter environmental laws and regulations to protect the environment has been the major driver. For example, at the beginning of 2002, The European Parliament and Council of Ministers has enforced the automobile manufacturers to assume full responsibility for the disposal of their products with no cost to the final owner for the cars manufactured (Anonymous, 2000; Goodfellow, 2002).

The process that involves restoration of old products to like new in remanufacturing offers a better alternative form of recycling. Remanufacturing differs from recycling because remanufacturing 'recycles' the value originally added to the raw material and most importantly it makes a much greater economic contribution per unit of product than does recycling. Accordingly the significant difference arises in the recapture of value added.

Thus, remanufacturing recaptures the value-added to the product when it was first manufactured. However, a study by Massachusetts Institute of Technology in 1981 on the remanufacturing of automobile components indicated that approximately 85% of the energy expended in the manufacture of the original product was preserved in the remanufactured product (Remanufacturing Central, 2008). A study by Smith and Keoleian (2008) demonstrated that remanufacturing (i.e. restores used automotive engines to like-new condition) may provides engines that are functionally equivalent to a new engine at much lower environmental and economic costs than the manufacture of a new engine. The life-cycle assessment (LCA) model developed that investigates the energy savings and pollution prevention that are achieved in the United States through remanufacturing a midsized automotive gasoline engine compared to an original equipment manufacturer manufacturing a new one showed several savings and reduction of pollution emissions resulted from the remanufactured engine (refer to Table 1). In terms of costs, the costs of remanufacturing a product are typically 40% to 65% cheaper than the cost of manufacturing a new product (Yoruk, 2004; Giuntini and Gaudette (2003). This is because when a failed component is removed from a product, it is usually possible to restore the product into operating condition by replacing the failed subassembly or the component. Furthermore, used products constitute an inexpensive source of components since the material and labor resources required to remanufacture a product is considerably less than those required to manufacture a new one.

**Table 1:** Energy savings and pollution prevention from production of remanufactured engines

Categories of savings in the production of remanufactured engines	Savings (%)
Energy saving	68% to 83%
Carbon dioxide emissions reductions	73% to 87%
Carbon monoxide reductions	48% to 88%
Nitrogen oxide reductions	72% to 85%
Sulfur oxide reductions	71% to 84%
Nonmethane hydrocarbon reductions	50% to 61%
Reductions of raw material consumption	26% to 90%

Reduction of solid waste generation	65% to 88%
Price difference with new engines	30% to 53% lower

Source: (Smith and Keoleian, 2008)

### 2.3 Automotive Remanufacturing Industry in Malaysia

In Malaysia, the automotive remanufacturing has begun in 1970s, the period just after the construction sector was booming. Heavy industrial vehicles and machineries for construction such as tractor, scrapers and cranes were highly demanded. However, when the construction projects were completed, these vehicles, machineries and equipments were left idle until they were transferred to new construction projects. Old and broken parts were replaced; the chassis cab were refurbished and reconditioned. However, the industry was put to a halt in the late 1980s when most of projects by the Public Works Department were outsourced to private contractors.

In the late 1990s, the remanufacturing practice was again introduced. License were given out to rebuild or remanufacture a huge number of used trucks that were left idle at several construction sites such as Putrajaya in Selangor, Bakun in Sarawak so that the trucks could be given a second life.

Although the commercial vehicle rebuilt industry in Malaysia is still new, however the industry has developed significantly since the first license was given out to Boon Koon Vehicles Industries Sdn Bhd in 2001. As of today 33 companies have been given license by the government. Up to March 1, 2008, 18 companies were already in operation. Five (5) remanufacturing companies are operating in Peninsular Malaysia, eight (8) in Sabah and five (5) in Sarawak. These companies form an association and registered under the Registrar of Societies Act 1966 in 2007.

There are several types of rebuilt commercial vehicles manufactured by the rebuilt commercial vehicle companies namely, (1) heavy duty rebuilt articulated trucks, (2) light, medium, heavy duty and specialized rigid vehicles, and (3) pick up trucks, panel vans and utility trucks. These vehicles are highly demanded by transportation, logistics, waste products management companies, haulage, building, construction and material handling industries especially in the category of small medium industries (SME). According to statistics supplied by Road Transport Department, the total number of rebuilt commercial vehicles registered in 2006 was approximately 7500 units and in 2008 was 11 000 units.

### 3. METHODOLOGY

The research was conducted in a 5 months' period, i.e. from September 2008 to January 2009. The data was collected from seventeen interviews, in which eight interviews were conducted with the commercial vehicle rebuilt companies, six with the related government agencies, one with a news agency, one with a commercial vehicle association and one with a new lorry company. Five interviews located at the East of Malaysia while the other twelve interviews were at West Malaysia. Although there are 18 rebuilt commercial vehicle companies in Malaysia; only eight of them were interviewed. This is because the data obtained from these eight companies were already saturated and that there was no new information obtained. With regard to the government authorities, all relevant authorities were interviewed.

Since a great number of researchers, i.e. seventeen researchers involved in the data collection, all interviews were conducted within one month's time. This is because the team of researchers was divided into three smaller groups and each group was assigned to conduct five to six interviews.

All interviews were transcribed. Content analysis method was used to analyze the data, in which several similar and contradict themes were highlighted as findings of the study.

The interview questions were different among the manufacturers, government authorities, newspaper agency and the new lorry assembler as they are exploratory in nature. However, all interview questions

began with asking the informants of the standard implementation procedures, implementations problems and their suggestions on how to improve them.

#### 4. RESULTS AND DISCUSSIONS

The literature review highlights many significant benefits of the industry. However, as highlighted by the Remanufacturing Central, the legal and regulatory are one of the major issues affecting the industry. Similarly, the results highlighted several weaknesses within the present practice of the institutional framework that allows some loopholes within the industry.

First, the lack of information and communication among the relevant authorities as well as between the relevant authorities and the rebuilt commercial vehicle companies has led to the misunderstanding of terms and definitions among the companies and the relevant authorities. Consequently, the rebuilt commercial vehicle companies were confused as there were no clear guidelines on which definitions to use as well as the standard procedure that they need to follow. A standard understanding of the terms and definitions is important as the wrongly used of definition would result to various illegal process of remanufacturing the vehicles. For example, these loopholes have led to the production of false document by the rebuilt commercial vehicle manufacturers and thus excessive number of rebuilt commercial vehicles has been registered. These numbers was found to be far greater than the quota given by the Ministry. However, with the recent electronically transfer of information among the relevant authorities has greatly improved the problems.

Second, safety was one of the main issues highlighted by the informants. In fact, all respondents including the rebuilt commercial vehicle companies have raised their concerns on the degree of safety of the vehicles manufactured; even though all the safety compliance checks and tests have been fulfilled. Thus, a questionable issue that has been highlighted was whether the present compliance tests were not sufficient enough with to meet the safety standard of the rebuilt vehicles. On the other hand, there was no statistic evidence available in the police accident report that differentiates the type of vehicles (rebuilt vehicles or new) involved in road accidents. In addition, studies conducted by the Malaysia Institute of Road Safety (MIROS) indicated that human factor was responsible for 85% of road accidents in Malaysia. Accordingly, it can be concluded that the present road compliance tests are sufficient enough to say that the vehicle are safe to be used and the party who are responsible to the safety of the vehicle is the users. Thus, relevant authorities do not need to add more of the vehicle safety testing procedures. However, proper monitoring should be emphasized on the production of the Certificate of Manufacturing produced by the manufacturers as this was one of the main loopholes leading to an illegal practice of the operation.

The energy savings and pollution prevention resulting from the production of remanufactured engines as displayed in Table 1 proved the environmentally friendly nature of the industry. With this positive statement, this industry should be promoted rather than putting them to a halt as intended by the relevant Ministries. However, the issue highlighted in the industry was due to exceeding number of rebuilt vehicles that have been registered that has caused annoyance of the new lorry assembler. Thus, promoting healthy competition between the rebuilt commercial vehicle manufacturers and the new vehicle assembler is essential towards a harmonization of the automotive industry in Malaysia.

Although several literatures emphasized the development of skills, technologies and job opportunities that the industry brings, however the benefits could be gained only when the workers are comprises of the local people. In the context of Malaysia, these benefits need to be evaluated by the relevant authorities as most of the workers comprise of foreign labor.

## 5. CONCLUSIONS

This study provides insights into the strengths and weaknesses of the present governance in dealing with the rebuilt commercial vehicle industry in Malaysia. It is important as it opens up various issues that have been lingering within the implementation of the industry.

As in all research, this research also has several limitations. Although data from all related government authorities have been obtained, leading to a comprehensive data collection, however the fact that none of the researchers has the chance to experience interviewing all informants has led to limited insights of the flow of issue being investigated. This is due the fact that the researchers have been divided to several groups whom are required to interview certain informants.

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