

CAMPUS-CITY LOGISTICS AND CLIMATE CHANGE: A ROAD MAP TOWARDS FUTURE SUSTAINABILITY

Dr. Usman Abbas

Department of Procurement and Supply Chain Management

Faculty of Management Sciences

College of Communication, Management and Social Sciences

Kaduna State University, Kaduna-Nigeria

+2348036061670; usmanabbas1991@kasu.edu.ng

Dr. Haruna Dadda'u

Department of Accounting

Kaduna State University, Kaduna

+234 803 700 6042

ABSTRACT

This study evaluates the influence of campus city logistics on climate change in Kaduna State University. The study adopts constructivism paradigm and qualitative approach. Its population was 55,640 staff members and students in all the four Kaduna Campuses and 381 were selected as sample by adopting Krejcie and Morgan (1970) sampling table. Unstructured questionnaires were distributed. Thematic analysis was explored for analysis. The study found that, campus city logistics contribute to curbing the degree of climate change triggered by carbon emission from students' and staffs' means of transportation through the establishment of shuttle service that runs across the campuses and some designated routes. It was recommended that, the management should ensure that the cost of tickets for the shuttling service is affordable to stakeholders to promote patronage. The model will create job opportunities, generate income to the Institute, improve air quality and protect the general environment from other externalities.

Keywords: Campus-City, Logistics, and Sustainability

1. Introduction

Sustainability is a wider and all-purpose matter that ought to be better embedded into the economy, culture, politics, society, and overarching structure of the university campuses (Finlay & Massey, 2012). Sustainable city shuttling is important not only for fiscal development but also for the ecological safety, thus all logistics operations within metropolises should be systematized in a way to be ecologically Conducive (Jagienka & Agnieszka, 2020). The world has in recent decades experienced the consequences of several instances of climate changes such as global warming caused by Greenhouse Gases (GHGs) emissions from Logistics activities of firms, individuals, and various Institutions. Universities and other higher institutions of learning globally attract quite a number of students and staff and majority of them have a means of transportation in form of cars and motorcycles. The use of these means contributes to so many environmental externalities and climate change. However, this may be curtailed through the establishment of campus city logistics which would reduce the number of cars and motorcycles shuttling within and outside the campuses.

Even though, city logistics is substantial in advancing an economy and delivering nationals' wants, it has a significant impact on livability in towns; thereby safeguarding the environment is vital. It is consequently worth noting that, stakeholder collaboration and policy frameworks are crucial issues in executing city transport measures (Akosua *et al*, 2021). Sustainability is the critical issue of our time, to pursue economic growth in a system that diminishes environmental effect while advancing social desires (William, 2015).

The subject of sustainable growth has been the emphasis of universal hot argument and work. The Sustainable Development Goals (SDGs) projected by the United Nations (UNs) at this phase cannot be accomplished without the establishment of the worldwide green campus (Zhu *et al*, 2020). Few studies were conducted on the effect of city transport on sustainability such as Finlay and Massey (2012); Jagienka and Agnieszka (2020); Akosua *et al* (2021); and William (2015) but to

the knowledge of the researchers none of this study's nature has been conducted in Nigeria and particularly in Kaduna state. Also, researchers of sustainability issues tend to neglect the cumulative negative effect of shuttling logistics activities in higher Institutions of learning to the environment and how this could be resolved to have a sustainable healthy atmosphere.

This study therefore evaluates the influence of campus city logistics on climate change in Kaduna State University and its environs and the contribution of the shuttle service towards achieving social and environmental sustainability. The major question to ask is how does campus city logistics influence climate change in Kaduna State University and its environs?

The study will be of significant benefit to the Management of the Universities as they will understand the benefit of establishing city public transport system shuttling between campus. It may serve as source of revenue to them, source of job creation and way of greening the environment. Regulatory Agencies may use the outcome of the study to formulate policies aim at mandating organizations to deploy public transport systems aim at making the environment more sustainable. Researchers may use the outcome of this research to conduct further studies and get an insight on the subject matter. Also, students may be aware of the efforts been made by the management and unionist to ease their hardships and in promoting environmental sustainability. Government, and Promoters of SDGs will also tremendously benefit from the outcome of the study. It will also contribute to providing a model that assist in achieving SDGs by 2030. Furthermore, the study will enrich existing body of knowledge on the subject matter and validates the stakeholder theory.

2. Theoretical Background and Review of Literature

This study was anchored with stakeholder theory. The theory is based on the assumption that, organizations function in an environment of many parties, each of which contribute to consistency of the organization and the capability of the

organization to create value for any stakeholder cluster. It obvious that, in this study both the management, staff, and student unions collaborate to create value for the University community. Therefore, different stakeholders come together to create value in form of campus-city logistics which reduce transportation cost to the students and staff and also enhance productivity.

Empirically, McKinnon and Edwards (2010) identify opportunities for improving vehicle utilization. Empirical analysis of vehicle utilization data was adopted. It was found that, improved vehicle utilization reduces emissions and operational costs. The study recommends that, policies should be implemented to enhance vehicle utilization in urban logistics. On the other hand, Quak and de Koster (2009) analyze the impact of urban policy restrictions on goods delivery. Case study analysis of policy impacts was adopted in the methodology. Finding indicates that, urban policy restrictions can both hinder and promote sustainable logistics. Designing urban policies that balance regulatory control with logistical efficiency was recommended. Moreover, Rajesh and Ravi (2015) identify enablers of supply chain sustainability. Case study and modeling approach were adopted. Finding portrays that, strategic alignment and stakeholder collaboration are key enablers. Focus on strategic alignment and stakeholder collaboration to enhance supply chain sustainability was recommended.

Loo and Chow (2011) explore sustainable logistics solutions for urban campuses. Case study analysis of urban logistics systems in three different cities was used. The study found that, effective coordination between campus logistics and city planning reduces environmental impacts. It was recommended that, the cities should implement integrated logistics systems with real-time data sharing to enhance sustainability. In another study, Arvidsson and Pazirandeh (2017) assess the potential impacts of city logistics solutions on urban sustainability. Simulation models to predict outcomes of different logistical strategies were used. It was found that, collaborative logistics models show a high potential for reducing emissions and improving efficiency. The study recommendation was to encourage

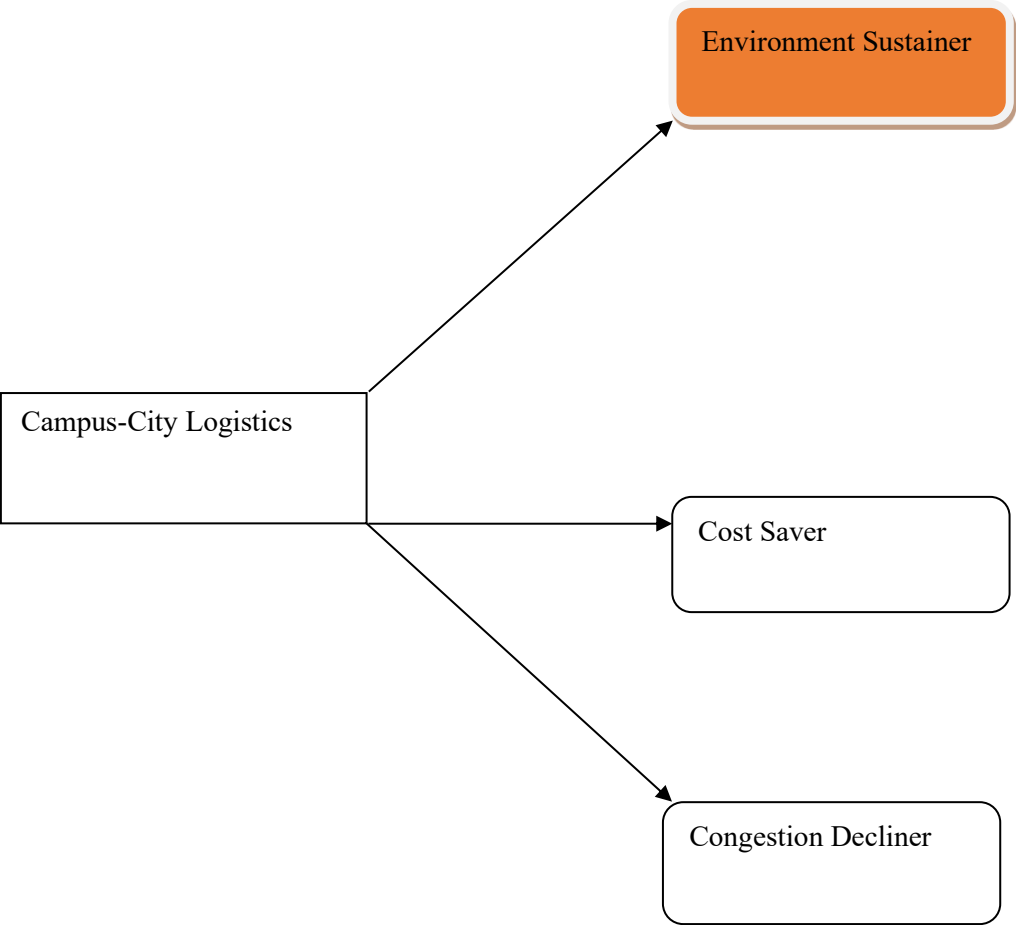
public-private partnerships to facilitate sustainable logistics solutions. Browne *et al.*, (2007) compare different freight transport strategies for urban areas. Comparative analysis of freight transport measures in various cities was adopted. It was discovered that, consolidation of freight deliveries significantly reduces urban congestion and emissions. It was recommended that stakeholders involve should promote freight consolidation centers near urban campuses. Bulkeley and Betsill (2005) analyze the role of multilevel governance in urban climate policy. Case study of urban climate initiatives across different governance levels was adopted. It was discovered that, effective governance requires collaboration between local, regional, and national levels. The recommendation was to strengthen multilevel governance frameworks to address climate change effectively.

Cohen and Munoz (2016) develop a framework for sustainable consumption and production in urban areas. Literature review and framework development was adopted in the methodology. Sharing economy models contribute significantly to urban sustainability. Policies that support sharing economy initiatives should be implemented. Földvári and Földvári (2016) review strategies and technologies for urban logistics. Literature review and technology assessment were adopted in the methodology. Advanced technologies like electric vehicles and drones can enhance urban logistics. There should be investment in emerging technologies to improve logistical efficiency and sustainability. Givoni and Banister (2010) explore the implementation of integrated transport policies. Policy analysis and case studies were adopted as methodology. It was found that, integrated transport policies improve urban mobility and reduce environmental impacts. Stakeholders are to develop and enforce integrated transport policies that prioritize sustainability. González-Feliu and Routhier (2012) model urban goods movement with limited data. The methodology developed a simplified urban goods movement model. It was found that, simplified models can still provide valuable insights for urban

logistics planning. It was recommended that stakeholders concern should utilize simplified models to inform logistics decisions in data-scarce environments.

Hesse and Rodrigue (2004) analyze the geographical dimensions of logistics and freight distribution. Geographical analysis of logistics networks was adopted in the methodology. The study found that, spatial organization of logistics networks significantly impacts urban sustainability. It was recommended to optimize the spatial organization of logistics networks to reduce environmental impacts. Holguín-Veras and Jaller (2012) evaluate freight demand management strategies. Case studies and demand management modelling were adopted. Finding shows that, freight demand management can effectively reduce congestion and emissions. Recommendation signal stakeholders concern to implement comprehensive freight demand management programs in urban areas. Le Pira *et al.* (2017) model stakeholders' preferences in transport planning. The methodology adopts participatory decision-making models. It was found that, including stakeholders in decision-making improves the acceptance of sustainable transport policies. It was recommended that, participatory models should be used to enhance stakeholder engagement in transport planning. Lindholm and Behrends (2012) identify challenges in urban freight transport planning. Literature review and regional analysis were adopted as methodology. The study found that, coordination between different stakeholders is a major challenge. Developing frameworks to improve stakeholder coordination in urban freight transport was recommended. Macharis and Melo (2011) explore various perspectives on urban freight transport. Multidisciplinary review of urban freight transport was adopted. Finding indicates that, integrating multiple perspectives leads to more sustainable logistics solutions. Fostering interdisciplinary collaboration in urban freight transport planning was recommended.

Figure I: Conceptual Framework



The figure I above is a conceptual framework depicting the linkage between campus-city logistics and climate change in Nigeria. It obvious that, campus-city logistics may lead to a sustainable atmosphere, saving cost from the use of non-renewable energy and help in reducing congestion by reducing the amount of vehicles and motorcycles shuttling among campuses.

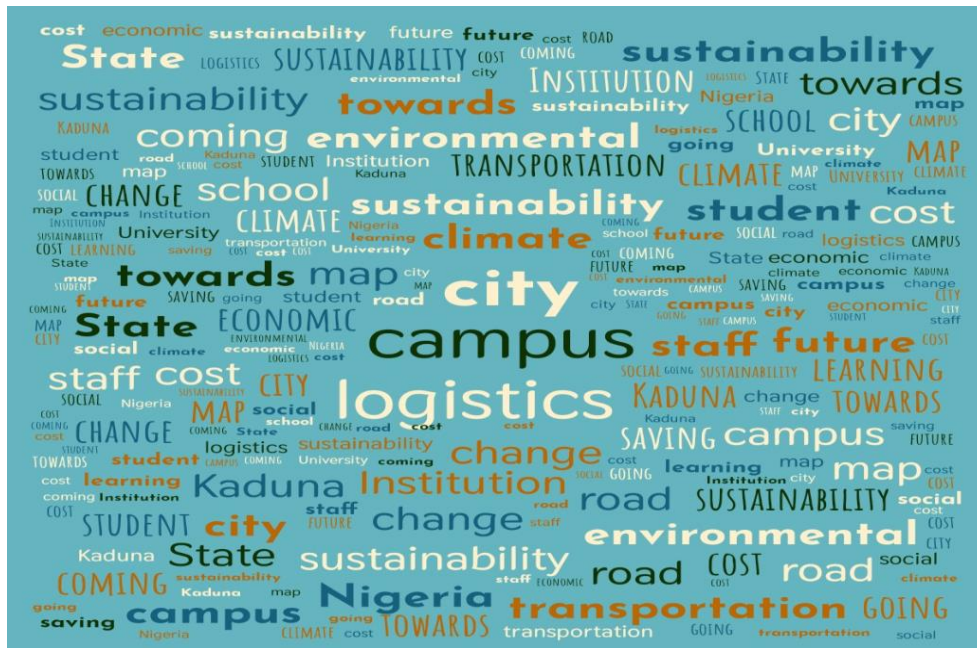
3. Methodology

The study adopts constructivism paradigm and qualitative approach because data and information can be obtained directly from the source. The population of the study is 55,640 (Fifty-Five Thousand, six Hundred and Forty) staff members and students at Kaduna State University in all the four Kaduna Campuses. 381 (Three hundred and eighty-one) were selected as sample by adopting Krejcie and Morgan

(1970) sampling table. The research utilizes primary data source where unstructured questionnaires were distributed to the respondents. Thematic analysis was explored in analysing the responses obtained from the respondents, this is because it gives room for the discussion of the responses in themes.

4. Analysis and Interpretation of Findings

Figure II: Word Cloud



From figure II above, the word cloud shows the frequency at which words appeared in the responses obtained from respondents. It was clear that, words that appear bigger in the cloud were used in highest number to answer the research questions raised. Responses from respondents to a greater extent give direction and help in answering questions raised in a study. It was therefore, evident that words such as campus, logistics, cost environmental, transportation, learning, economic, city, and sustainability played a crucial role in answering the research questions.

Campus-City Logistics as Environment Sustainer

The major objective this study was to evaluate the influence of campus city logistics on climate change in Kaduna State University and its environs. The

objective was geared towards promoting environmental protection and social needs/inclusion. Based on the analysis carried out from the outcome of data obtained, the study found that, campus city logistics contribute to curbing the degree of climate change triggered by carbon emission from students' and staffs' means of transportation through the establishment of shuttle service that runs across the campuses and some designated routes.

The introduction of campus-city logistics in the Kaduna State University was found to greatly contribute in reducing greenhouse gasses emission as the number of vehicles and motorcycles roaming about within the environment has greatly reduced.

Campus-City Logistics as Cost Saver

Campus-city logistics was found to contribute in saving cost to both staff and students as tickets are sold at affordable rates. By affordable price, the university community subscribe so much to the service. It is clear that, when individuals use their private vehicles and motorcycles for transportation it cost them a lot to fuel and maintain the machines. However, by moving bus from one campus to the other, about 50 cars and 20 motorcycles on average have been taking off the road and this save cost to a greater extent.

Campus-City Logistics as Congestion Decliner

Campus-city logistics was found to contribute positively in declining congestion in the University's campuses and their environs. This because the number of transportations means that are private has reduced due to the deployment of the public transport service. When individuals transport themselves in private vehicles and motorcycles that leads high level of congestion. The deployment of public transportation service system to a greater extent help in decongesting the roads and public spaces. Therefore, campus-city logistics was found to serve as congestion decliner in Nigerian Universities especially Kaduna State University.

5. Discussion of the Findings

One of the greatest problems globally is being experienced by nations is the issue of greenhouse gasses emission which all stakeholders need to come together to cut down. Private vehicles and motorcycles contribute significantly to these emissions. Based on the finding of this study, campus-city logistics indicate a significant improvement in curtailing the emissions and thereby promoting a favourable climate. This is in line with reality and the stakeholder theory, that, when different stakeholders come together, they create value that is beneficial to all. This finding is in line with the study of Bulkeley and Betsill (2005).

Therefore, the deployment of public transport in KASU has helped in saving cost and reducing congestions. If other institutions can adopt similar strategy greenhouse gas emission could be reduced drastically. In reality, as smaller number of emissions accumulate, they will make the environment more hazardous and this could have health implications. The outcome is in agreement with the finding of Loo and Chow (2011).

It is therefore, of significant importance for individuals, supply chains and organizational to understand that, with small amount of movement to curtail these emissions, we can make world great again.

6. Generalization from the Study/Conclusions and Implications

The Kaduna State University has stepped up measures to ensure sustainability is always at the forefront of its operations. To promote environmental protection, the University came up with a shuttling service that operates across different routes within the city of Kaduna state. The Institution procured modern long buses that accommodate sizable number of students and staff at a time. The service significantly reduces the number of vehicles and motorcycles moving within and outside the campuses of the University, it reduces traffic congestion, lessens carbon emissions, vibrations, accidents, and decreases the amount of expenditure by students and staff on fuel and external commercial transport. Therefore, these has

really helped in answering the research question earlier raised at the introductory part of this paper.

The movement of vehicles and motorcycles that burn non-renewable energies contribute to climate change in an environment. This has a negative effect on the health of the Inhabitants of the environment. Establishing systematic methods that explore strategies which could assist in curbing the change in climate is very crucial. Therefore, this study concluded that, establishing a campus city shuttling service reduces climate change to large extent by reducing carbon emissions.

Based on the finding and conclusion of this study, it was recommended that, the management of the University should formulate policies that will discourage or prevent staff and students from using private vehicles and motorcycle to/in the campuses. Also, the management should ensure that the cost of tickets for the shuttling service is cheap and affordable to students and staff so as to encourage use of the transport service within the environments. The model will create job opportunities, generate income to the Institute, improve air quality and protect the general environment from other externalities. This paper will contribute to existing body of knowledge by enriching literature on sustainability and help in validating stakeholder theory. Also, other Institutions, organizations and parties interested may adopt this kind of approach to ensure conducive climate change is in place. Similar studies such as the ones conducted by Finlay and Massey (2012) and Jagienka and Agnieszka (2020) advocated for environmental sustainability through friendly logistics arrangement.

References

Akosua, A. S., Yang, X. Y., Clement, M., Zalia, A. H., & Fathia, B. V. (2021). City logistics measures and environmental sustainability: an evidence from Ghana. *American Journal of Industrial and Business Management*, 11, 582-597. <https://doi.org/10.4236/ajibm.2021.115037>

- Arvidsson, N., & Pazirandeh, A. (2017). An ex-ante evaluation of city logistics solutions. *Research in Transportation Economics*, 65, 13-23.
- Browne, M., Allen, J., & Atlassy, M. (2007). Comparing freight transport strategies and measures. *Transport Reviews*, 27(4), 551-572.
- Bulkeley, H., & Betsill, M. (2005). Rethinking sustainable cities: multilevel governance and the 'urban' politics of climate change. *Environmental Politics*, 14(1), 42-63.
- Cohen, S., & Munoz, P. (2016). Sharing cities and sustainable consumption and production: towards an integrated framework. *Journal of Cleaner Production*, 134, 87-97.
- Finlay, J., & Massey, J. (2012). Eco-campus: applying the ecocity model to develop green university and college campuses. *International Journal of Sustainability in Higher Education*, 13(2), 150-165.
<http://doi.org/10.1108/14676371211211836>
- Földvári, P., & Földvári, Z. (2016). Urban logistics strategies and technologies. *Procedia Engineering*, 161, 254-260.
- Givoni, M., & Banister, D. (2010). Integrated transport: from policy to practice. *Routledge*.
- González-Feliu, J., & Routhier, J. L. (2012). Modeling urban goods movement: how to be oriented with less data? *Procedia - Social and Behavioral Sciences*, 39, 29-42.
- Hesse, M., & Rodrigue, J. P. (2004). The transport geography of logistics and freight distribution. *Journal of Transport Geography*, 12(3), 171-184.
- Holguín-Veras, J., & Jaller, M. (2012). Comprehensive freight demand management. *Transportation Research Record*, 2288(1), 1-9.

- Jagienka, R., & Agnieszka, S. (2020). Environmental sustainability in city logistics measures. *Energies*, 13, 1-29; <https://dx.doi.org/10.3390/en13061303>
- Krejcie, R.V., & Morgan, D.W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*.
- Le Pira, M., Inturri, G., Ignaccolo, M., & Pluchino, A. (2017). Modelling stakeholders' preferences for participatory decision making in transport planning. *Transportation Research Part F: Traffic Psychology and Behaviour*, 49, 82-96.
- Lindholm, M., & Behrends, S. (2012). Challenges in urban freight transport planning – a review in the baltic sea region. *Journal of Transport Geography*, 22, 129-136.
- Loo, B. P. Y., & Chow, A. S. Y. (2011). Sustainable urban logistics: concepts, methods and information systems. *Journal of Transport Geography*, 19(6), 1285-1295.
- Macharis, C., & Melo, S. (2011). *City distribution and urban freight transport: multiple perspectives*. Edward Elgar Publishing.
- McKinnon, A. C., & Edwards, J. B. (2010). Opportunities for improving vehicle utilization. *International Journal of Physical Distribution & Logistics Management*, 40(3), 192-207.
- Quak, H., & de Koster, R. (2009). Delivering goods in urban areas: how to deal with urban policy restrictions and the environment. *Transportation Science*, 43(2), 211-227.
- Rajesh, R., & Ravi, V. (2015). Modeling enablers of supply chain sustainability: a case study. *Renewable and Sustainable Energy Reviews*, 52, 759-770.
- William, P. N. (2015). Transport infrastructure and sustainability: a new planning and assessment framework. *Smart and Sustainable Built Environment*, 4(2), 140-153. <http://dx.doi.org/10.1108/SASBE-05-2015-0009>

Zhu, B., Zhu, C., & Dewancker, B. (2020). A study of development mode in green campus to realize the sustainable development goals. *International Journal of Sustainability in Higher Education*, 21(4), 799-818.
<https://doi.org/10.1108/IJSHE-01-2020-0021>