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Perceived Benefits of Green Logistics Practices by Malaysian Food based Manufacturers

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Abstract: Green logistics is concerned with producing, supplying and moving goods in a sustainable manner. The advantage of practicing green logistics is not only to the environment but also to the society and businesses. Now-a-days, many companies have put great efforts towards practicing green logistics to obtain benefits and there are claims that green logistics can be an effective tool and strategy to increase competitive advantage for business survival. The objectives of this study are to investigate the benefits of practicing green logistics by the Malaysian food based manufacturers and to investigate if there is a significant difference on the perceived benefits obtained by the manufacturers with different level of green logistics practices. Statistical analyses such as descriptive analysis, mean ranking analysis, correlation analysis and t-test analysis were used to analyze the data. The benefits of green logistics are classified into three aspects such as economic, environment and social. This study revealed economic and environment aspects are positively significant with level of green logistics.

Key words: Green logistics, competitive advantage, sustainability, food based industry, Malaysia

INTRODUCTION

In recent years, concern for the environment among the business owners and society at large has increased significantly due to a number of reasons. Firstly as a result of the adverse environmental impacts of company's products processing activities (Azzone and Noci, 1998). Secondly, constant pressure by the society that institution should address environmental issues (Murphy and Poist, 2003). Thirdly, managers are now realized the benefits of adopting environmentally programs to their company's image (Van Hoek, 1999). Finally, due to the changes of consumers demand and preferences for environmentally friendly products which have transmitted the entire value chain (Lampe and Gazda, 1995). According to Bloemhof-Ruwaard *et al.* (1995), the changes of consumers demand have amended the responsibilities of suppliers and manufacturers towards the products they move and sell in the market. Because of these pressures, green logistics practices emerged as one of the best solutions especially in manufacturing industry. Green becomes a common term to represent the environmentally friendly image especially on products, procedures, systems, technology and the way business is conducted (Eltayeb and Zailani, 2009). The principle of green logistics suggests that the regular logistics practices still apply in business premises activities however considerations are emphasized on the environmental friendliness element. Green logistics includes practices such as distributing products in bundle size rather than in smaller batches, using alternative fuel vehicles for manufacturing and shipping, reducing size of packaging building environmentally friendly facilities for manufacturing and storage, utilizing raw materials which are harvested in a sustainable way, promoting 3R (Reduce, Reuse, Recycling) programs and many more.

Results from many studies on sustainable practices indicated that producing product in a sustainable way had improved company business profits and performance (McKinnon *et al.*, 2010; Rodrigue *et al.*, 2001; Van Hoek, 1999). In addition, many companies now realize that they will have a very significant cost reduction if their business activities were carried out in environmental sustainability way (Rodrigue *et al.*, 2001). By practicing more green activities, it can increase consumers' perception that the company cares about the social issues particularly on social impact of the product it produces. Thus, companies

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have actively promoted their workers to increase the appeal of their products to their consumers. Companies which have developed better methods to procure raw materials and green logistics has positively contributed in manufacturing and delivering of raw materials and end products by reducing relevant costs. By the same token, consumers are now willing to pay extra for products bearing label which shows company's effort towards environmental and social responsibility. This makes green logistics not only ethical but attractive from a business view point. The increasing demand from customers and environmental groups for more eco-friendly products has made many companies to seriously consider undertaking green logistics practices towards conserving the environment while doing their business. The objectives of this study are to investigate the benefits of practicing green logistics by the Malaysian food based manufacturers and to investigate if there is a significant difference on the perceived benefits obtained by the manufacturers with different level of green logistics practices.

Literature review

Green logistics activities: Logistics means having the right thing at the right place and at the right time. Council of Logistics Management defined logistics as the process of planning, executing and manage the efficient of valuable flow and storage of goods, services and related information from production point to point of consumption which aim to fulfil to customers requirements. This definition includes internal and external movements, inbound, outbound and reverse of materials for environmental purposes. Jiange (2009) defined logistics as activities include freight transport, inventory management, storage, material handling and all the related to information processing. As further described by Delfman *et al.* (2002) and McKinnon *et al.* (2010), logistics activities consist of the transportation, storage and managing of products as they move from raw material source through the production system to their final point of sale or consumption which also includes warehousing, transportation, inventory management, order processing and packaging. Logistics appears especially well qualified to reduce environmental and ecological concern in areas such as pollution control, protective packaging materials, plant and warehouse sitting and reverse logistics of material to be recycled (Poist, 1989). In 2010, global temperature has increased by 2°C. Logistics has played a crucial role in order to make large involvement to the drastic reduction in CO_2 emissions that will be required by 2050 (McKinnon *et al.*, 2010). Therefore, environmental friendly elements need to be added to these logistics activities to merge as a new term called green logistics. Green logistics can be defined as a logistical system that compatible with the environment which is an environment friendly and efficient logistics system (Rodrigue *et al.*, 2001). Meanwhile, Jiange (2009) described green logistics from two aspects. First aspect of green logistics relates all process of environmental performance (behaviour) and second aspect refers to through the effective logistics operational mechanism as a carrier to improve and achieve organizational or social environment performance (behaviour).

Benefits of practicing green logistics: Awareness of the importance of environment conservation continued to grow in 2010. This was due to enormous pollution from business premises activities and these businesses realized the impact to their business image. They are seeking for solution to become environmentally also known as going green and one of the efforts is by practicing green logistics. Green logistics gives a of lot benefits to most companies. Insight Survey Report (2008) revealed from its green survey that 52% of companies received benefits in terms of reducing logistics costs and reducing manufacturing costs along their business supply chain. The results also revealed that 47% of companies gained competitive advantage by practising green supply chain. Another green survey conducted by Aberdeen Group (2008) also discovered that by practicing green supply chain it helped to reduce emissions, reduce waste and improve disposal. Switching into alternative fuel such as biodiesel and bioethanol, one of green logistics practices, assists in increasing efficient fuel consumption. Apart from that, this fuel is very cheap compared with the other development of other renewable fuel alternative such as hydrogen (McKinnon *et al.*, 2010). Green logistics practices such as recycling or reuse of plastic products can significantly reduce the energy required across the life cycle because of the high energy inputs needed to process the requisite virgin materials greatly exceeds the energy needs of the recycling or reuse process steps (Arvanitoyannis and Kassaveti, 2007). Ubeda *et al.* (2010) described the benefits of green logistics practices include reduce number of routes introducing to backhauling in logistics activities and design the shortest routes to control the emissions of CO_2. This is beneficial to the environment and society because reduction in these types of gases can help to reduce environmental impacts such as global warming and at the same time improve the society health status. As further argued by Rodrigue *et al.* (2001) if the company were less practice Just In Time (JIT) in logistics activities it can help to

reduce traffic congestion, reduce more energy consumption and reduce from producing more emissions of CO_2. A report by Cooper Controls (2005) indicated that green logistics practices such as turn off lights in empty areas can give significant benefits as it reduces in electricity expenses about 60-80% from total energy consumption. The United Kingdom Warehousing Association (Williams, 2010) proposed that green logistics practices such as application of fluorescent lighting equipment compared with metal halide and sodium vapour in business premises can give significant reduction in relative costs, CO_2 emissions and energy utilization. Further, Wu and Dunn (1995) recommended that companies can reduce environmental problems such as unmanageable waste disposal by applying recycle or reuse container of packaging materials in their logistics activities. The Industry Council for Packaging and the Environment (INCPEN, 2008) also suggested that companies use lighter packaging for their products to cut down storage space and lorry movements, save money and have possibility to load more unit product in storage or loaded onto a vehicle. In warehousing, green logistics practices such as reuse plastic crates as opposed to cardboard boxes will be useful to solve waste disposal crisis (A&A Transfer, Inc., 2012). Van Doesburg *et al.* (2009) indicated benefits of green logistics practices can be obtained by a company if the business premises layout were contained some environmental building features such as having lots of windows, sky lighting, using translucent building materials for providing lighting and using solar panels to store energy during the day for usage during night operations. These approaches according to Van Does burg *et al.* (2009) will reduce energy consumption in warehouses by 20%. McKinnon *et al.* (2010) argued that the application of systematic operation, age of vehicle, driver behaviour and the nature of enforcement of safety regulation in manufacturing and processing activities to avoid workers accident or product damages will greatly benefit the society.

MATERIALS AND METHODS

The sample frame of this study consisted of 318 food based manufacturers located in all states in Malaysia and Census Method was used to collect data from the targeted manufacturers. The addresses of the manufacturers were obtained from the list in Federation of Malaysian Manufacturing (FMM) Directory in 2010. The research instrument was a structured questionnaire consisted of closed ended 5 point Likert scale questions and open ended questions. These questions were divided into four sections. The first section covered questions on manufacturers profiles and the second section measured the greenness level of logistics activities practiced by the food based manufacturers. The third section was designed to investigate the benefits perceived by the manufactures when practicing green logistics. The fourth section focused on the extent the manufacturers are aware about environmental issues and their efforts to reduce environmental impacts of their logistics activities. The self administered questionnaire was distributed to the manufacturers through postal. Out of 318 questioners distributed, only 120 were returned and analyzed. Descriptive analysis was used to determine the profiles background of food based manufacturers and level of green logistics practices. Mean ranking analysis was carried out to investigate the characteristics of green logistics benefits.

In order to determine the relationships of all variables, correlation analysis was used. t-test analysis was used to test whether there is a significant difference between levels of green logistics practices (low green logistics practices and high green logistics practices) with each perceived benefits aspect namely economic, environment and social.

RESULTS AND DISCUSSION

Profiles of respondents and green logistics practices: Table 1 shows the profiles of the respondents. The survey revealed that the majority of the respondents (29.2%) were inventory and logistics managers. Majority of the manufacturers (84.2%) had been established for >10 years. Most of the manufacturers (53.3%) had >150 fulltime employees. The results also showed that 50.8% of the manufacturers earned annual sales more than RM25,000,000. Based on this result, it can be concluded that most of the manufacturers were considered as a large company. The result also showed that 49.2% of the manufacturers were local company which is located in Selangor (55.8%). About 52.5% of the manufacturers practiced green logistics and the rest (47.5%) were not.

Mean ranking analysis: The reliability test was conducted prior to mean ranking analysis in order to examine the reliability of all variables. In this study, the manufacturers gave responses to 12 statements related to green logistics benefits. The reliability test result indicated that all variables were reliable with Cronbach's Alpha score of 0.893. Nunnally and Bernstein (1994) stated that a reliability coefficient of 0.70 and above is considered more than acceptable for most behavioral science applications. According to Hair *et al.* (1998), the reliability test is important to measure the validity of the variables and to examine either the instrument used is

Table 1: Background profiles and green logistics practices

Profiles	Frequency (N = 120)	Percentage
Position		
Chief Operating Officer	12	10.0
General Manager	11	9.2
Plant Manager	13	10.8
Inventory and Logistics Manager	35	29.2
Marketing Manager	14	11.7
Purchasing and Procurement Manager	10	8.3
Operation Manager	13	10.8
Supervisor	12	10.0
Year established		
<1950	19	15.8
1951-1960s	8	6.7
1961-1970s	12	10.0
1971-1980s	18	15.0
1981-1990s	17	14.2
1991-2000s	27	22.5
>2000	19	15.8
Number of fulltime employees		
<5	3	2.5
6-50	30	25.0
51-150	23	19.2
>150	64	53.3
Annual sales turnover		
<250,000	1	0.8
250,001-10,000,000	51	42.5
10,000,001-25,000,000	7	5.8
>25,000,000	61	50.8
Types of company		
Local	59	49.2
Multinational	11	9.2
Multidomestic	48	40.0
Global	2	1.7
State of origin		
Selangor	67	55.8
Penang	6	5.0
Sarawak	1	0.8
Johor	8	6.7
Kedah	3	2.5
Sabah	8	6.7
Pahang	2	1.7
Melaka	1	0.8
Wilayah persekutuan	23	19.2
Perak	1	0.8
Green logistics practices		
Do not practice green logistics	63	52.5
Practice green logistics	57	47.5

consistent or not and either the instrument can be used as prediction indicator or not which contribute to accurate outcome.

Table 2 shows the result of mean ranking analysis on the benefits of green logistics practices gained by the manufacturers. The results indicated that the highest mean was related to the statement of increase profit and revenue with score of 4.37. This indicates that most of the food based manufacturers perceived that increased in profits and revenue of the company as the top benefits gained as a result of practicing green logistics. Meanwhile, the lowest mean was for the statement of enhance Customer Service Relationship (CSR) with score of 3.75. This however still indicates that these manufacturers perceived practicing green logistics in their company was capable to enhance Customer Service Relationship (CSR). The mean scores on the perceived benefits of green logistics were then further classified into three main aspects namely economic, environment and social. These aspects were based on McKinnon *et al.* (2010) where the researchers suggested three approaches of logistics sustainability which covered the economic, environment and social. The total means of these three aspects were calculated. Table 3 shows the total mean of the economic, environment and social benefits which items were calculated from Table 2. The total mean for economic benefits was calculated based on items 1, 2, 3 and 6 whereas the total mean for environment benefits was calculated based on items 4, 5, 9 and 10. Finally, the total mean for social benefits was calculated based on items 7, 8, 11 and 12. From the mean ranking analysis results in Table 3, it was revealed that most of the food based manufacturers perceived economic aspect (4.27) as the most beneficial advantage followed by environment aspect (4.07) and social aspect (3.92) as a result of practicing green logistics.

Correlation analysis: Correlation analysis was done to investigate the relationship between green logistics

Table 2: Perceived benefits of green logistics practices

	Percentage (%)						
Items	1	2	3	4	5	Mean	Ranking
Increase profits and revenue	0.0	0.0	7.0	49.1	43.9	4.37	1
Improve brand image	0.0	0.0	5.3	54.4	40.4	4.35	2
Reduce overall business costs	0.0	0.0	5.3	56.1	38.6	4.33	3
Reduce environmental impacts	0.0	0.0	5.3	56.1	38.6	4.33	3
Reduce waste and improve disposal	0.0	0.0	17.5	52.6	29.8	4.12	5
Establish a competitive advantage	0.0	0.0	31.6	33.3	35.1	4.04	6
Enhance good environmental conditions for society	0.0	0.0	28.1	40.4	31.6	4.04	6
Increase corporate social responsibility	7.0	0.0	8.8	52.6	31.6	4.02	8
Increase energy efficiency	1.8	3.5	26.3	36.8	31.6	3.93	9
Reduce fossil fuel consumption	0.0	0.0	31.6	45.6	22.8	3.91	10
Reduce community impacts	0.0	7.0	33.3	24.6	35.1	3.88	11
Enhance Customer Service Relationship (CSR)	0.0	21.1	15.8	29.8	33.3	3.75	12

N = 57; 1) Not at all; 2) Very little; 3) A little; 4) Somewhat; 5) To a great extent

Table 3: The test result: perceived benefits variables

	Economic	Environment	Social
Mean	4.2719	4.0746	3.9211

Table 4: The results: pearson correlation between perceived benefits of green logistics practices (Economic, environment and social) and level of green logistics practices

Independent variables	Economic	Environment	Social
Level of green logistics (correlation value)	0.331*	0.343**	0.192
Practices (significant level)	0.012	0.009	0.153

**Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed)

Table 5: The test result: t-test analyse the differences between the level of green logistics practices and the perceived benefits (Economic, environment and social)

Grouping variables (N)			Values
Manufacturers with low level green logistics practices			21
Manufacturers with high level green logistics practices			36
Independent variables	Economic	Environment	Social
t-test	-2.906	-3.157	-1.4480
Significant	0.005*	0.003*	0.1530
Mean difference	-0.3740	-0.4196	-0.3462

*Level of significance at p<0.05 (2-tailed)

practices level and benefits in terms of economic, environment and social aspects. The result shown in Table 4 indicates that there were correlations between the economic benefits (p = 0.012) and environment benefits (p = 0.009) with level of green logistics practices. It can be inferred that the higher level of green logistics being practiced, the more benefits in terms of economic and environment perceived by the food based manufacturers. Besides, the result showed that Pearson product moment coefficient correlation for these two variables were significantly and positively correlated with level of green logistics practices. These results implied that firms that practiced high level of green logistics activities perceived more economic and environment benefits to their organization. In this analysis, the perceived benefits of environment and economic aspects have a fair strength of relationship with r = 0.343 and r = 0.331, respectively (Chan, 2003).

t-test analysis: t-test analysis was carried out to investigate the difference between level of green logistics practices and the perceived benefits (Economic, environment and social aspects) among the Malaysian food based manufacturers. Table 5 shows that 2 groups of manufacturers who were practiced green logistics in their business operations. The 1st group of food based manufacturers (N = 21) was identified as the group that practiced less green logistics in their business operations. The remaining manufacturers (N = 36) was the group that practiced more green logistics in their operations. From the t-test analysis, the result indicated that there was a significant difference between the level of green logistics practices of the 2 groups (low green logistics practices and high green logistics practices) in terms of economic and environment perceived benefits. The economic aspect benefit was significant at 5% level of significance (p = 0.005) and the environment aspect benefit was also significant at 5% level of significance (p = 0.003). The highest mean difference between these 2 groups was -0.4196.

CONCLUSION

Environmental issues which concern greatly on pollution, climate change, congestion, inefficient waste disposal and resource diminution have triggered many companies to start applying green logistics. The government and society have also played significant roles towards reducing the adverse effects of these issues. Business operations such as sourcing, manufacturing and logistics are believed to be a contributing factor to most environmental problems. This study revealed perceived benefits of green logistics practices from the perspective of Malaysian food based manufacturers which cover three aspects such as economic, environment and social. It was found that the level of green logistics practices have significant positive relationships with the economic and environment aspects. This result is important to the government since it can provide guidelines to establish rules and regulations on green activities to the industry players in practicing greener logistics activities thus improve the sustainability of food based manufacturing industry in Malaysia while improving the capacity for future generation.

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REFERENCES

A&A Transfer, Inc., 2012. Green initiatives. http://www.aatransferinc.com/aa_transfer.cfm?a=6.

Aberdeen Group, 2008. Building a green supply chain: Social responsibility for fun and profit. http://www.aberdeen.com/Aberdeen-Library/4966/RP-green-supply-chain.aspx.

Arvanitoyannis, I.S. and A. Kassaveti, 2007. Current and potential uses of composted olive oil waste. Int. J. Food Sci. Technol., 42: 281-295.

Azzone, G. and G. Noci, 1998. Seeing ecology and green innovations as a source of chance. J. Organ. Change Manage., 11: 94-111.

Bloemhof-Ruwaard, J.M., P. van Beek, L. Hordijk and L.N. van Wassenhove, 1995. Interactions between operational research and environmental management. Eur. J. Oper. Res., 85: 229-243.

Chan, Y.H., 2003. Biostatistics 104: Correlational analysis. Singapore Med. J., 44: 614-619.

Cooper Controls, 2005. Energy saving from greengate: Supporting the requirements of EPAct 2005 tax deductions. http://www.cooperindustries.com/content/dam/public/lighting/controls/resources/library/literature/greengate/Greengate%20Energy%20Savings%20EPAct%20Brochure.pdf.

Delfman, W., S. Albers and M. Gehring, 2002. The impact of electronic commerce on logistics service providers. Int. J. Physical Distribution Logistics, 32: 203-222.

Eltayeb, T.K. and S. Zailani, 2009. Going green through green supply chain initiatives towards environmental sustainability. Operat. Supply Chain Manage., 2: 93-110.

Hair, J.F., R.E. Anderson, R.L. Tatham and W.G. Black, 1998. Multivariate Data Analysis. 5th Edn., Prentice Hall International, New Jersey, USA.

INCPEN., 2008. Packaging in perspective. Advisory Committee on Packaging, The Industry Council for Packaging and the Environment. http://incpen.org/docs/PackaginginPerspective.pdf.

Insight Survey Report, 2008. 2008 Supply chain monitor How mature is the greensupply chain?. http://www.escp-eap.eu/uploads/media/Supply_Chain_Observatory_2008.pdf.

Jiange, T., 2009. Researches on the Establishment Model of Green Logistics. School of Economics and Management, Zhongyuan University of Technology, Zhengzhou, China.

Lampe, M. and G.M. Gazda, 1995. Green marketing in Europe and the United States: an evolving business and society interface. Int. Bus. Rev., 4: 295-312.

McKinnon, A.C., S. Cullinane, M. Browne and A. Whiteing, 2010. Green Logistics: Improving the Environmental Sustainability of Logistics. Kogan Page, London, UK.

Murphy, P.R. and R.F. Poist, 2003. Green perspectives and practices: A comparative logistics. Int. J. Supply Chain Manage., 8: 122-131.

Nunnally, J. and I. Bernstein, 1994. Psychometric Theory. 3rd Edn., McGraw-Hill, New York, USA.

Poist, R.F., 1989. Evolution of conceptual approaches to designing business logistics systems. Trans. J., 1: 55-64.

Rodrigue, J.P., B. Slack and C. Comtois, 2001. Green Logistics. In: The Handbook of Logistics and Supply-Chain Management, Brewer, A., K.J. Button and D.A. Hensher (Eds.). Emerald Group Publishing, London, UK., ISBN: 9780080435930, Pages: 545.

Ubeda, S., F.J. Arcelus and J. Faulin, 2010. Green logistics at Eroski: A case study. Int. J. Prod. Eco., 131: 44-51.

Van Doesburg, R., P. Baptist and W. Van Heijst, 2009. Warehousing Report 2009. Capgemini Consulting, Utrecht, GN.

Van Hoek, R.I., 1999. From reversed logistics to green supply chains. Supply Chain Manage.: Int. J., 4: 129-134.

Williams, R., 2010. Save energy, cut costs, energy efficient warehouse operation. United Kingdom Warehousing Association, pp: 1-49. http://www.ukwa.org.uk/_files/23-carbon-trust-23.pdf.

Wu, H.J. and S.C. Dunn, 1995. Environmentally responsible logistics systems. Int. J. Phys. Distribut. Logist. Manage., 25: 20-38.