

Analysing Green Logistics in Small and Medium Logistics Service Providers in Johannesburg

Nandipha Bheqezi, Hulisani Makushu, Lerato Legabi, Gugulethu Baloyi and Sebonkile C. Thaba

Department of Transportation and Logistics
College of Business and Economics
College of Economic and Management Sciences
University of Johannesburg
South Africa
scthaba@uj.ac.za

Abstract

The purpose is to investigate the level of involvements from small, medium enterprises (SMEs) when it comes to practising green logistics. With the recommendation that can easily be implemented by the SMEs in South Africa. In this research study, the positivist philosophy was chosen from the five research philosophies most commonly referred to in business. Positivism involves analysing the social occurrences and clarifications of the social world and is concerned with the theoretical perspective of natural science. As the aim was to determine the understanding of green logistics among logistics SMEs, the results show that most organisations are aware of green logistics interventions. The study concentrated on three main activities of green logistics, namely transport, packaging and warehouse. Data collected from a sample of 120 logistics SMEs, where 94% of the business agrees states that they are aware of Green logistic but only 16% of the SMEs always implement the green logistics initiatives. Based on positivism philosophy, three green logistics factors tested, Transportation, packaging and warehousing. The study found out that transportation is the primary activity in green logistics and happens to be one factor that SMEs are mostly considering the efficient way by implementing green logistics.

Keywords

Green logistics, small-medium enterprises (SMEs), logistics activities, transport, warehouse, and packaging.

1. Introduction

Logistics is one of the industries contributing largely towards environmental harms, and over the years, the green logistics literature has come up with various interventions to eliminate the damage, (). Green logistics is explained as endeavours to estimate and limit the natural effect of logistics activities, (Saroaha, 2014). Over the last two decades, following increasing pressure from the public and government, there has been an implementation of green logistics in enterprises, (Browne, M. Cullinane, S. McKinnon, A. Whiteing, 2015). This is particularly important in the transportation sector, which is a major contributor to environmental damage, (Larina, et al., 2021). However, despite the increasing awareness of the need for green logistics, its adoption and awareness are still low. The attitude towards green approaches varies among logistics service providers, with some integrating green initiatives throughout their business and others offering green alternatives (Isaksson & Maria Hüge-Brodi, 2013). Green logistics is done to reduce logistics activities that contribute to environmental deterioration, also known as global warming (Kakkur, 2015). In South Africa, the integration of green supply chain management practices, particularly reverse logistics and adherence to legislation, has been found to improve environmental and overall supply chain performance (Eph, 2018). Global warming includes the general pollution of the environment owing to certain logistics activities, reported, (Kondratjev, J., 2015) as major logistics activities such as:

- *With the transportation* activities, it reported that vehicles have an impact on the environment owing to the emission of greenhouse gasses (GHG) including, but not limited to, lead, carbon monoxide, carbon dioxide (CO₂), methane, nitrogen oxide, and nitrous oxide. Transportation contributes 15 percent of CO₂ emissions worldwide, (Rodrigue, 2017).
- *Packaging*: to assist with certain logistics activities such as transportation, loading and unloading, storage and the maximum protection of the goods, secondary packaging (crates, cardboard boxes or plastic containers) are in detail discussion. The environmental impact of unrecovered waste material is estimated to grow above 2 billion tons in the next seven years, (Bank, 2019).
- *Warehousing*: the operation of large warehouses leads to an increase in the use of electricity to run the warehouse systems, including lighting, heating and cooling as well as the operation of machinery in the warehouse, (Fichtinger, 2017).

The study is focusing on these three aspects, namely transportation, packaging and warehousing, particularly within the SME sectors. The small or medium enterprise (SME) is as an independent enterprise with a low market share, managed by owners or part-owners, (Chetty, 2014). The classification of SMEs is according to the number of employees which is 10-50 for a small enterprise and 50-200 for a medium enterprise, (Srinivas, H., n.d). The total turnover for a small business ranges between R13 million and R26 million and is above R26-million for medium enterprises, (Bank, 2017). South African law dictates that a small business is any entity comprising predominantly of people carrying on small business concerns in the various economic sector.

The recognition of SMEs reflects an answer to the economic and social wellness of emerging countries. The SMEs has a high potential of lessening the unemployment rate, which is the current issue in South Africa sitting at a rate of 26.7 per cent, (StatsSA, 2017). SMEs have been known to experience a shortage of skills and resources needed to manage environmental issues, which hinders an industrial and governmental objective of better sustainable practice, (S., 2010).

The small-medium enterprises in the logistics sector contain three essential elements, namely reliability, lead-time and cost, (Gesce, 2012). The SME logistics companies generally lack a skilled workforce, compelling the Chief Executive Officer (CEO) to be typically more involved in innovation selection' (Gesce, 2012). This means a CEO with more prominent green logistics information can better direct the business in a "green" direction (Piralal S.K., 2015); (Sandén Gustafsson, 2014); & (Jansen van Rensburg, 2015).

There are several research papers (Mitra, 2014) & (Shang, 2010) on green logistics and the green supply chain; however, the research mostly focuses on the concept from a perspective of large enterprises, (Mafini, 2017). Despite SMEs contributing 34 per cent of South Africa's gross domestic product (GDP), (The Banking Association South Africa, 2018). In the rise of pressures to reduce the carbon footprint, logistics enterprises have had to include sustainability strategies that have a specific focus on economic and environmental factors; this led to the concept of green logistics, (Jansen van Rensburg, 2015). SMEs in the logistics sector plays a role in almost all industries and sectors in South Africa as they are of central importance in the movement of goods and services.

2. Literature Review

The purpose of this literature review is to provide an overview of existing green logistics theories as well as contextualize the scope and focus elements such as environmental, economical and green logistics practices.

A. Economic

The economic element denotes the financial worth and profits that a business produces. The economic element is the "traditional" means of success measurement as it is commonly used in the valuation of a business's production. Economic growth in businesses is essential; however, a business that pays attention to environmental matters stands to gain better economic performance. End-consumers are more eager to consider buying goods and services from a business that is mindful of the environment; therefore, all supply chain members, including logistics, should be involved. Logistics businesses decrease expenses and increase financial productivity using collaboration, reverse logistics or fuel and route optimization. When a logistics business decreases its expenses, it moreover decreases the environmental influence it has owing to a lower amount of emissions released.

The economic objective of logistics companies is to take full advantage of the value creation of logistics services. The value is associated with customer service and satisfaction stages. In local and global competitive markets, the

economic objective was made possible through service quantities while neglecting the quality of services offered [28]. There will be a replacement of the quantitative measure of value by green logistics leading to sustainability in the future ineffective businesses. Therefore, small logistics businesses need to foster the growth of efficient and modern logistics services to realise economic sustainability.

The economic element is known as the critical requirement needed by SMEs to survive in the competitive environmental market. Furthermore, there is no separation in economic issues from environmental issues. A business that does not have a steady economic condition could face the challenge of not being able to pay attention to the environmental conditions. The uncertainty in realizing income associated benefits of green logistics causes conflict between clients and supply chain members, including the small logistics businesses. The clients and focal enterprises within the same supply network, pressurize small businesses to practice green logistics. In contrast, SMEs want to survive with the profits that they have rather than invest in green logistics.

B. Environmental

Environmental issues are becoming more conspicuous, and logistics is having a close relationship with the environment; therefore, it can be the consideration of environmental issues when managing a logistics business. Particularly in the purchasing of raw materials also the delivery of goods, transportation is a significant logistics activity that harms the environment. Transportation and other logistics activities harm the environment this including the fuel consumption, air pollution as well as improper waste disposal. Today, global warming, created by a substantial scale of emissions of greenhouse gases, is one of the top environmental matters faced by logistics businesses.

Consumers are becoming environmentally friendly, which clarifies that organisations are becoming mindful and are supporting green logistics programmes inside their organisations, which is enhancing the organisations' performances. The initiatives are decreasing the environmental effect but extent to which is difficult to measure, unlike with economic measurements.

Firms with global supply chains and outsourcing systems are forced to comply with the environmental rules and regulations to reduce the environmental effect. Environmental awareness for global supply chains also influences which suppliers a firm will utilize. Organisations' environmental corporate image might be due to poor ecological performances of the supplier. The vast number of and the key impact that SME logistics firms have on the environment cannot be overlooked. Even though the environmental effect of these logistics businesses is not effectively quantifiable. It is measured that SME logistics contribute around 70% of environment degradation.

Green Logistics Activities

The logistics sector has been identified as one of the industries contributing the highest to environmental corrosion while consuming a considerable amount of natural resources and contributing 5.5 per cent of total emissions of greenhouse gases.

Three primary activities are identified to elaborate on the application of green logistics in small and medium enterprises. These are packaging, warehousing and transportation.

Transportation

Green logistics in transportation aims to reduce the consumption of energy and the emission of greenhouse gases, with transportation contributing 15 per cent of CO₂ emissions worldwide. Fossil fuels have remained the most used source of energy in vehicles, 85 per cent of the world's energy consumption is derived from fossil fuels. The use of renewable fuels is attributed to saving 20 per cent in greenhouse gas emissions. Biodiesel is one of two commonly used biofuels. Biodiesel is the manipulation of vegetable oils used as alternatives for fossil fuels. In South Africa, significant biofuel industry leaders have not emerged owing to the current high cost of fuel. The use of efficient fuels in transportation by SMEs is deemed as vulnerable due to limited resources available to them and tight operating margins in which they operate.

Packaging

Waste generated from packaging material in China has become the fourth-largest contributor to pollution in the country, where packaging material usually is used once and discarded afterwards. In South Africa, the SME sector was reported to contribute 80-90 per cent of the collected waste material generated from packaging materials. A primary concern for logistics companies is to reduce the ever-increasing amount of solid waste. Paper and cardboard

are reported to be 41 per cent of total packaging waste generated; with a reduction of 1.5 per cent reported in 2012. In a Marine Pollution report, South Africa ranked number 11 out of 20 top countries ranked by mass contribution to plastic pollution in the ocean: 12 per cent of the waste collected was made of plastic. The mass production of packaging material, of which 40 per cent becomes plastic waste material, has an estimated growth of 12 billion tons by the year 2050.

There is a 5.0 to 5.5 per cent annual growth estimated in the green packaging market between the years 2015 and 2023. Basing environmental materials used in the introduction of biodegradable and recyclable materials. These include paper, biodegradable plastic, bagasse biodegradable packaging and mycelium. It is found out that SMEs have difficulty in providing sustainable packaging in their organisations, with reasons listed as lack of financial power and limited resources which leads to SMEs avoiding additional costs; SMEs also do not have access to adequate information on available financial incentives.

Warehousing

Warehousing contributes 24 per cent to total logistics costs. Modern logistics systems aim to reduce the levels of inventory at all times; however, the reduction of inventory in warehousing increases the amount of inventory in transit -increasing the number of vehicles on the road and congestion. In an organisation, warehousing is deemed as the most significant fixed asset; therefore, it requires an excellent investment in terms of streamlining the use of fossil fuels to power the warehouse.

The six division segments of average electricity usage in warehouses are refrigeration, ventilation, computer, cooling and miscellaneous. Lighting and miscellaneous activities account for the most electricity used, at 34 and 35 per cent, respectively. Renewable energy sources are used to power green warehouses. One of the more significant obstacles of renewable energy is the inability to meet the high demand for energy as generating renewable energy is an adaptable process. The use of efficient energy sources in SME-owned warehouses is at a minimal level owing to the up-front costs, time restrictions and lack of commitment from management.

3. Research Problem Statement, Questions and Objectives

3.1 Problem Statement

Absence of environmental awareness, assumptions of costly and timely implementation of green logistics in SMEs are issues singled out in literature articles (Winston, K., 2012) & (Van den Berg, 2013). It is difficult for SMEs to accomplish sustainable measurement because there are no general rules to guide them (Sloan, 2013). Therefore, an absence of research exists concerning the degree to which small and medium-sized logistics business in South Africa execute green logistics practices, as well as the hindrances which are keeping business from executing activities, (Sandén Gustafsson, 2014).

3.2 Research Question

Main research question

To what extent do logistics small and medium-sized service providers adopt green logistics practices?

Sub-research questions

- What is the understanding of green logistics amongst logistics small and medium service providers?
- How does each logistics small and medium service provider incorporate green logistics activities in their enterprise?
- Which factors influence the adoption of green logistics in small and medium service providers?

Research Objectives

Primary research objective

The primary objective of this study is to analyse the degree to which logistics small and medium service providers adopt green logistics.

Secondary objectives

- To determine the understanding of green logistics among logistics small and medium service providers.
- To determine how logistics small and medium service providers, execute green logistics activities in their enterprise
- To identify factors influencing the adoption of green logistics in logistics small and medium service providers.

4. Research Methodology and Design

A research design explains the method with which the data collection and measurement process will be conducted and the analysis of the collected data by following a framework that guides the research process (Kothari, C. R., 2004). A deductive reasoning approach was used, which is the theory-to-data approach where data is collected to assess suggestions connected to an existing concept, (Saunders, M., Lewis, P. & Thornhill, A., 2016). The companies were contacted either telephonically or using email communication, for data collection

Research Purpose

Exploratory research was used in this research as it primarily focuses on findings or the construction of a principle (Jupp, V., 2006). Exploratory research allows for findings to be assessed differently in order to answer or solve the problem that has been identified (Saunders, M., Lewis, P. & Thornhill, A., 2016). Medium, electronic form (offline, online), as well as to translate, print, publish, distribute and sell the Contribution in any foreign languages and throughout the world.

Research Philosophy

In this research study, the positivism philosophy was chosen from the five research philosophies most commonly referred to in business, (Saunders, M., Lewis, P. & Thornhill, A., 2016). Positivism involves analysing the social occurrences and clarifications of the social world and is concerned with the theoretical perspective of natural science (Saunders, M., Lewis, P. & Thornhill, A., 2016) & (Dudovskiy, J., 2017).

Positivism was the chosen philosophy of this study as it encouraged the use of quantitative methods, such as conducting surveys (Creswell, 2014), which were used in this research. It provided the opportunity for investigators to keep an unbiased stance throughout the research process to avoid data manipulating. Positivism helped determine the primary and secondary objectives in an unbiased manner, with the researcher being independent and with no influence on the outcome of the research (Saunders, M., Lewis, P. and Thornhill, A., 2009).

Methodological choice

The research strategy was a quantitative survey using a questionnaire (Saunders, M., Lewis, P. and Thornhill, A., 2009). The quantitative questionnaire is defined as the gathering of data from a section of people according to the way they answer questions, (Check, J., & Schutt, R. K., 2012). In this research, study questionnaires were used when collecting data from logistics small-medium service providers about green logistics

5. Data Collection

1. *Unit of analysis:*

The unit of analysis is defined as the subject on which the study is based, (Collis, J & Hussey, R, 2009). The focus of this study was on small and medium enterprises (SMEs) in particular, logistics enterprises providing transportation, packaging and warehousing services.

2. *Population and population size:*

The population in a research study is defined as the complete number of elements related to the defined research unit of analysis (Saunders, M., Lewis, P. & Thornhill, A., 2016). A database of logistics small and medium service providers in Johannesburg was created from the Brabys online map and business search directory, resulting in a

database of 725 logistics small and medium service providers used as the population size. These companies mainly focus on providing either transportation, packaging or warehousing services, or a combination of these services.

3. *Sampling strategy and sampling size:*

The sampling strategy used was random. It involves the creation of the sample by selecting units in the population at random (Saunders, M., Lewis, P. and Thornhill, A., 2009). The sample was created by assigning a number to each case chosen at random from the sample until the desired sample size was obtained. The sample size of this research was 120 logistics service providers. The number of respondents was 50.

4. *Data collection instrument:*

A structured questionnaire was used to collect data because it is a common strategy that most companies used to answer questions such what, where, who. Survey strategies using questionnaires are popular to collect data in a highly economical way and easy to evaluate (Saunders, M., Lewis, P. & Thornhill, A., 2016). We physical went to different SMEs logistics companies around Gauteng, to complete the questionnaires.

5. *Data analysis:*

There are two types of data analysis methods, namely descriptive and inferential statistics (Saunders, M., Lewis, P. & Thornhill, A., 2016); (Collis, J & Hussey, R, 2009); (Laerd statistics, 2013). In this research study, descriptive statistics were used. Descriptive statistics are used to describe characteristics used to measure a set of entities using characteristics such as the total, mean, range and the standard deviation. Results are compiled to form graphs, charts and tables illustrating the information, (Wyllis, R. E. , 1978).

6. *Data quality-validity and reliability:*

Reliability occurs when repetition of previous research designs are present and consistent results are achieved (Saunders, M., Lewis, P. & Thornhill, A., 2016); (Collis, J & Hussey, R, 2009) & (Creswell, 2014). Internal validity states the potential of a questionnaire to determine and answer the set objectives of the study (Saunders, M., Lewis, P. & Thornhill, A., 2016) & (Jansen van Rensburg, 2015). External validity refers to those questions in a study's research whether the answers can be generalised or are appropriate to other settings or groups, (Saunders, M., Lewis, P. & Thornhill, A., 2016).

6. Results Presentation and Analysis

A sample of 120 small to medium logistics service providers selected, however, due to several reasons such as time constraints, inability to locate relevant respondent and other respondents could not answer 75 per cent of the questionnaire. As a result, there were only 50 respondents.

A Post Matric Diploma or Certificate was the highest level of qualification of 36 per cent of the respondents. The least obtained qualification at 14 per cent, was a post-graduate degree.

Employee or Owner & Level of Employment (Q5, 6)

Of the respondents, 84 per cent were employees, with 16 per cent of owners. Of the 50 respondents, 21 were Junior Managers, nine Senior Managers, eight Middle Managers and five Directors. Of the seven 'other' 'other' respondents, five were owners, and two were secretaries.

Number of employees

Five companies displayed the highest number of employees with 90 employees. Least number of employees reported is one employee. With a range between one and 139 employees for the 50 respondents. The average number of employees for the sample was 48.84 employees, with a standard deviation of 34.941.

Vehicle Type and Type of Fuel

Table 1 shows that of the 122 vehicles owned by the respondents, 83 per cent use diesel, while only 10 per cent use biodiesel and 12.3 per cent use gasoline.

The number of vehicles owned ranged from one to 108 vehicles in the company under the different types stated in the questionnaire. The most vehicles recorded are 15 vehicles. Of the 50 logistics service providers, 36.9 per cent use larger trucks as their primary source of transportation

Table 1: Vehicle type and the fuel used (n=122)

Type of Vehicle	Gasoline	Diesel	Compressed Natural Gas	Biodiesel	Liquefied Petroleum
Cars	13	5			
Light-duty vehicles	1	23		5	
One-ton trucks		24	2	5	
Larger trucks		40	2	1	
Other (motorbike)	1				
Total	15	92	4	11	0

Packaging Materials

There is 26.3 per cent of the respondents with packaging facilities that chose pallets as their primary packaging type, with boxes at a close second choice at 25.5 per cent and plastic at 16.8 per cent. The least used packaging material indicated under 'other' was paper at 2.2 per cent. The use of pallets indicates that the service providers practice green logistics within their day-to-day business days as pallets can be used multiple times and are recyclable.

Warehouse Energy

Electricity is the preferred type of energy, as indicated by 45 responses at 75 per cent of the total responses. The least used energy type was the geothermal energy with a 1.7 per cent response.

Understanding Green Logistics

Green Logistics Concepts

As multiple response questions, 66 per cent of the respondents are familiar with recycling as a green logistics concept which is ranked at 16.3 per cent, and the second most familiar concept is environmentally friendly operations at 15.8 per cent. Carbon footprinting appears to be the least familiar concept with a percentage of 5.4.

Commonly used green logistics strategies in SMEs

Reduction of fuel consumption is the most used green logistics strategy in SMEs ranked at 18.1 per cent, making it one of the strategies to reduce cost, and vehicle scheduling is the second most used strategy ranked at 16.7 per cent. Technology solutions and Improve energy use in refrigeration are the least strategy used with only 2.2 per cent use. Green logistics implementation in companies

Of the 50 respondents, 94 per cent are implementing green logistics, and they comprehend that green logistics attempts to estimate and limit the natural effect of logistics activities. The remaining 6 per cent does not implement green logistics in their enterprise.

Execution of Green Logistics

Logistics Activities

Transportation Management is rated by 16 per cent of the respondents as a logistics activity that is performed in their company's. It is followed by warehousing and storage (13%), fleet management (11%), packaging (10%), customer services (10%), materials handling (9%) and procurement at (7%) and inventory control (5%).

Green Practices in Warehousing

With regards to green practices in warehousing, Figure 1 indicates that 50 per cent of the respondents always have an efficient warehouse lighting system. Temperature control in the warehouse is always optimized by 40 per cent of the respondents. Energy efficiency in the warehouse, which includes optimal space and equipment usage is often done by 29 per cent of the respondents. Regarding on-site recycling, 27 per cent never use this practice. Automatic warehouse

systems are rarely used by 29 per cent of the respondents. Inventories are rarely minimized by 29 per cent of the respondents.

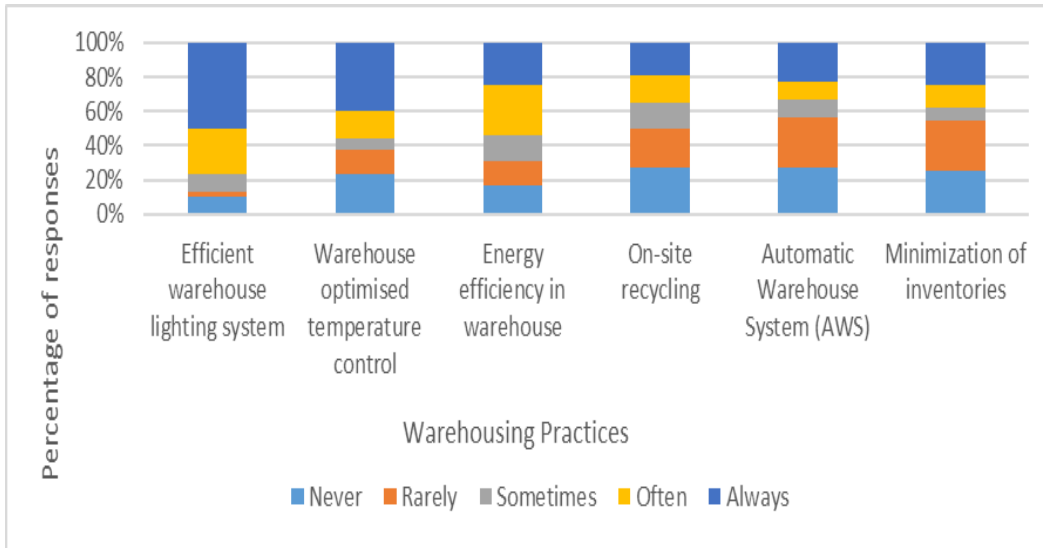


Figure 1: Distribution of green practices in warehouses of respondents (n=48)

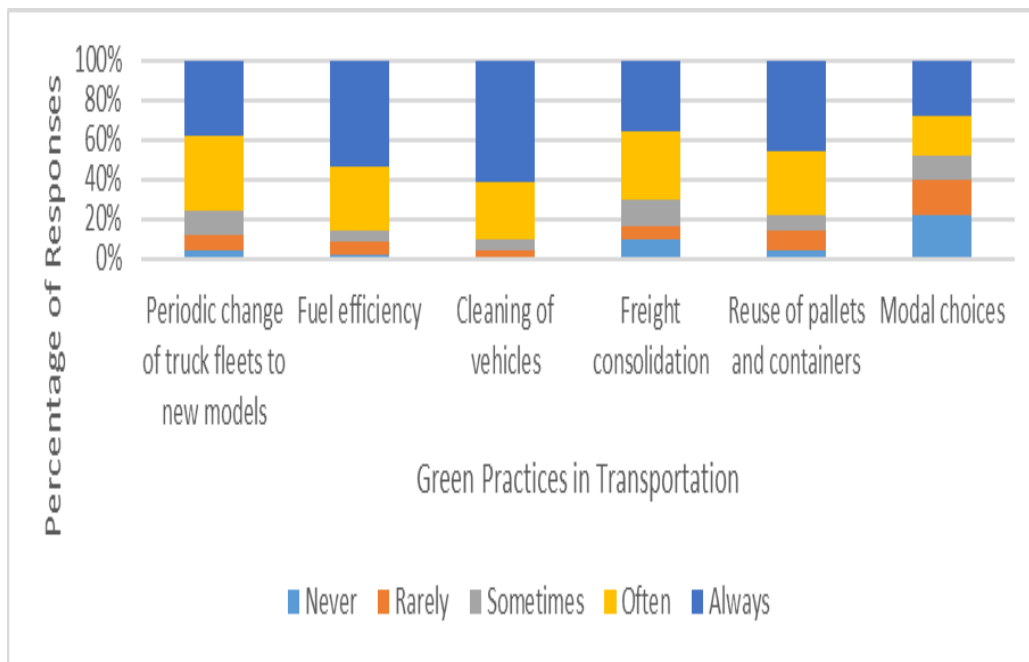


Figure 2: Distribution of Green Practices in Transportation (n=50)

Green Practices in Packaging

Respondents were required to indicate how often the green practices in packaging were implemented in their businesses from a Likert scale ranging from 1 to 5. Environmentally friendly packaging materials are often used by respondents with a mean of 3.5 and a standard deviation of 1.41 (Table 2).

Table 2: Green Practices in Packaging (n=46)

	Mean	Std. Deviation
Energy consumption in the packaging house	2.98	1.48
Use of different packaging technologies and materials to reduce contamination	3.09	1.40
Packaging recycling	3.20	1.45
Environmentally friendly packaging materials	3.50	1.41

Green Logistics Implementation.

Of the respondents, 56 per cent indicated that they implement green logistics often, and 16 per cent always implement green logistics.

Green Logistics a cost-saver or unnecessary expense.

The results indicate that 88 per cent of the respondents consider green logistics as a cost-saver, whereas 12 per cent consider it as an unnecessary expense.

Adoption of Green Logistics.

Advantages of implementation of green logistics.

The mean value with the standard deviation for each advantage provides an indication of the importance of the advantages for all respondents. The respondents rated Improve fuel efficiency as the main advantage of implementing green logistics practices with a mean of 4.46 and a standard deviation of 0.762. Followed by satisfy customer requirements ranked as the 2nd most important advantage with a mean of 4.38 and a standard deviation of 0.667, establish a competitive advantage ranked as the 3rd most important with a mean of 4.16 and a standard deviation 0.889, Satisfy suppliers requirements ranked as the 4th most important advantages with a mean of 4.00 and a standard deviation of 1.143.

Disadvantages of implementing Green Logistics.

The mean value with the standard deviation for each disadvantage indicates the significant disadvantages for all respondents. The respondents rated Lack of required technologies as the main disadvantage of implementing green logistics with a mean of 4.10 and a standard deviation of 0.863. It is followed by the expensive implementation of green logistics as the 2nd most crucial disadvantage with a mean of 4.04 and a standard deviation of 1.177.

Reasons for implementing Green Logistics practices

Figure 3 indicates that 56 per cent of respondents strongly agree that improving customer relations followed by 54 per cent compliances with government regulations, 48 per cent improve the image of the company, 42 per cent desire to be environmentally friendly, 26 per cent improve financial return on investment are the most important reasons for implementing green logistics practices.

Green Practices in Transport

Figure 2 indicates that 38 per cent of respondent always periodically change their truck fleets to new models; 54 per cent of respondents always use fuel efficiency as a green practice. Cleaning of vehicles is always conducted by 62 per cent of the respondents and freight is always consolidated by 36 per cent of the respondents. The respondents indicated

that 46 per cent always reuse pallets and containers, and 28 per cent of the respondents always use different modal options

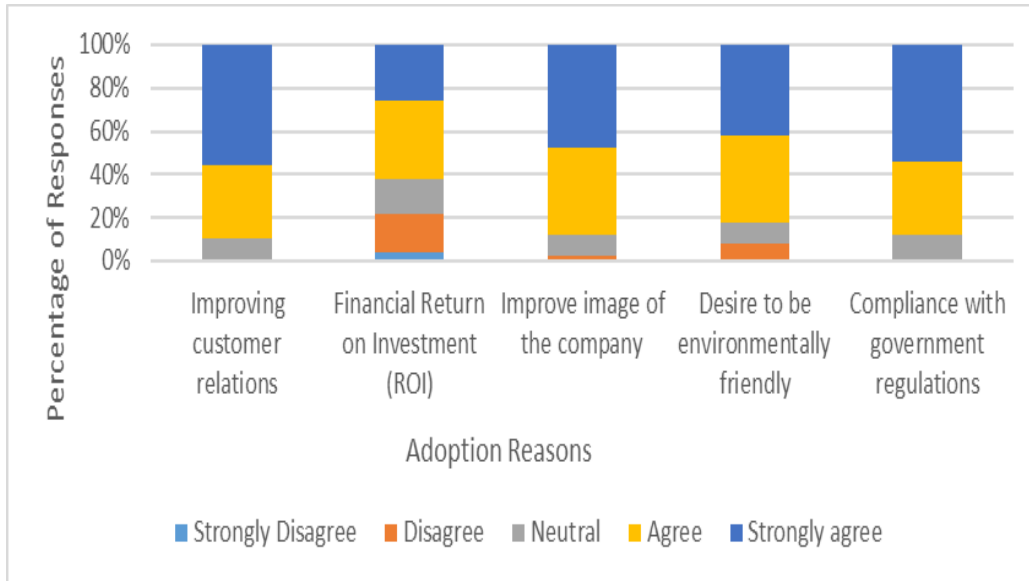


Figure 3: Reasons for Adopting Green Logistics Practices (n=50)

Investing in technologies to support Green Logistics

In Figure 4 the data indicate that 52 per cent of the respondents strongly agree that investing in technologies to support green logistics improve competitiveness, 48 per cent improve the overall quality of customer services, and 46 per cent

improve response to customer's green needs. While 44 per cent of the respondents agree that it reduces the cost of transport and logistics operations.

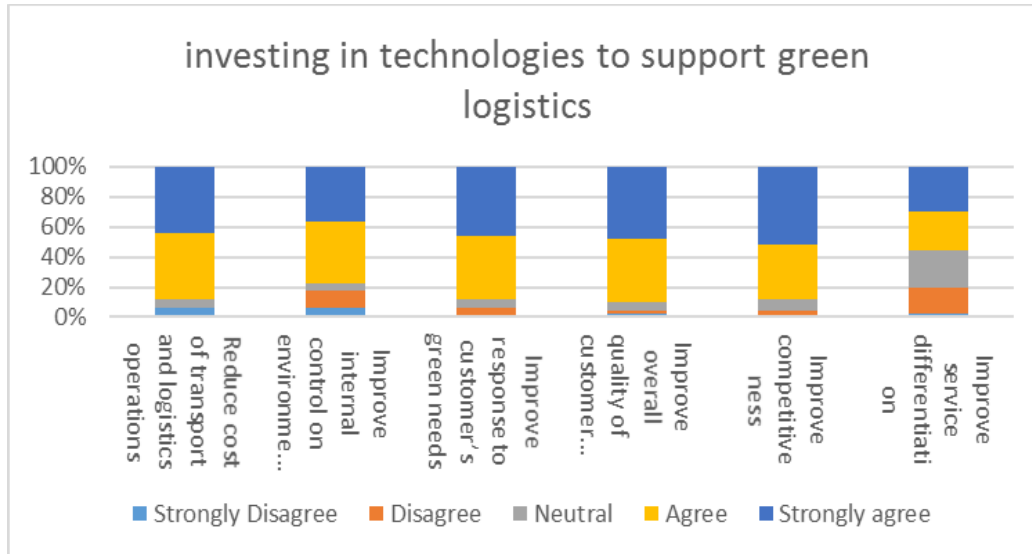


Figure 4: Investing in technologies to support green logistics (n=50)

Stakeholders exerting strong influences in adopting Green Logistics (Q26)

The mode value for the stakeholders indicates the essential stakeholders that form part adoption of green logistics. The Table 3 shows that respondents agree that customers, logistics suppliers, expert's and government regulation are the most important stakeholders when implementing green logistics in the business

Table 3: stakeholders exerting strong influences in adopting green logistics

	mode
Competitors	4
Customers	5
Management of Transport/Logistics Suppliers or partners	5
Employees	4
Experts (academics/consultants)	5
Trade bodies (NGOs & civil societies)	4
Government regulations	5

7. Discussion of the Results

With 94 per cent of the enterprises implementing green logistics, this demonstrates that there is an understanding of green logistics amongst logistics small-medium service providers. Reduced fuel consumption is the most used strategy because green logistics in transportation aims to reduce the consumption of energy and the emission of greenhouse gases (Deng, 2011).

It seems that transportation management is the significant logistics activity indicated by 16 per cent of the respondents. Efficient warehouse lighting systems appear to be the critical focus of green warehousing practices to reduce the high-cost lighting activities amongst the respondents at 50 per cent. Environmentally friendly packaging materials appear as the focus in the implementation of green practices in packaging.

Green logistics is viewed as a cost-saver rather than an unnecessary expense, and this contradicts the statement by Winston (2012), stating that SMEs are focused on surviving the business environment with the profits they make

rather than investing in green logistics. Improving fuel efficiency was rated as the main advantage of implementing green logistics. It shows that these small to medium logistics service providers are aware of the advantages of implementing green logistics practices.

Employee or Owner & Level of Employment.

8. Conclusion

Data were collected from 50 small and medium logistics service providers to determine the extent to which green logistics practices were adopted by these service providers located in Johannesburg. The data collected and analysed revealed that of the 50 service providers, 94 per cent alluded to being knowledgeable of some of the logistics activities however only 16% of the respondents indicated that they always apply the strategies. Notably, efficient warehouse lighting was indicated as a green practice that is always used by the service providers; however, 75 per cent of the respondents use electricity as their primary warehouse energy source. This implies that although the lighting in the warehouses of these enterprises is competent, they are not using the most environmentally friendly source of energy. Larger trucks are the more prominently owned vehicle type by the service providers; however, with the respondents indicating fuel efficiency as the more used transportation strategy, it is essential to notice that 93 per cent of service providers with transportation as activity use diesel for their vehicles. This is indicative yet again of a lack of using sustainable fuel types such as biodiesel and compressed natural gas. Pallets are used by 26.3 per cent of the service providers with packaging as an activity. This is the only activity that uses sustainable and re-usable materials in their enterprises. The study has shown that although there is sufficient knowledge of the subject by service providers, they do not practice green logistics in the three activities mentioned

Management Implications

The study contributes to the limited research that has been done on the adoption of green logistics practices by small and medium logistics service providers. It does this by providing additional information on the subject and increases the understanding of green logistics developments found in SMEs. Strategically, this study can assist SMEs to improve their adoption of green logistics practices as well as evaluating supplier compliance by creating an evaluation criterion that assesses the supplier based on environmental and economic performance

Limitations

The research study had a relatively small sample size, and this is a limitation as it does not give enough information to formulate a generalisation of results as there is a larger percentage of enterprises that were not included in the research than there are in the research.

Future Research

Larger sample size can be used in future research to increase the reliability of the research. An increase in sample size will result in more statistically significant results. For future research purposes, the education of logistics SMEs can be focused on, specifically on the transformational business practices that will achieve a level of sustainable business operations.

Acknowledgment

We acknowledge the department of transport and supply chain management of the University of Johannesburg for the support

References

- Saunders, M., Lewis, P. & Thornhill, A., *Research Methods for Business Students. Sixth edition.* England: Pearson Education Limited. Essex, 2016.
- Srinivas, H., *What are SMEs, 2018.* [Online] Available at: <https://www.gdrc.org/sustbiz/what-are-smes.html> [Accessed 6 April 2018].
- The Banking Association South Africa, *SME Enterprise, 2018.* [Online] Available at: <http://www.banking.org.za/what-we-do/sme/sme-enterprise> [Accessed 23 February 2018].
- Wyllis, R. E. , Teaching Descriptive and Inferential Statistics in Library School. *Journal of Education for Librarianship*, Volume 19, pp. 3-20, 1978.

- Bank, T. W., *The World Bank. (2017). Solid Waste Management, 2017. Available from: <http://www.worldbank.org/en/topic/urbandevelopment/brief/solid-waste-management>. [Accessed 23 February 2018]. [Online] Available at: <http://www.worldbank.org/en/topic/urbandevelopment/brief/solid-waste-management>. [Accessed 23 02 2018].*
- Bank, T. W., 2019. *Understanding Poverty*. [Online] Available at: <http://www.worldbank.org/en/topic/urbandevelopment/brief/solid-waste-management> [Accessed 22 August 2019].
- Browne, M. Cullinane, S. McKinnon, A. Whiteing, *Green Logistics: Improving the environmental sustainability of logistics*. India: Kogan Page, 2015.
- Check, J., & Schutt, R. K. , *Research methods in education*. Thousand Oaks, CA: SAGE, 2012.
- Chetty, V. e. a., *Informal Small Medium and Micro Enterprises (SMME) Retailers in South Africa.*, Johnsnesburg: Henley Business School, 2014.
- Collis, J & Hussey, R , *Business Research: A Practical Guide for Undergraduate & Postgraduate Students*. UK: Palgrave Macmillan, 2009.
- Creswell, J., *Research design: Qualitative, quantitative, and mixed methods approaches*. United States of America: Sage, 2014.
- Deng, Y. & H. L., *Research on Strategies of Developing Green Logistics*. s.l., s.n, 2011.
- Dudovskiy, J. , *Positivism Research Philosophy. Research Methodology, 2017*. [Online] Available at: <https://research-mehtodology.net/research-philosophy/positivism/> [Accessed 28 March 2018].
- Fichtinger, J. e. a., Environmental impact of warehousing: a scenario analysis for the United States.. *International Journal of Production Research.*, 21(55), pp. 6485-6499, 2017.
- Gesce, G., *Logistics practice of small and medium-sized enterprise. Institute of Business Economics.*, s.l.: Department of Logistics and Supply Chain Management, 2012.
- Jansen van Rensburg, *A framework in Green Logistics for companies in South Africa. Master's dissertation.*, Johannesburg: University og South Africa, 2015.
- Jupp, V., *The Sage dictionary of social research methods.* s.l.:Sage, 2006.
- Kakkur, R., *Important India, 2015*. [Online] Available at: <https://www.importantindia.com//11701/essay-on-global-warming/> [Accessed 22 February 2019].
- Kothari, C. R., *Research Methodology: Methods and Techniques*. Second Edition. New Delhi: New Age International Publishers, 2004.
- Laerd statistics, *Descriptive and Inferential Statistics, 2013*. [Online] Available at: <https://statistics.laerd.com/statistical-guides/descriptive-inferential-statistics.php> [Accessed 28 March 2018].
- Lee, J, Kim, Y, & Kim, Y. ,Antecedents of Adopting Corporate Environmental Responsibility and Green Practices. *Journal of Business Ethics*, 148(2), pp. 397-409, 2018.
- Li, L. & Y. L., *Development Path of Green Logistics Under Environmental Maintenance.* .. s.l., s.n, 2011.
- Mafini, C. a. M., The impact of green supply chain management in small to medium enterprises: Cross-sectional evidence. *Journal of Transport and Supply Chain Management*, 11(1), pp. 1-11, 2017.
- Malá, D., Sedliacikova, M., Dušak, M., Kaščáková, A., Musová, Z. and Klementová, J., Green logistics in the context of sustainable development in small and medium enterprises. *Malá, D., Sedliacikova, M., Dušak, M., Kaščáková, A., Musová, Z. and Klementová, J.*, , Volume 1, p. 68, 2017.
- Marchant, C. and Baker, P., Reducing the environmental impact of warehousing. *Green logistics: Improving the environmental sustainability of logistics*, pp. 167-192, 2010.
- Meyer, D., *Green Supply Chains Need Innovative Sustainable Packaging, 2019*. [Online] Available at: <http://greeneconomypost.com/green-supply-chains-innovative-sustainable-packaging-18068> [Accessed 16 March 2019].
- Mitra, S. & D. P., Adoption of green supply chain management practices and their impact on performance: An exploratory study of Indian manufacturing firms. *International Journal of Production Research*, 52(7), p. 2085–2107, 2014.
- OUC (Orlando Utilities Commission), *Managing energy costs in warehouses in, 2018*. [Online] Available at: <https://ouc.bizenergyadvisor.com/> [Accessed 16 March 2018].
- Packaging waste statistics, *Development of all packaging waste generated, recovered and recycled, EU, 2007-2016, 2017*. [Online]

- Available at: http://ec.europa.eu/eurostat/statistics-explained/index.php/Packaging_waste_statistics
[Accessed 16 March 2018].
- Piralal S.K., e. a., Piralal S.K., Nair S.R., Yahya N. An Integrated Model of the Likelihood and Extent of Adoption of Green Practices in Small and Medium Sized Logistics Firms.. *American Journal of Economics*, 5(2), pp. 251-258, 2015 .
- Rodrigue, J., *The Environmental Impacts of Transportation. The Geography of Transport Systems*, New York: .: Routledge, 2017.
- Sandén Gustafsson, H., & Göransson, H., *Green logistics in South Africa: A study of the managerial perceptions in the road transport industry in South Africa*, s.l.: Umeå School of Business and Economics.
- Saroha, R., Green Logistics & its Significance in Modern Systems. *International Review of Applied Engineering Research*, 4(1), pp. 89-92, 2014.
- Saunders, M., Lewis, P. and Thornhill, A., *Research methods for business students*. s.l.:Essex. Financial Times/Prentice Hall., 2009.
- Shang, K. L. C. & L. S., A taxonomy of green supply chain management capability among electronics-related manufacturing firms in Taiwan. *Journal of Environmental Management*, 91(5), pp. 1218-1226, 2010.
- Singh, L.P. Singh, S & Bhardwaj, A. , Role of Logistics and Transportation in green supply chain management: An exploratory study of Courier service industry in India. *International Journal of Advanced Engineering Technology*, 2(1), pp. 260-269, 2011.
- Sloan, K. K. B. & R. C., Towards sustainability: Examining the drivers and change process within SMEs. *Journal of Management and Sustainability*, 3(2), pp. 19-30, 2013.
- StatsSA, *StatsSA Quarterly Labour Force Survey - Quarter 4: 2017, 2017*. [Online]
Available at: <http://www.statssa.gov.za/publications/P0211/P02114thQuarter2017.pdf>
[Accessed 08 03 2018].
- Van den Berg, U. L. J. a. V. d. B. H., The effects of greening the supplier and innovation on environmental performance and competitive advantage.. *Journal of Transport and Supply Chain Management*, 7(1), pp. 1-7, 2013.
- Winston, K., *SMEs and green supply chain management, 2012*. [Online]
Available at: <http://ezinearticles.com/?SMEs-and-Green-Supply-Chain-Management&id=7050083>
[Accessed 23 February 2018].

Biographies

Bheqezi N., she enrolled as Honours degree student at the University of Johannesburg, the Department of Transport and Supply Chain Management. PO Box 524 Auckland Park, 2006 (phone: +2778197165; e-mail: 215045041@student.uj.ac.za)

Makushu H. She enrolled as an Honours degree student at the University of Johannesburg, the Department of Transport and Supply Chain Management. PO Box 524 Auckland Park, 2006 (e-mail: 201104564@student.uj.ac.za).

Legabi L., she is was enrolled as Honours degree student at the University of Johannesburg, the Department of Transport and Supply Chain Management. PO Box 524 Auckland Park, 2006 (e-mail: 201596678@student.uj.ac.za).

Baloyi G. she is enrolled as Honours degree student at the University of Johannesburg, the Department of Transport and Supply Chain Management. PO Box 524 Auckland Park, 2006 (e-mail: 201595217@student.uj.ac.za).

Thaba SC. She is currently a lecturer at the University of Johannesburg, the Department of Transport and Supply Chain Management. PO Box 524 Auckland Park, 2006 (e-mail: scthaba@uj.ac.za).