



A Review on Green Logistics Paradox

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ABSTRACT

Logistics do not stop only at cargo movement around the globe or the type of cargo carried - foodstuff, military, electronic, apparel product, construction material, pharmaceutical product, etc. Due to its nature and intensity of activities, logistics have immense impact on the environment. It follows that the environmental impact derived from logistics activities can be minimized if all logistics service provider (LSP) and manufacturers apply green initiative measures to control and mitigate damages towards the environment. Unfortunately, in real life, logistics activities still contribute to pollution. In fact, most companies survive their business by giving little consideration to the health of the environment. The fact is the level of Green Logistics adoption and awareness are still low. The environment takes toll while logistics service providers and manufacturing compete in profit making strategies. It is time for these companies to pause and plan for a more sustainable business strategy that contributes to the benefit of the society and the environment. Green logistics initiative offers options to the LSP to choose in order to adopt better logistics operation while still safeguarding the environment. By using a Deductive approach, theories of green logistics are compiled and then trimmed to a smaller scope by focusing on the most recent development of green logistics theories. The preliminary findings of this study indicated that the body of knowledge in green logistics paradigm is still scarce which outlines the importance of understanding the adoption process of green logistics.

Keywords: Effectiveness, Environment, Green Logistics, Logistics Service Provider

1. INTRODUCTION

The concern for sustainable environment is growing and has ignite the interest of new studies on green approach towards engineering, technology and operations in many sectors around the world. One of the sectors is logistics. The awareness of green approach in logistics services prevailed as it influences many of the operations by the logistics stakeholders in the supply chain movement [1]. Green logistics requires a well plan integration concept involving all stakeholders in the Supply Chain movement as well as the policy makers [2]. It is obvious that the demand for logistics is derived from the demand of other means [3]. The need to travel from one location to another or to export product from one country to another country is one of the examples of derived demand in logistics [4]. Logistics supports the Supply Chain Management (SCM) of suppliers, manufacturing companies, distributors and eventually the end-users [5]. It is functioning as part of the utility other than water, electricity and the internet. Thus, the significant of logistics is undeniable in the context of supplying human need in today lifestyle. Nevertheless, in performing the role, logistics contribute negative impact towards the environment [6]. Similar to manufacturing, in the event of logistics movement, it slowly but surely altering the land structure, global temperature, quality of air and ecology through noise and vibration, air and water pollution, land requisition, carbon footprint as well as disruption of hydro liquid to the atmosphere [7]. Way back in 1996, according to [8], the planning, management and implementation of transportation have direct impact towards the environment. These negative impacts occurred during logistics activities implementation such as transportation, warehousing, procurement and other logistics elements [9]. A significant studies done associated with green logistics from 2001 to 2016. There are two objectives of this paper first is to identify green logistics

parameters and second objective is to rationalize green logistics parameter in terms of awareness, implementation, effectiveness opposing to challenges faced by LSP over the past recent years.

2. THE ERAS OF GREEN LOGISTICS

2.1 The Era of Green Logistics Awareness and Adoption

The relationship between logistics and the environment discussed in the context of transportation system and sustainability was first discussed in the area of transport modes and terminals [10]. Later, studies on the application of green logistics implementation by logistics Service Providers (LSP) companies depending on the level of awareness on green logistics initiatives surfaced. It is a challenge as the offering of green services to customers require suitable approaches to match with the availability resources and operations of the company [11]. Although this study was done in 2011 and its scope of study located in Glasgow, its finding is important as it opened up new areas of study on green logistics awareness and implementation in other part of the world. The adoption level of green logistics initiatives by Third Party Logistics (3PL) companies then discussed on the pros and cons of the main driving factors influencing 3PL companies adopting green logistics initiatives particularly from the customer's requirements. The implementation of green logistics strategies depends on many drivers including the management policy and direction as well as the demand from customers [12]. The influencing factors had been tested through many studies on variables of customer pressure, government policy, organizational directions and the implementing green initiatives as drivers to the adoption of green logistics [13].

2.2 The Era of Green Logistics Implementation

Logistics operations and implementation require tremendous support of information technology and engineering innovations to ensure smooth movement and to satisfy the customers. The development of green technology in material handling such as a more sophisticated software for Warehouse Management System (WMS) to control and monitor the inventory, a much user and environmental friendly warehouse equipment for example the forklift, racking system, RFID and packaging is crucial both [14] [15] have the same opinion on this. It minimizes real impact date of cargo identification and order picking process in warehouses. Moreover, mismatch or discrepancy of cargo handling subside [16]. The development of solar panels and many other automation inventions permit significant the eco-system of logistics operations [17]. Warehouses and

terminal operations require huge support of energy in terms of electricity, lighting, air-conditioning for management offices, server rooms and cool rooms for storing frozen or perishable products. The availability of alternative power supply which is environmentally friendly. This definitely helps logistician to enhance its service level and reduce the level of pollution at the same time. Besides that, technology development allows a better information system to reduce the negative impact of procurement and documentation in logistics and Supply Chain Management (SCM) activities [18]. This activity increases the level of carbon footprint through document printing, labelling and communication activities as logistics elements are integrated. This was much earlier discussed by Rodrigue et al. in his research done in 2001. Without new technology development, the role of logistics as part of customers' utility is defeated. Reverse logistics, eco-design of product operations and supply chain management reduced waste and pollution. According to [19], companies in Malaysia does practice reverse logistics in its operations nevertheless reverse logistics implementation alone do not determine the significant greenness in logistics movement. It has to be supported by other initiatives for example regulations, customer pressures, business gain and social responsibility of the company [20]. On the contrary, according to [21] with the support of proper information technology in the execution of reverse logistics indicate positive impact towards the environment. Innovation and technology advancement in green logistics operations and the understanding of Green Supply Chain Management (GSCM) enforced a much sustainable manufacturing and logistics support towards the environment [22]. Through appropriate technology and environment framework, green practices are applicable despite the size of the company [23]. In accordance to balance between operational requirements in maintaining the service performance, mitigating increase of cost as well as the demand of customers indicating gaps appear to be the challenge faced by the LSP companies in the adoption of green logistics [12]. Thus, proper awareness training among the LSP, suppliers and customer, cooperation and collaboration between all parties are significant in promoting the adoption of green logistics [24]. [25] and [26] shared the same sentiment on adequate environmental awareness training of respective stakeholders in logistics and supply chain sectors.

2.3 The Era of Understanding Green Logistics Impact

It is clear as based on previous literatures, despite the support of advanced technology and innovation support, LSP still facing challenges in providing green logistics services. This is due to the fact that influencing variables of the ever-changing government policy, increasing customer demand and innovation of logistics operational requirements [27]. These opposed on a great difficulty in green logistics

implementation and influence the willingness of LSP to sustain its green service offerings to customer. On the contrary, with the support of a well-integrated green logistics system and communication through a macro overview of the logistics elements supporting the green initiatives alleviate the green logistics involvement of LSP [26]. Nevertheless, 3PL companies' involvement in green logistics promote quality logistics services through ISO 14001 certification to its customers including those 3PL companies adopting Halal logistics [28]. Many companies understood the importance of green management in its operations in order to keep the sustainability of its business [29] and The effectiveness of implementing green logistics in the context of service level improvement and operations expenses benefiting the Green LSP companies had been discussed critically by [30], [31]. While [32] convinced the decision making process done by the managerial section determine the competitiveness of a company. According to [33], 3PL companies gain economic advantages through the implementing green logistics initiatives especially in its operations activities. The benefits gain could only be possible through a series of integrations between logistics providers and its customers as the expectation and services offering are unique. The impact of green logistics implementation varies according to the size of the company in the market business.

3. METHODOLOGY

There are more studies related to green logistics field however selection of literatures based on the scope covered carefully observed through three era in green logistics paradigm. Material were sourced through several search engines which are Scopus, Science Direct, Google Scholar and Books on Green Logistics. Literature from a period between 2000 up to 2017 were compiled according to the research objectives and keywords determined in the early stage of preparing this paper. Keywords such as "green logistics", "challenges", "Adoption", "implementation" and "sustainable" were referred during material compilation and sourcing for this paper. The input gathered were then analyzed through the application of deductive analysis method. The theories in green logistics had been gathered in a systematic manner enabling the identification of the layers of development stage in green logistics. Deductive Analysis method used to group reasoning from general to specific entities [34]. Theories on green logistics awareness, adoption, implementation, challenges and impact had been selected as the main theme and coding in the analysis process. Other green logistics studies remain significant in the area of green logistics however, this paper focus on the research direction done on green logistics era based on three stages of green logistics theories. Group of theories divided into three era of green logistics according to the era of green logistics. Figure 1 is the classification of era on the green logistics based on deductive

analysis model.

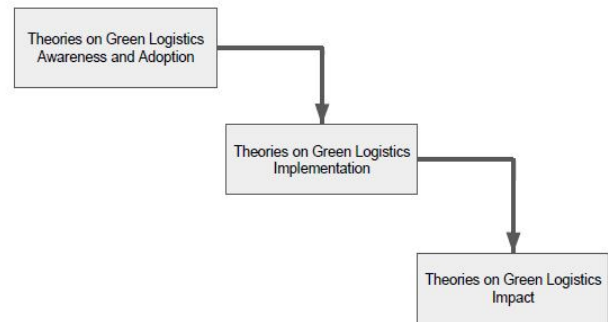


Figure 1: Green Logistics Deductive Model

4. DISCUSSION

These compilations of green logistics theories determined the pattern of green logistics underpinning scope from the past years to current. Based on the pattern observed the scope in green logistics theories have reach to its maturity phase which is to explore on the evaluation of the green logistics implementation done by these LSP companies. This is due to fact that the level of effectiveness in green logistics initiatives practice done by LSP companies remain unjustified as the standard operating procedure of each LSP varies according to the logistics element it applies. The implementation of green initiative focus on individual company rather integrated with other LSP companies. Based on literatures compiled, the level of greenness is uncertain due to the lack of suitable measurement tool to classify the effectiveness level. Recent studies focus more on green logistics effectiveness in the perspective of economic, social, environment index and financial gain. Although the trend of green logistics research is now expanding and moving towards measuring the implementation effectiveness, the scope of effectiveness in the perspective of collective implementation among LSP necessary.

5. CONCLUSION

Gauging back to the initial era of green logistics awareness and the adoption green logistics initiatives theories has open up new layers of exploration in the era of green logistics implementation by LSP service providers. Nevertheless, the implementation of green initiatives theories established then raised the issue of challenges faced by the stakeholders. Eventually the era of green logistics consequences was discovered. In 2017, new theories on the effectiveness of green logistics implementation among the LSP companies appeared. These studies focus on green logistics measuring mechanism from mathematical formula, statistical method to Green Logistics Performance Indicator (GLPI) approach. There are many other angles in measuring the effectiveness of green logistics implementation in the context of economic,

service performance or customer satisfaction which yet to be explore in the coming era of green logistics. This indicates that the issue of green and sustainability in logistics remain significant and is not being isolated. This review reflects that worthy efforts have been made in logistics sector to improve the environment over the past decade even though in the beginning of the era green logistics perceive as impervious by many. Future study focus more on integrated practices and collective impact of green logistics implementation among LSP is imperative.

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