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Assessing Heavy Goods Vehicles (HGVs) from Operational Strategy Perspective in Reducing Global Warming

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Abstract

The thriving of the logistics industry in Malaysia has faced numerous challenges, and one of them is to reduce carbon emission. Government and agencies tend to give more attention to road passenger transports (public and private vehicles) rather than road freight transport (commercial vehicles) especially Heavy Goods Vehicles (HGVs) in a matter of reducing global warming. Despite in Malaysia, certain road haulages have not yet implemented the right strategy in their operation in order to support this carbon emission reduction and this leads to myriad problems in HGVs operational planning. This study aims to assess the right strategy for HGVs implementation in their operations in order to support Malaysia voluntary target to reduce 40% of its carbon emission by 2020. Hence, writers have developed a conceptual framework for the study's objectives. The evaluation of this assessment is based on the HGVs operators' perspective and writers had conducted a quantitative research approach by distributing questionnaires towards respondents. The data had been analysed by using descriptive analysis and simple estimation calculation on the cost to determine the difference between the company who practice the strategy and who doesn't. Based on the preliminary result, most of them agreed that by using the right strategy, the operational cost and carbon emission can be reduced. The present research is therefore intended to make contributions to the field of green logistics as well as road haulage industry in Malaysia.

Keywords: Heavy Goods Vehicles (HGVs), Global Warming, Operational Strategy, Carbon Emission, Operational Cost.

Introduction

In recent years, Malaysian Government starts to put several initiatives to support the mitigation of global warming issues. As one of the biggest industry in Malaysia, road haulage industry has an important role in reducing its transport emission to support our national agenda which is to reduce its carbon emission to 40% by 2020 (Zaid et. al., 2015; Mustapa & Benkett, 2016). Besides that, in the

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Tenth Malaysia Plan, it had shown that we are actually already achieving 33% of carbon emission reduction in Malaysia (Ibrahim et al., 2016). It shows that a lot of improvement can be implemented by all stakeholders in the road haulage industry in order to achieve the target in supporting against global warming.

However, most public and private agencies are overlooked about road haulage companies, especially HGVs as they focus more on sustaining public transportation and private passenger' vehicles in reducing global warming. Normally, road haulage in Malaysia operates their daily HGVs routine based on trips. Therefore, poor planning in managing their HGVs operation can lead to excessive fuel usage and high carbon emission. Consequently, the right strategy in their operation was needed in order to reduce their operational cost and it will indirectly support the carbon emission reduction (Tarudin, 2013). In order to solve these HGVs problems, the industry must come out with several green strategies which have been put into practices.

The main thrust of these management practices is not only to reduce operational cost and carbon emission but also to support the principles of green logistics in managing global warming issues. Based on this situation, writers want to assess HGVs from an operational strategy perspective in reducing global warming. Apart from that, this study is a suggestion to the government and the logistics industry to clarify the best strategy for the implementation in order to sustain HGVs based on the cost and carbon emission measurement indicator.

Discussion of Framework Development

Currently, people start to take the initiative from various aspects in order to reduce the global warming issues and one of the initiatives is coming from the prime mover study. The most popular study about green logistics and global warming was coming from McKinnon (2015) study, he had shown that the prime movers contribute one of the highest carbon emissions in European countries. Besides that, Santos (2017) had stressed out, in reducing carbon emission in the transport sector are costlier compared to other sectors due to the reason that

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transport still heavily relies on fossil fuels. This can be supported by Chukwu et al. (2015) and Chong et al. (2015). A recent study by Alaharja (2015) suggested that logistics efficiency can be improved with logistics planning such as route and load planning. These green strategies are crucial elements in HGVs operations.

However, Gajanand and Narendran (2013) state that, freight forwarding companies become more efficient in planning their schedule and distribution journey as the rise up of fuel cost nowadays. The strategy, namely route planning or arranging transport and vehicle planning (Košíček et al., 2011) determines the arrangements which (the chose transport vehicles) should supply the request focuses on asking for amounts of products at the perfect time. Another essential point stated by Hordnes (2016) that reduction within the port and transit time will have substantial improvement result on the time used on the route trip. As a matter of a fact, route planning can achieve up to 10% gains in cost efficiency and energy saving. This can be supported by Blanco and Sheffi (2017) statement which mentioned that vehicle routing and scheduling is often the most environmentally intensive activity.

Route planning can also overcome transport planning issues (Košíček et al., 2011). On the other hand, Kamakate (2009) mentioned the proper load planning of truck freight can save energy and lower the emissions. It was supported by Alaharja (2015) also mentioned the efficiency of load plans determine to a large extent how sustainable the deliveries are. Scotland Transport Department (2010) advised the trucks should be loaded in a logical order which makes it secure and efficient to unload at the client's premises.

To measure the effectiveness of strategies, one of the components that are being proposed is cost efficiency. As mentioned by Rodrigue (2017), reducing costs is the purpose of logistics, especially transport costs and logistics companies are very supportive of strategies that enable them to reduce it. This shows the important role of cost as a decision making factor in strategy selection. Another component that can access the targeted strategy is carbon emission. Reduction of carbon emission plays an important role and becomes objective for HGVs

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operators. This can be supported by Ubeda, Arcelus, and Faulin (2011) who mention that the minimization of distances and pollutant emissions associated with the introduction of changes in transport planning shows the importance of optimizing operations. It can be seen that the growth of fuel effiency can have impact on reducing fuel use and consequently, reduced average greenhouse emission per vehicle.

However, because of the lack of documentation for road haulage on how to sustain their HGVs and the implementation of green logistics initiatives from road haulage perspectives in these studies, there is a need for further studies to provide a deeper and more comprehensive understanding of green logistics implementation in Malaysia. To illuminate the uncharted field of this study, writers manage to provide a comprehensive conceptual framework according to the objectives. The independent variables are the Green Strategies and two indicators under this variable are Route Planning (Blanco & Sheffi, 2017; Hordes, 2016; Alaharja, 2015) and Load Planning (Alaharja, 2015; Scotland Transport Department, 2010; Kamakate, 2009). The dependent variable is the assessing HGVs in reducing global warming (Mckinnon, 2015; Košíček et al., 2011). The outputs of the framework are cost efficiency (Rodrigue, 2017; Mckinnon, 2015) and carbon emission reduction (Rodrigue, 2017; Mckinnon, 2015; Ubeda et. al., 2011). The Figure 1 below shows the conceptual framework of the study provides by writers.

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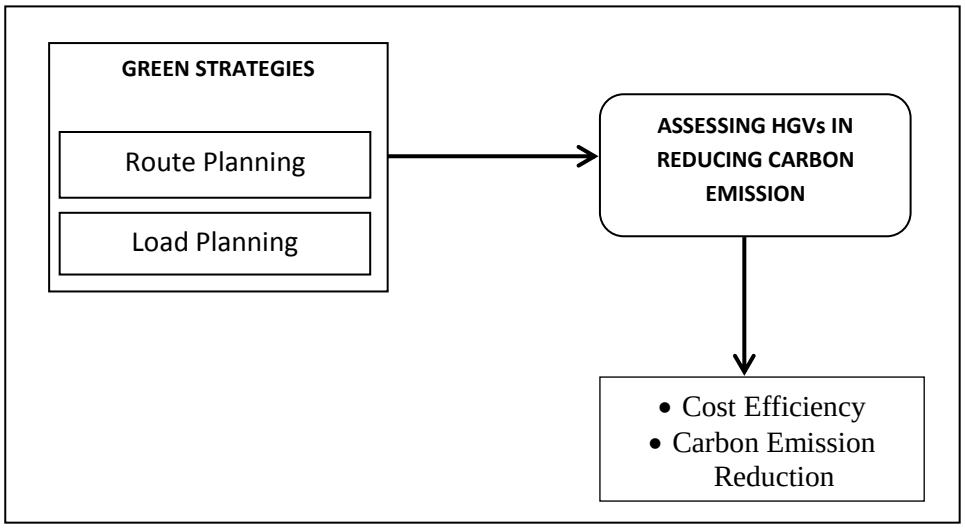

Figure 1. Conceptual Framework

This conceptual framework proposed two green practices for sustaining HGVs in the matter of cost efficiency and carbon emission reduction with regards from operational strategy viewpoint. The conceptual framework has been proposed by utilizing empirical pieces of evidence in the existing literature, whereas future research is carried out to validate the proposed conceptual framework. For deep understanding, this proposed framework adds value in existing body of knowledge regarding the effort in supporting green logistics practices, especially in road haulage industry. From the managerial point of view, managers could utilize the proposed framework in improving their insights on how to manage their HGVs using green planning tools.

Methodology

This study possesses huge numerical data, therefore, the writers applied quantitative approach design due to the mission of gaining new insights into Malaysia scenario. This study has been conducted on the population of road haulage companies that carry on the business of import and export with HGVs which based in Shah Alam area as listed in the Malaysia Logistic Directory

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2016/2017. The respective respondents in this study will be the manager and middle management in the operation department especially handling HGVs. For the preliminary study, writers have got 30 respondents to proceed with this preliminary study.

Therefore, the sample for this study consists of 30 companies that are involved with the haulage of containers in Shah Alam, Selangor. Regarding to the population, writers have selected a sample by using the simple random sampling method, (Sekaran, 2003) as it is considered as the most efficient sampling design when differentiated information is needed from the various strata within the population. The purpose of using this technique is to avoid members of the population being significantly under or over-represented (Hussey and Hussey, 1997).

A set of structured questionnaires is used for primary data collection as a survey instrument to serve as the basis for collecting data pertaining to the road haulage industry perspective regarding this study and simple calculation for measuring cost and carbon emission reduction. This method is to enhance empirical evidence in finding out the users' views and experiences in using the strategy. Mechanism of "adopt and adapt" from past literature (Smith & Perks, 2010; Byrne et. al, 2013; McKinnon et. al, 2015) has been used in building the foundation of the questionnaire which divided into a few sections which cater for several needed information for this study.

The respondents' perception has been analyzed with descriptive analysis as a statistical technique to measure the data gathered. Writers also used purposive sampling to select 3 types of companies which are big company, medium company and small company for measuring the reduction of cost and carbon emission by using selected formulas to estimate the percentage. Meanwhile, one of simple estimation calculation formula is provided as in Figure 2 below to measure cost reduction;

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Total Cost = *a1 + a2 + a3+ …..*

Where:

a is the element of cost

Total Cost = Fuel Cost + Toll + Maintenance

Fuel Cost = Fuel (L) x Price (RM/L)

Cost per day = Fuel cost per day + Toll (per day)

Figure 2. Estimation of Fuel Calculation

*Malaysia Fuel price for week 3rd – 9th May 2018: Diesel RM 2.18 per liter

*Weekly petrol price adjustments in Malaysia announced by Malaysian Ministry of Domestic Trade, Cooperatives and Consumerism (KPDNKK)

Result and Discussion

Based on the descriptive analysis, the majority of respondents for this preliminary study is from 56% big companies (A) and followed by 34% medium companies (B) and 10% of small companies (C). Other than that, the majority of big companies had implemented the right in their HGVs operations which is 67.9% of them, followed by 25% of Medium companies and 7.1% of Small companies 48.8%. Next, the data indicate that almost 48.8% of A was not implemented the right strategy in their HGVs operation, followed by 39.5% of B and 11.6% of C. Based on the preliminary analysis, the respondents agree that by implementing the right strategy for their road planning and load planning, the cost can be reduced and indirectly support the reduction of carbon emission. The result of simulation also had shown that there is a 19.94% reduction of operational cost when the company had implemented the suitable strategy in their daily operation.

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Company	Implementation of Green Strategy	
	Yes	No
A	RM 30,150	RM 35,475
B	RM 24,300	RM 33,075
C	RM 28,050	RM 34,500
Total Cost	**RM 82,500**	**RM 103,050**

Figure 3. Total Cost operational per day

Referring to Figure 3, it was shown that the cost per day for the company that had implemented the right strategy, the costs which it needed to bear is lower, compared to the company that did not practice any kind of strategy implementation. The difference in this amount is higher. Therefore, by implementing the green strategy, a road haulage company can significantly reduce its operating cost, thus generating more revenue for the company. This result is supported by a previous study where it was shown that the effectiveness and efficiency of implementation of the strategy can reduce the operational cost. This is similar to the study that was conducted by Chang et. al., (2006), where the authors conclude that a cost reduction in the range of 5% to 46% is achievable, if a combination of the container types in the supply and demand nodes is found by dealing with the empty container reuse system. Based on the result, the percentage of cost reduction is 19.94% and it was considered acceptable in the attainable range state ($5\% < x < 46\%$).

In addition, the result of the estimation simulation below also had shown that there is a very small reduction of carbon emission when the company had implemented the right strategy in their daily operation. The data have shown that only 1% reduction of total carbon monoxide and 0.99% reduction of total carbon dioxide produce by respondents' HGVs. Even though the result showed a merely small percentage of carbon reduction, hence the writers had found that there is a

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positive effect on cost and carbon emission reduction on green strategies implementation.

Conclusion

This research indicates that the majority of road haulage companies in Malaysia perceive that by having the right strategy, operating costs can be reduced. Based on the number of trips involving HGVs operation, companies that implement the right strategy has a lower number of trips compared to the companies which do not implement any strategy. Based on this scenario, it shows that the development of the road haulage industry in Malaysia is able to reduce global warming indirectly because when they have implemented the right strategy, it will reduce their operational cost and carbon emission. It is just not about to support efforts against global warming, it is also about how they could sustain in their industry for a long-term period.

Based on the result of this study, writers can conclude that green practices are very good to be implemented in freight transport industry. Moreover, it can achieve the voluntary target in the eleventh Malaysia Plan. The mission set by the Malaysian Government by 2020 is nearly to be achieved as this study also has been conducted to correspond with Phase 3's key action in the Logistics and Trade Facilitation Masterplan (2015-2020) which drive the logistics industry to green initiative's implementation. Writers hope that this paper can stimulate many further researchs in this vital field.

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