

# EFFECT OF GREEN LOGISTICS PRACTICES AND SOCIAL PERFORMANCE ON PERFORMANCE OF LOGISTICS FIRMS IN KENYA

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## Abstract

Emissions from logistics industry are rising at a greater concern than any other industry and the trend is expected to continue such that by 2030 these levels will be 80% higher than present levels unless there is a change. Environmental concerns have become essential for organizations given the current context of globalization. Many firms aim at reducing cost and they need to strike a balance between economic, social and ecological factors for sustainability. Taking measures regarding environmental concerns in a socially responsible way is becoming an important part of the modern organization agenda. This study focused on establishing the effect of green logistics practices and social performance on the performance of logistics firms operating in Kenya. The study was guided by the philosophy of positivism research. The cross-sectional survey research design was employed. The population of interest consisted of all the 892 logistics firms in Kenya which were registered under Kenya International Freight and Warehousing Association (KIFWA) as at December 2018 (KIFWA, 2018) from which a sample size of 300 respondents was drawn. Primary data was collected using a structured questionnaire. Data were analyzed using covariance-based structural equation modelling (CB-SEM). The study established that there is a significant positive relationship between the implementation of green logistics practices and firm performance of logistics firms in Kenya. The mediating effect of social performance on the relationship between green logistics practices and firm performance was found to be positive and significant. It was recommended that logistics firms in Kenya

*should implement environmentally sound practices in all phases of their operations and the larger supply chain, beginning with practices like green packaging, fuel efficiency, optimization of routes, carbon emission measurement and reverse logistics.*

**Keywords:** green logistics practices; green packaging; fuel efficiency; optimization of routes; carbon emission measurement; reverse logistics; social performance; firm performance

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## 1.1 Introduction

Environmental concerns have become essential for organizations given the current context of globalization (Molina-Besch & Pålsson 2014). Industrialization and consumerism are ever-growing bringing in a scenario where trade pursuit of humans has begun to spread unfavourable environmental impact (Ratnajew & Bandara, 2015). The greater focus now is on ecological pollution through logistics practices. In the recent past, interest has shifted to the effects of logistics on climate change, owing to the improved understanding of the danger being posed by global warming (McKinnon, Cullinane, Browne & Whiteing, 2010). Green logistics practice is the way to go as it consists of activities which are associated with the eco-efficient organization of the forward and reverse flows of information and products from the point of origin and the consumption point to meet or exceed customer expectations (Carter & Easton, 2011).

The green logistics practices include green packaging, route optimization, fuel efficiency, carbon emission measurement and reverse logistics (McKinnon, Browne & Whiteing, 2010; Molina-Besch & Pålsson 2014; Hampus & Henrik, 2014; Weng & Chen, 2015). The practices were chosen because of the impact they have on the logistics sector and the capability of their logistics operations becoming greener. Green Packaging is the use of packaging optimization technique which is important for logistical organizations to reduce their environmental impact (Laosirihongthong, et. al., 2013). When organizations are implementing their environmental programs it becomes important to reduce solid waste like metal scrap, materials, packaging and organic waste. Thirty-three per cent of the waste stream comes from packaging material, which indicates that it is important to have programs in green packaging to have the ability to decrease an organization's carbon footprint effectively (Isaksson & Hüge-Brodin, 2013).

A tool that can be friendly to the environment and efficient is using improved fuel-efficient fleets. Fuel efficiency can be enhanced by using proper maintenance programs, eco-driving techniques and alternative fuels. Logistics greenness can be increased by shifting to more efficient and eco-friendly fuels. Wu and Dunn (1995) identified safer, cleaner and more accessible alternative fuels compared to diesel, which consisted of liquefied natural gas (LNG) and compressed natural gas (CNG) which is cheaper than petrol by 40 per cent. Consequently, there ought to be a shift by logistics companies to the usage of alternative fuels if they want to

have an environmentally sustainable future.

Another way of improving fuel efficiency is by using an eco-driving technique which aims at reducing the consumption of fuel. Drivers are trained on how to save fuel without a loss in mobility. There is a possibility of saving up to 25 per cent of fuel consumption. Firms can monitor driving behaviours and fuel consumption of each truck using a tracking system which can inform them of unnecessary or excess usage of vehicles, unauthorized use of a private vehicle, driving behaviours which are poor, fuel wastage and drivers speeding and idling (Janota, Dado & Spalek, 2010). Another major environmental issue is proper maintenance of the trucks in an efficient and safe condition which does not only extend the vehicle lifetime but also improves the efficiency of the vehicle and reduce the rate of accidents (Hampus & Henrik, 2015).

Optimization of routes has to do with the coordination of a fleet of vehicles, which has a capacity that is fixed in the most possible efficient way, which gets a feasible solution that reduces the voyage amount, time travelled in total and the vehicle numbers in use to the minimum. Ecologically responsible logistics companies would have better space utilization, more direct routes, fewer shipments, less handling and shorter movements (Wu & Dunn, 1995). The above issues lead to lower pollution levels because automobiles travel at the best efficient paces that are friendlier to the environment and consume less fuel. Therefore, optimization of routes is an expense reducer as a result of minimization of travelled distances and economical vehicle usage. According to Sbihi and Eglese (2010), organizations can achieve route optimization by making sure that vehicles heading to congested routes are redirected to faster and more efficient routes which many a time brings the implication that the suggested route leads to an increase of the length of total travel other than the use of a shorter route that is less efficient.

Logistics companies measure emissions, which come from their activities. Transportation actions produce the largest carbon dioxide emissions within the logistics industry (Wolf & Seuring, 2010). If a company measures the logistics' chain emission, it can reduce the associated expenses and on the environmental impact by checking the areas of emission and unnecessary waste to reduce it. Hart and Ahuja (1996) argue that pollution prevention is the ability to not just reduce the company's overall effect on the environment, but also cost, enhancing overall efficiency and effectiveness of the firm. They continue to posit that by removing waste and optimizing operations logistics companies can prevent pollution. The conclusion they make is that there is a benefit of being green because it cuts down on cost and efficiency is increased. Though there is an initial investment required, it is advantageous in the long run to be ecologically friendly. When companies discover and analyze their logistics chains they receive knowledge of areas they can achieve waste reductions and also areas of inefficiency.

The reverse logistics concept is stated as the movement of material from the consumption point back to the

original point. It is different from forward logistics which specifically refers to transport from the place of origin to the point of consumption (Rogers & Tibben-Lembke, 2001). Therefore, the approach intends to utilize transports fully and decrease the number of empty return freights. They further stated that the vehicles making a return from the consumption point are involved in, reusable packaging, remanufacturing and recycling. This illustrates how the flow of goods and reverse logistics fits into the supply chain. A case in point would be using reverse logistics to recycle used and old computers, after delivering new model computers by use of forward logistics. Wu and Dunn (1995) argue that there is an increase in two-way freights and this can only increase into the future because of returnable and reusable packaging. They continue to posit that there is a need for supply chains to have the capacity to adapt to this increase and reverse logistics raises costs because of the extra storage and handling.

Social performance is a firm's arrangement of principles of responsibility socially, social responsiveness observable outcomes, processes, programs and policies and how they are related to the organization's societal relationships (Mitchell, Agle & Wood, 1997). It can be comprehended as the measurement of social issues that generate concerns in society (Searcy, 2013). The relationship between green logistics practice and social performance is anchored on the stakeholders' theory which recommends organizations to create externalities affecting numerous parties who are both external and internal to the organization. It recognizes the fact that other than shareholders, there are people or groups who the firm is committed to and who are prone to be specifically affected by the moves made by it or have an unequivocal legally binding relationship with it (Sarkis, Zhu & Lai, 2011).

Firm performance focus in today's global environmental demands has changed. Formerly, the focus was mainly on wealth creation through economic performance which was superior and measured in terms of liabilities, assets success and market strength in general. Today the focus has shifted to social and environmental performance while attaining high firm performance to reach optimal heights of sustainability (Carter & Rogers 2008). For organizations to attain a long-term competitive edge there must be an intersection of society, environmental and economic superiority according to organizational sustainability (Thoo, Abdul, Rasli & Zhang, 2014). Therefore, firms ought to shift focus to long-run profitability that could lower the societal and environmental risks simultaneously (Porter & Kramer, 2006). Hallegatte, et. al. (2011) maintained that the link between green growth and social performance is clear because generally, changes in monetary growth are linked to social performance even where there are policies to reduce inequality. Superior social performance is seen as a possible source of competitive edge, as it leads to more efficient processes and productivity improvements, new market opportunities and lower costs of compliance (Schaltegger & Wagner, 2006).

Research on the relationship between green initiatives and social performance are inconclusive, meaning that, it is unclear how green logistics practices affect the social dimension. A positive link between green practices and social performance has been found (Waddock & Graves, 1997; Lin, Yang & Liou, 2009; Ruf, Muralidhar, Brown, Janney & Paul 2001; Wagner, 2010). Other researchers found no significant relations between the two (Mahoney & Robers, 2007; Parast & Adams, 2012). Consequently, green logistics practice is in a primary point to influence sustainability in social performance.

Contradicting results are given by findings from previous research on the link between social performance and firm performance. For instance, Li (2006) examined 521 companies listed in Shanghai and found out that increased social performance activities were related to a decrease in organization value in the short term but not in the long term. Shi and Tang (2012) studied the relationship between social performance and firm performance of agricultural firms in China and found a significant positive link between the two. There is a gap in consensus on the link between social performance and firm performance. Further, most studies have been done outside Kenya. Consequently, it can be hypothesized that social performance has a positive effect on firm performance. Again, it has been established that social performance can be enhanced by implementing green logistics practices (Lin, Yang & Liou, 2009; Wagner, 2010). Besides, it has also been established that social performance is positively related to firm performance (Hallegatte, et. al. 2011; Shi & Tang, 2012). This leads to the following proposition: The relationship between green logistics practices and firm's performance is mediated by social performance.

## **1.2 Statement Problem**

Emissions from logistics industry are rising at a greater concern than any other industry and the trend is expected to continue such that by 2030 these levels will be 80% higher than present levels unless there is a change (Ribeiro, et. al., 2007). In consideration of the above rates of emission emanating from the logistics industry, it is vital to initiate countering resolutions. One commonly talked about the method is the initiation of green logistics as a measure to reduce the environmental effect of transportation practices. Taking measures regarding environmental concerns in a socially responsible way is becoming an important part of the modern organization agenda (Murphy & Poist, 2003). Firms aim to reduce cost and they need to strike a balance between economic, social and ecological factors for sustainability.

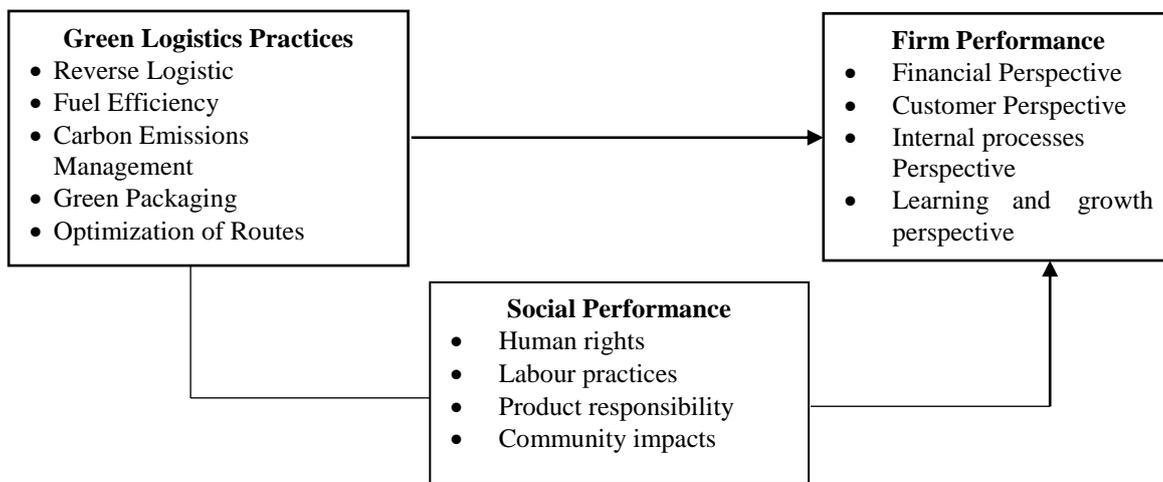
Several empirical studies have been carried out to investigate this relationship (Donghyun, Sang & Sung, 2012; Lai & Wong, 2012; Isaksson, 2012; Kung, Huang & Cheng, 2013; Laosirihongthong, Adebajo & Tan, 2013; Björklund & Forslund, 2014; Weng & Chen, 2015; Mogeni & Kiarie, 2016). However, some studies have indicated a positive link between green logistics practices and firm performance (Kung, Huang & Cheng, 2013; Björklund & Forslund, 2014; Weng & Chen, 2015). Others have indicated no link between

particular green logistics practices and firm performance (Donghyun, Sang & Sung, 2012; Isaksson, 2012). While some established the existence of a negative association between specific green logistics practices and firm performance (Cordeiro & Sarkis, 1997). To add on that, others found a blend of positive and other relationships (Laosirihongthong, Adebajo, & Tan, 2013).

The evidence indicated above has clearly shown that there seems to be a lack of consensus on the relationship between green logistic practices and firm performance. This is due to conflicting results regarding the type of relationship that exists between the components of green logistics practices and firm performance. In turn, firms are unable to tell if adopting green logistics practices yields improved firm performance or not. Therefore, this study aimed to establish the link between green logistics practices and firm performance by gathering evidence in the Kenyan context.

**1.3 Conceptual Framework**

The study developed the conceptual model as indicated in Figure 1 to explain the relationship between the variables under investigation. In this case, green logistics practice is the independent variable measured by reverse logistic, fuel efficiency, carbon emissions management, green packaging and optimization of routes. Social performance is the mediating variable whose indicators human rights, labour practices, product responsibility and community impacts. On the other hand, firm performance is the dependent variable of the study estimated based on financial perspective, customer perspective, internal processes perspective, as well as learning and growth perspective.



**Figure 1: Conceptual Framework**

From the conceptual model, the study formed the following hypothesis:

**H<sub>1</sub>:** *Green logistics practices by an organization have a significant effect on the firm's performance.*

**H<sub>2</sub>:** *The relationship between green logistics practices and firm performance is mediated by social performance.*

#### 1.4 Materials and Methods

The study was guided by the approach of positivism research philosophy. The cross-sectional survey research design was employed. The population of interest consisted of all the 892 logistics firms in Kenya which were registered under Kenya International Freight and Warehousing Association (KIFWA) which was a representation of all Kenyan logistics firms (KIFWA, 2018). Out the total study's population, a sample size of 300 was drawn from which primary data was collected using a structured questionnaire. Data were analyzed using covariance-based structural equation modelling (CB-SEM) of which Analysis of Moment Structures (AMOS) software was used in the analysis. The study assumed that hypothesis would be supported if Normed chi-square is between 1 and 3, CFI value is greater than 0.95, SRMR is less than 0.08, RMSEA is less than 0.06 and p-values of path coefficient is less than 0.05.

#### 1.5 Results

The results indicated that the hypothesis predicted a positive effect of green logistics practices on firm performance. To test the hypothesis, CB-SEM analysis was conducted. The results from testing this relationship are presented in Figure 2 and Table 1.

Table 1 Hypothesis Testing Result for Green Logistics Practices and Firm Performance

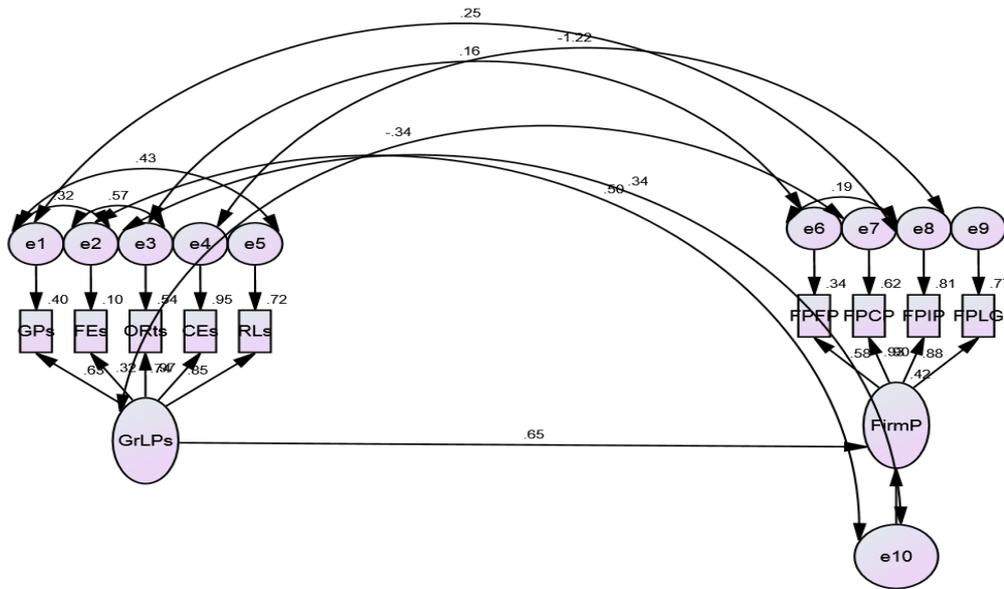
Endogenous Variable	Exogenous Variable	Standardized coefficients	Standard Error (S.E.)	Critical Ratio(C.R.) /T statistics	P-Value	Hypothesis testing result
Firm Performance $R^2=0.417$	Green Logistics Practices	0.65	.109	6.191	***	Significant

Source: Research Data (2020)

To get the effect of the five green logistics practices constructs namely green packaging, fuel efficiency, optimization of routes, carbon emission measurement and reverse logistics on firm performance, a composite factor of the five latent variables formed green logistics practices variable as a second-order factor. An assessment of the relevance of the significance of the path coefficient reveals that green logistics practices had a positive significant effect on firm performance ( $\beta=0.65$ ,  $p<0.001$ ) with a t-value of 6.191. Sufficient model

fit indices were obtained, that is,  $\chi^2/d.f. = 1.912$ , CFI = 0.989, SRMR = 0.036, RMSEA = 0.066, PCLOSE = 0.211. The endogenous latent construct; firm performance has a coefficient of determination ( $R^2$ ) of 0.417, meaning that, the latent construct green logistics practices explain 41.7% of the variance in firm performance. The hypothesis that green logistics practices by an organization have a significant effect on the firm's performance was therefore supported as the relationship was found to be significant.

**Figure 2: Green Logistics Practices and Firm Performance**



Source: Research Data (2020)

Key:

- Grnpac1**= Exogenous latent construct (Green Packaging)
- FuelEff1**= Exogenous latent construct (Fuel Efficiency)
- OptRout1**= Exogenous latent construct (Optimization of Routes)
- CarbEmm**= Exogenous latent construct (Carbon Emission)
- RevLog1**= Exogenous latent construct (Reverse Logistics)
- GLPs**= Exogenous second-order latent construct (Green Logistics Practices)
- FP**= Endogenous latent construct (Firm Performance)
- FPFP**- Firm Performance Financial Perspective
- FPCP**- Firm Performance Customer Perspective
- FPIP**- Firm Performance Internal Processes
- FPLG**- Firm Performance Learning and Growth

## 1.6 Green Logistics Practices, Social Performance and Firm Performance

**H<sub>2</sub>:** *The relationship between green logistics practices and firm performance is mediated by social performance.*

To investigate the mediating effect of social performance on the relationship between green logistics practices and firm performance Gaskin's AMOS Estimand was used. Hypothesis two (H<sub>2</sub>), stated that social performance mediates the relationship between green logistics practices and firm performance. Figure 2 illustrates the test of the presence of a mediating effect of social performance on the relationship between green logistics practices and firm performance. Model fit measure obtained were deemed sufficient,  $\chi^2/d.f. = 1.629$ , CFI = 0.992, SRMR = 0.038, RMSEA = 0.054, PCLOSE = 0.379. The relationship between green logistics practices and firm performance was positive and significant ( $\beta=0.65$ ,  $p<0.001$ ), results from bootstrapping indicated that, social performance mediates the positive relationship between green logistics practices and firm performance ( $\beta=.361$ ,  $p = .007$ ), at 0.05 level of significance. Hypothesis 2 is, therefore, supported. Table 2 presents the bootstrapping results and model fit indices.

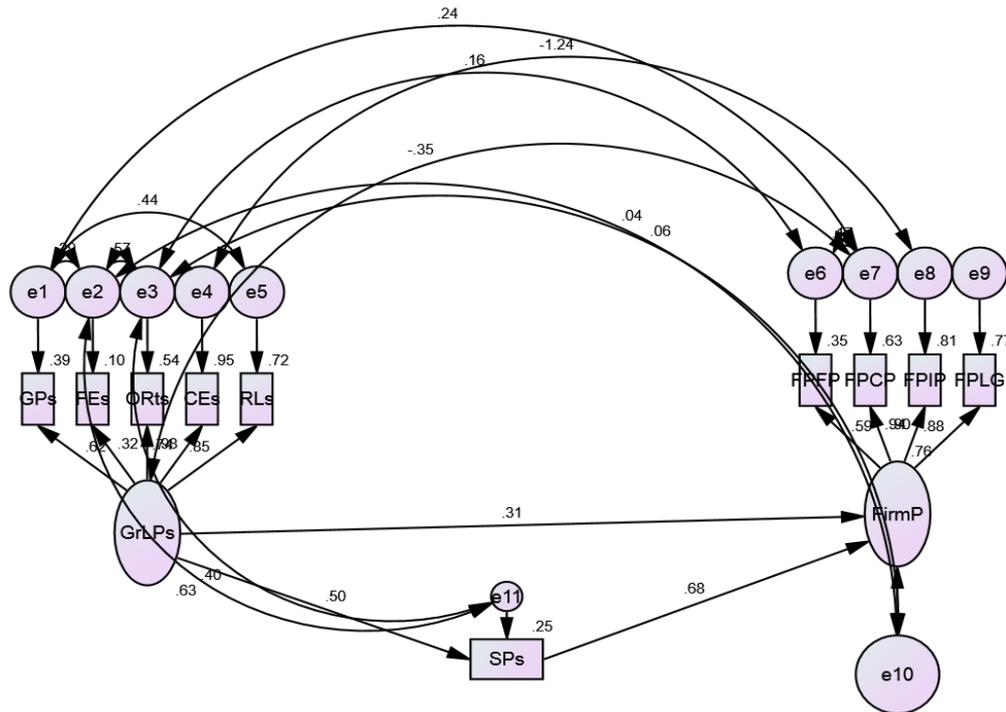
The coefficient of determination (R<sup>2</sup>) for firm performance construct was 0.758, meaning that, the latent construct green logistics practices and social performance construct explain 75.8% of the variance in firm performance. This indicates a very great improvement in variance explained compared to when the latent variable, social performance is excluded from the model (R<sup>2</sup> improved from 41.7% to 75.8%). Social performance coefficient of determination was 0.249 and according to Moore, Notz and Flinger (2013), this can be considered as weak, while the R<sup>2</sup> value for the firm performance of 0.758 is considered strong.

**Table 2: Mediation of Social Performance on Green Logistics Practices and Firm Performance**

Dependent Variable.	Parameter	Estimate	Lower	Upper	P-Value	Hypothesis testing result
Firm Performance <i>R</i> <sup>2</sup> =0.758	Green logistics practices X Social performance	.361	.259	.503	.007	Significant

Source: Research Data (2020)

**Figure 2: Mediation of Social Performance on Green Logistics Practices and Firm Performance**



Source: Research Data (2020)

- GP= Exogenous latent construct (Green Packaging Practices)
- FE= Exogenous latent construct (Fuel Efficiency)
- ORts= Exogenous latent construct (Optimization of Routes)
- CE= Exogenous latent construct (Carbon Emission)
- RL= Exogenous latent construct (Reverse Logistics)
- GrLPs= Exogenous second-order latent construct (Green Logistics Practices)
- ECPs = Mediating variables (Economic Performance)
- FirmP= Endogenous latent construct (Firm Performance)
- FFP-Firm Performance Financial Perspective
- FPCP- Firm Performance Customer Perspective
- FPIP- Firm Performance Internal Processes
- FPLG-Firm Performance Learning and Growth

The findings of the study showed that there is a significant positive relationship between the implementation of green logistics practices and firm performance. Green logistics practices construct was found to explain 41.7% of the variance in firm performance of logistic firms in Kenya. This implies that there are other variables which if included in the model can improve the model by a margin of 58.3%. The findings have shown that green logistics practices significantly influenced firm performance positively since the significance level was less than 0.001. The findings of the study have therefore indicated that green logistics

practices, when adopted by a firm, could lead to better performance within logistics firms in Kenya. The study findings are in concurrence with conclusions from other previous studies (Lai & Wong, 2012; Abareshi & Molla, 2013). The findings support the natural RBV, RBV and stakeholders' theory, which provided theoretical anchorage to this relationship. The study consequently extends the literature by contributing to the positive link between green logistics practices and firm performance, therefore, reducing the uncertainty of contradictory findings from past studies on whether pursuing these practices is beneficial.

The finding adds support to the findings of positive links of past studies on the relationship between green logistic practices and social performance (Lin, Yang & Liou, 2009; Ruf, Muralidhar, Brown, Janney & Paul 2001; Wagner, 2010) This is in line with Hallegatte, et. al. (2011) who upheld that, the relationship between green growth and social performance is clear since generally, changes in monetary growth are linked to social performance even where there are policies to reduce inequality. A positive link between social performance and firm performance was established by Lee, Lau, Cheng (2013) who argues that by engaging in social practices, firms can improve their reputation, which in turn improves firm performance. This claim is supported by the result of this empirical investigation, in that, the social performance was found to have a positive and significant effect on firm performance.

The mediating effect of social performance on the relationship between green logistics practices and firm performance was found to be positive and significant. This is aligned to assertions of Lee, Lau, Cheng (2013) who indicate that, by engaging in social practices, firms can improve their image and reputation, and potentially increase the value of a firm by increasing its social performance and eventually its overall performance. The findings support the stakeholder's theory, which puts forward that firms produce externalities, which can cause stakeholders to build pressure on companies to reduce harmful effects (Sarkis et al. 2011; Freeman 1984). Stakeholder pressures can act as motivating factors that push companies to adopt environment-friendly practices (Huiying Zhang Fan yang 2016).

### **1.7 Limitations of the study**

This study has limitations; this cross-sectional study is limited logistics firms in Kenya of the 892 companies who were members of KIFWA in 2018. Therefore, firms that were not members of KIFWA were not included in the sampling frame though they might have had green logistics practices in their operations. Therefore, the results may lack robust external validity. For the generalizability of the research to increase, other firms who may not be KIFWA members and probably in other countries should be studied.

This research was a cross-sectional study using a quantitative approach that captured the perception of one respondent per organization at a specific point in time. Though this approach is effective in gathering the

perception about the changing aspects of performance at a precise point in time, green logistics practices, social and firm performance, fluctuate in a way that longitudinal studies lead to better and diverse perceptions. The data may have been affected by the respondents' inclination of any occasions that might have occurred previously or circumstances at the point of filling in the research instrument.

### **1.8 Conclusion and Recommendations**

The study concluded that logistics firms in Kenya have implemented and put into operations practices of green logistics. This has played a critical role in influencing the overall performance of logistics firms in Kenya. The study further concluded that green logistics practices relate positively to social performance in enhancing firm performance. This conclusion is true regardless of the ownership status of the firm or its EMS certification status. These results have supported the concepts of resourced based view, natural resourced based view, triple bottom line and stakeholders' theory confirming that green logistics practices do affect firm performance.

This study has established that implementing green logistics practices leads to enhanced firm performance. It can, therefore, be recommended that logistics firms in Kenya should implement environmentally sound practices in all phases of their operations and the larger supply chain, beginning with practices like green packaging, fuel efficiency, optimization of routes, carbon emission measurement and reverse logistics. The study further suggested that the implementation of green logistics practices should be advocated to ensure the sustainability of not only the current generation but also the future generation. This is because operations of the logistics industry are the most widely recognized to affect the natural environment in the greatest negative way.

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