

CONCEPTUAL FRAMEWORK IN GREEN SUPPLY CHAIN MANAGEMENT IMPLEMENTATION TOWARDS ENVIRONMENTAL SUSTAINABILITY IN AFRICAN NATIONS

Okam Enyinna [BEng, MSc.]

*PhD, Production and Manufacturing Engineering
Kingston University London, UK.*

ABSTRACT

Environmental pollution as a result of greenhouse gas emissions is becoming a major problem within developing nations experiencing significant growth in their industrial activities. This increase in industrial activities is deemed to be in correlation with economic growth as seen in countries like China and India.

Economic and industrial growth alongside urbanization in African nations has presented itself at a high cost of increased greenhouse gases emissions and waste generation. One could argue that stricter environmental laws would be imposed in the region due to the growing environmental issues associated with the increase in industrial activities. Therefore, it is of great importance that enterprises implement strategies towards meeting present and future environmental laws and regulations within the region. The proper implementation of contemporary operations management strategies like green supply chain management (GSCM) strategies and principles can contribute immensely towards reducing the environmental impacts associated with economic and industrial growth within African nations.

Conceptual frameworks have been developed and proposed within this paper towards the proper implementation of GSCM in African nations. There are also a number of GSCM strategies proposed in this paper that are deemed appropriate to be implemented in African nations towards environmental sustainability.

Keywords: *Green Supply Chain Management (GSCM), Green manufacturing, Green logistics, Eco design, Green procurement, Reverse logistics, Investment recovery, Environmental impacts*

INTRODUCTION

Environmental sustainability is increasingly becoming a necessity in business practises in the developing world, as a number of organisations in the developing world are starting to implement strategies towards environmental sustainability. Industrial waste and emissions caused by the increase in operational activities of enterprises in developing countries are contributors to the existing environmental problems mankind is faced with today including acid rain, climate change and various kinds of pollutions

A number of companies have expanded their presence into and within Africa including multinational Swedish retail clothing company “H&M” and Irish company “Primark”, both sourcing materials from Ethiopia (The Economist, 2014). According to Dyson, J., (2012), H&M, Primark and Tesco are sourcing textile and clothing from Ethiopia, as the country is undergoing an expansion program in the textile and clothing industry. American conglomerate General Electric is currently building a plant worth \$250m in Nigeria to develop electrical gears (G.E., 2016).

A recent prediction by the World Bank highlights the possibility of Asian manufacturing jobs migrating to Africa (The Economists, 2014). Furthermore, Obiageli Ezekwesli, the vice president of World Bank Africa, forecasted that more than 80 million jobs are likely to leave China, attributing this anticipated development to wage pressure. These predictions are likely to be feasible as long as African labour productivity continues to increase and there is a significant reduction in excessive bureaucracy (red tape) as well as corruption, amongst other factors.

It would come as no surprise if stricter environmental laws are imposed in African nations to help tackle the increasing environmental issues the region is faced with today as well as the anticipated environmental impacts that can be attributed to the growth experienced in the manufacturing sector in recent times. Hence, it is deemed a necessity for proper operations management strategies like GSCM to be implemented in the region.

In this paper, the author developed and proposed conceptual frameworks at both organisational and national levels towards the uptake and proper implementation of GSCM by organisations within African nations. The author also proposed a number of GSCM strategies deemed appropriate to be implemented in African nations. Strategies and frameworks developed and proposed in this paper have the prospect of contributing towards environmental sustainability in African nations.

LITERATURE REVIEW

Comparisons between GSCM in developing nations and GSCM in developed nations

These comparisons were drawn based on studies according to Arimura, T.H., Darnall N., Katayama, H., (2011), Chiou, T.Y., Chan, H.K., Lettice, F., & Chung, S.H., (2011), Liu, X., Yang, J., Qu, S., Wang, L., Shishime, T., & Bao, C., (2011), Eltayeb, T. K. and Zailani, S.H.M., (2011), Li, Y., (2011), Zhu, Q., Qu, Y., Geng, Y., and Fujita T., (2015), Nawrocka, D., Brorson, T., & Lindqvist, T., (2009), Mbaabu, D.K. (2016), Ojo, (2014), Large, R.O. and Thomsen, C.G., (2011), Seman, N. A. A., Zakuan, N, Jusoh, A., Arif, M. S. M. D., (2012).

	Developing Nations	Developed Nations
Success/Performance	<p>Though progress has been made over the years in the implementation of GSCM in certain developing nations like China, however it has not significantly influenced performance in the region.</p> <p>CHINA</p>	<p>The level of green supplier assessment and green partnership has had a direct impact on environmental performance.</p> <p>Germany</p>
Awareness	<p>There is lack of public awareness and lack of knowledge about environmental impacts.</p> <p>Nigeria</p>	<p>It can be argued that there is an ample level of awareness of domestic and international environmental regulations/policies as well knowledge on the importance and benefits of green practices in manufacturing</p>
Adoption	<p>Despite the increasing awareness of GSCM in China, there has not been the expected effects towards the adoption of its practices</p> <p>China</p> <p>Construction companies in South Africa are still behind in the adoption of Green Supply Chain Management</p> <p>South Africa</p>	<p>One can argue that the high level of awareness in developed nations have contributed immensely towards the adoption of GSCM practices</p>
Implementation	<p>Proper implementation of green practices is lagging in developing nations and this has led to poor environmental performance.</p>	<p>Nations in the developed world are adequately implementing GSCM and are reaping the benefits in terms of environmental and financial performances.</p> <p>UK, Germany, Japan etc.</p>
Collaborations and Relationships	<p>Proper collaborations and relationships with suppliers are lagging.</p> <p>Nigeria</p>	<p>ISO 14001 has had a positive influence in the environmental activities that exist between customers and suppliers. Also, there have been benefits with respect to facilitating environmental works achieved as a result of the closer relationships with suppliers.</p> <p>Sweden</p> <p>The level of green supplier assessment and green partnership has had a direct impact on environmental performance.</p> <p>Germany</p>

Governmental Influence	There is improper or lack of legal enforcement by government. This poses a barrier in GSCM implementation. Nigeria	Programs put in place by the government towards encouraging EMS adoption has indirectly influenced the implementation of GSCM by ISO 14001 adopters. Japan
Commitment	The lack of commitment by top management has proven to be a major barrier to GSCM implementation Nigeria	The ability of organisations to adhere to environmental regulations can be influenced by supplier commitment and customer environmental requirement. Italy

Author's Proposed GSCM strategies towards environmental sustainability in Africa

In recent times there has been an emerging boom in the manufacturing sector in Africa (The Economists, 2014). With this development in mind, the author's proposed strategies are towards the manufacturing sector. However, some or if not all of the proposed strategies in some capacity can be applicable across other sectors within the region.

The author proposes the following GSCM practices to be implemented in African nations including green procurement, green manufacturing, green logistics, reverse logistics, eco design and investment recovery. The proposed strategies are based on materials by;

- ❖ Sanyé-Mengual, E., Pérez-López, P., González-García, S., et al. (2014)
- ❖ Kumar, R. and Chandraker, R., (2012)
- ❖ Saroha, R., (2014).
- ❖ Menezes, J., Reis, E., Valle, P. and Rebelo, E., (2009).
- ❖ Ninlawan C., Seksan P., Tossapol K., and Pilada W., (2010).
- ❖ Bhattacharya, A., Jian, R., and Choudhary, A., (2011).

Green Procurement

This is an environmental based purchase that involves activities that contribute towards reducing environmental impacts whilst meeting needs for materials, goods, utilities and services. Green procurement is the answer to enterprises that are environmentally concerned and also economically conservative. Green procurement can also be a driver for innovation, providing enterprises with incentives for developing green products. Green procurement can help enhance an organization's corporate image in the marketplace and create markets for new products and services.

Green Manufacturing

This involves an industrial operational transformation in a number of ways including;

- ❖ Implementation of green energy
- ❖ Developing and selling green products
- ❖ Implementing green processes in the operations of organizations

There are three important steps that can be put in place in order to ensure the proper implementation of green manufacturing. These steps are planning, execution and communication. Implementing green manufacturing is an extensive journey of development and in order to be successful, ample attention needs to be paid towards all three aforementioned steps. Furthermore, excellent management, regular review and continuous communication (internal and external) are essential.

Green Logistics

The term logistics is used to describe the transportation, storage and handling of products all through raw material sourcing to manufacturing and to final point of sale from where purchase occurs for final consumer. Logistics is comprised of the following activities including;

- ❖ Transportation
- ❖ Storage
- ❖ Inventory management
- ❖ All round handling
- ❖ Related information processing

The key objective of green logistics is to reduce the environmental impacts of the aforementioned logistics activities.

Reverse Logistics

This is a process whereby products are being retrieved from the consumer for the sake of capturing value or appropriate disposal. Activities in reverse logistics include;

- ❖ Collection
- ❖ Inspection
- ❖ Selection
- ❖ Sorting
- ❖ Reprocessing
- ❖ Direct recovery
- ❖ Redistribution
- ❖ Disposal

Eco Design

This is an approach of design that puts into consideration the environmental impacts of products all throughout their lifecycle. There are a number of ways in which eco design can be implemented and they include;

- ❖ Designing products in ways that allow for less consumption of materials and energy during manufacturing processes.
- ❖ Design products to be energy effective
- ❖ Design products in ways that allow for products to be reused and recycled

- ❖ Design products in ways that less hazardous materials or procedures are required during manufacturing
- ❖ Design products to weigh less and have less volume. This design process would bring about less use of materials, less consumption of energy, less time involved in production processes, less storage spaces requirements, and ultimately cost saving.
- ❖ Design products in such a way that makes the implementation of investment recovery possible

Investment Recovery (IR)

Investment recovery helps to create revenue and also brings about significant cost savings for organizations. IR provides organisations with a structured program to pin point, reuse, sell or dispose of surplus or idle assets. It can also convert assets into revenue when idle assets are sold and also in cases where idle assets are deployed to other locations of an organization to help prevent the disposition of these idle assets to landfills and scrap yards.

Author's Remarks

Organisations can benefit a great deal from the implementation of GSCM. A strong argument can be made that organisations that implement GSCM strategies would be more prepared to manage the challenges associated with meeting present and future environment laws. It can be envisioned that on the long run, the benefits of GSCM implementation in Africa nations would transcend beyond organisational and national benefits into regional benefits.

Author's Framework at Organisational Level towards the Successful Implementation of GSCM in Organisations in Africa

The author has designed a conceptual framework at organisational level towards the successful implementation of GSCM in organisations within Africa nations. The said framework is elaborated below.

Leadership is a vital part of the proposed framework as every other component depends a great deal on leadership. The first step to be taken after a proposed green initiative has been approved by leadership is assessing current practices. At this juncture, the present practices carried out by an organization are to be assessed to determine what can be, improved, taken off or incorporated into the existing green initiative (if there is one already in place). The next step is strategic planning, which is broken down into internal and external planning. Internal planning entails planning towards increasing staff awareness and training, strategies towards greening operational processes, evaluating present as well as anticipated environmental regulations and budgeting. On the other hand, external planning includes assessing suppliers and selecting the most appropriate suppliers.

The subsequent step involves setting up an environmental committee that would be responsible for managing and overseeing every activity pertaining GSCM implementation. The committee would be the first to be contacted regarding any GSCM matter. Furthermore, the committee would also be responsible for educating and training staff on GSCM matters. Members of this committee could be representatives for their organization in conferences

where green environmental practices are shared or discussed with representatives of other organizations and bodies (governmental or otherwise).

The step following after an environmental committee has been created involves, integrating GSCM into an organisation's policies. After which, there is operational changes, which is broken down into organisations having to build solid relationships and collaborating with other external members of their supply chain as well as implementing the proposed green practices including green procurement, green manufacturing, green distribution, etc.

The final step is monitoring and measuring performance. This is a very important step, as organisations need to be able to monitor and measure progresses made as a result of the implementation of GSCM.

Figure 1 below demonstrates the author's proposed framework at organisational level towards the successful implementation of GSCM in organisations in Africa.

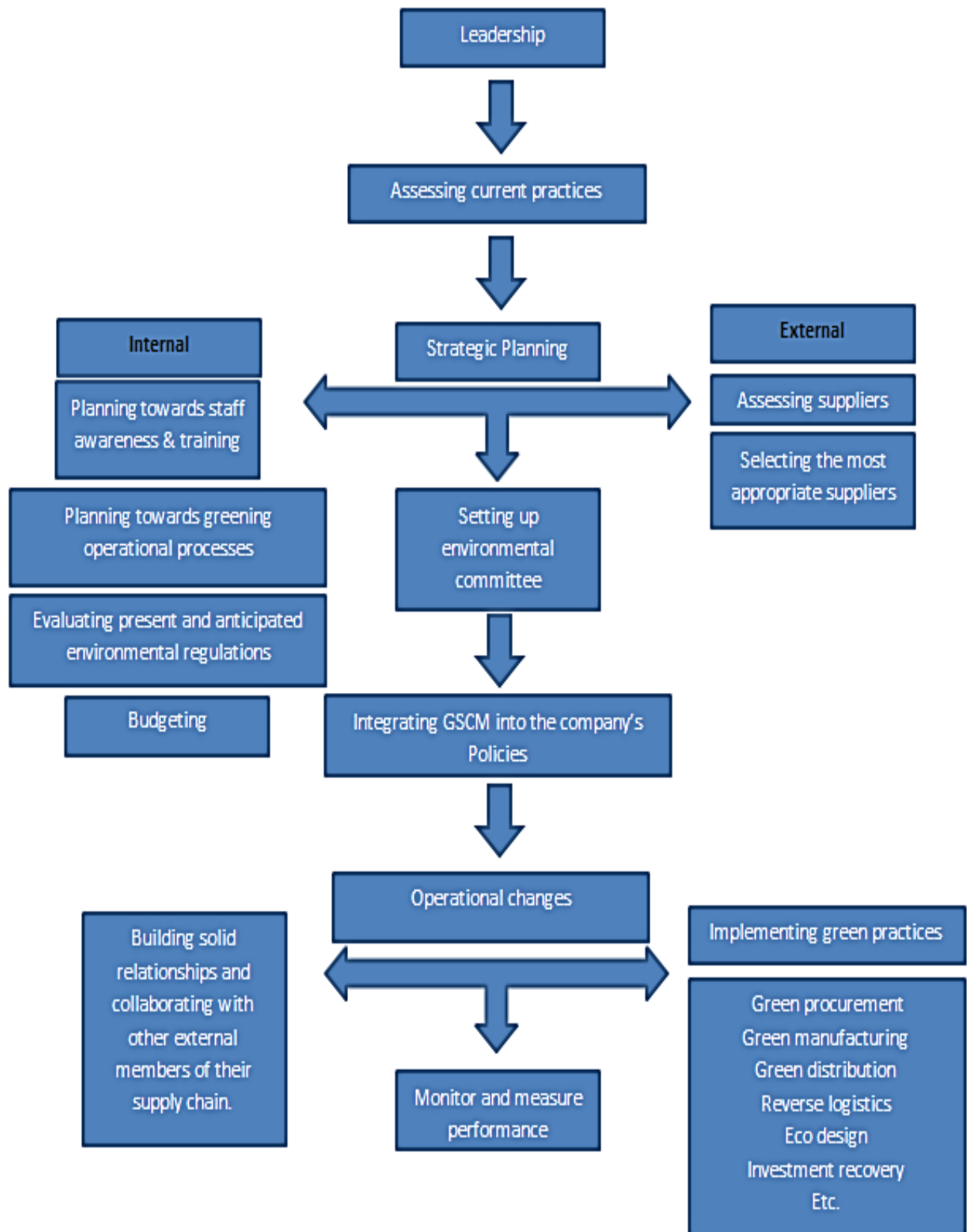


Figure 1. Framework at Organisational Level

Potential Benefits of the Proposed Strategy (Organizational level)

Besides the reduction in greenhouse gas emissions there are number of benefits that can be attained including;

- ❖ Improved staff morale
- ❖ Improved company image
- ❖ Improve brand value
- ❖ Enhanced product performance
- ❖ Improved customer preferences and satisfaction
- ❖ Improved market prospects
- ❖ Low cost towards transportation
- ❖ Low cost towards packaging
- ❖ Lower production cost
- ❖ Lower maintenance cost
- ❖ Enhanced lifecycle of products
- ❖ Reduction in environmental tax levied on organisations

Author's remarks

Companies that engage in GSCM practices can attain significant financial successes as a result of the aforementioned benefits. The collective environmental contribution of companies within Africa in the long run can potentially translate on a regional scale towards tackling the environmental issues Africa is faced with today.

Author's Framework at National Level towards the Successful Implementation of GSCM in Organisations in Africa

The author has designed a conceptual framework at national level for the successful implementation of GSCM by the federal governments of African nations towards encouraging the uptake and the proper implementation of GSCM by organisations within the region. The author's proposed framework is discussed in the following steps below.

- ❖ Set up new environmental body or improve existing one: The federal government should have set up, a new environmental body or improve existing one.
- ❖ Evaluate environmental Issues: The federal government should evaluate the environmental issues the nation is faced with as well project into the future with respect to anticipated environmental issues.
- ❖ Evaluate the activities of companies within the nation: The government should evaluate the activities that organisations carry out towards environmental sustainability or activities that are detrimental to environmental sustainability.
- ❖ Planning: This is categorized into planning towards increasing awareness, encouraging the uptake of green practices, amending existing laws as well as creating new laws towards environmental sustainability, etc.

- ❖ Execution: This involves executing the plans developed during the strategic planning phase. This step entails executing the green initiative developed during the planning phase and enacting new environmental laws. Green initiatives could be programs toward increasing the awareness of green practices and its benefits as well as programs to encourage the uptake of green practices and more.
- ❖ Put a system in place to make sure the laws are adhered to: It is mandatory that a system is put in place to ensure that organizations within the nation adheres to environmental laws enacted and to ensure that companies that fall short are penalised.
- ❖ Have a system in place to monitor and measurement performances: It is necessary that a system is put in place towards monitoring and measuring the impacts of the strategies applied by the government towards GSCM implementation as well as the impacts of the enacted environmental laws towards the adoption of GSCM. Also, performances as a result of the implementation of green practices by organisations should be monitored and measured.

Figure 2 below demonstrates the author's proposed framework at national level towards the successful implementation of GSCM in organisations in Africa.

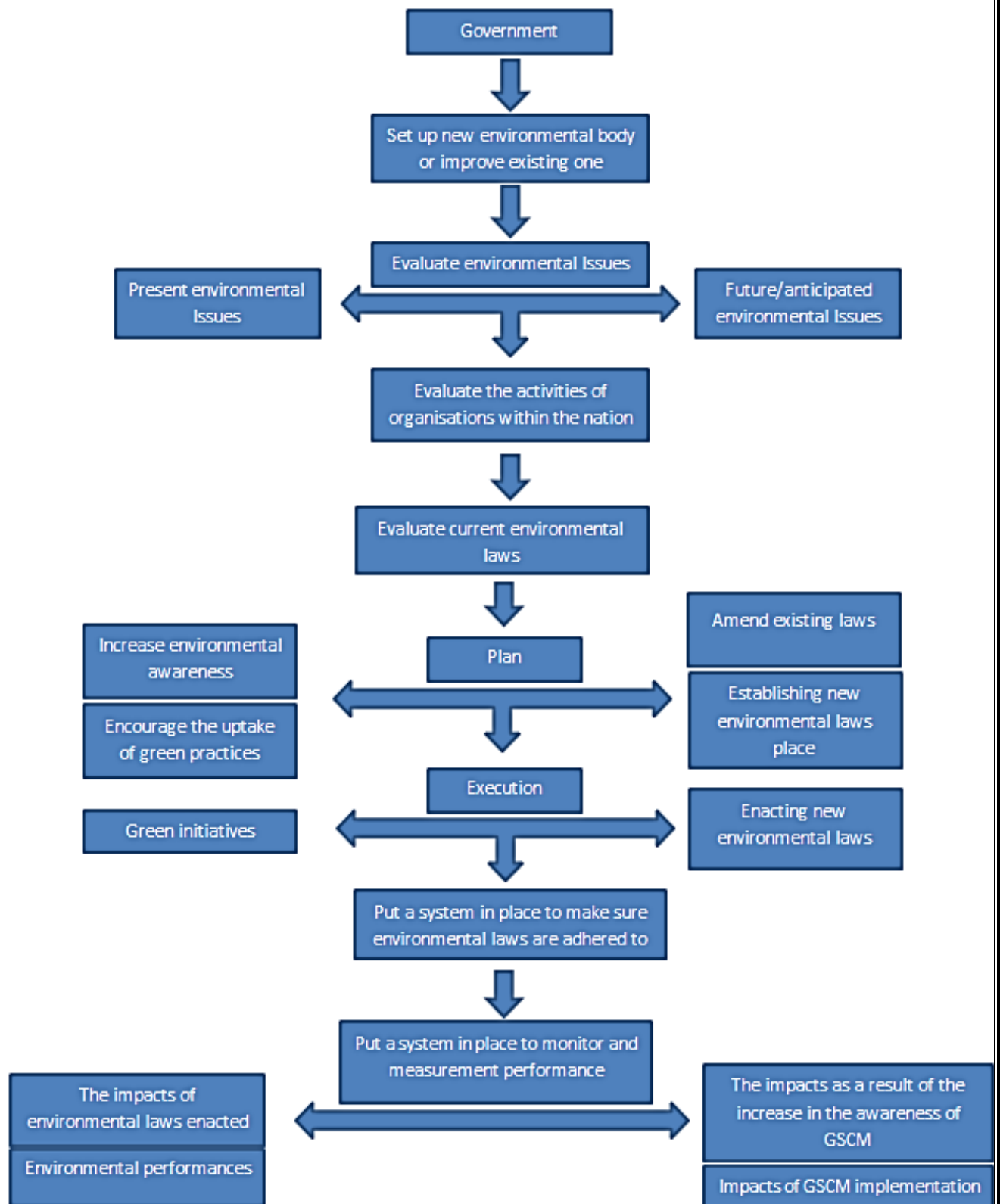


Figure 2. Framework at National Level

Potential Benefits of the Proposed Strategy (National level)

Besides improvements in environmental performances, there are other attainable benefits including;

- ❖ Reduction in cost towards categorizing, treating and disposing waste
- ❖ Creation of new markets with respect to production and exportation of green products and services
- ❖ Creation of employment
- ❖ Improved energy security
- ❖ Contributions towards economic growth

Author's remarks

A proactive approach by federal governments would play a vital role in tackling the environmental issues that nations in Africa are face with today. The national government should have a more hands on approach, collaborating closely with enterprises within the nation towards environmental sustainability. Strict but rational measures should be put in place to ensure that enterprises adhere to both domestic and international environmental laws. Also, enterprises that fail to meet these environmental requirements should be penalised. There should be a system in place to monitor and measure environmental performances. Finally, green practices, technologies and strategies should constantly be reviewed and updated

CONCLUSION

Increasing economic and industrial growth in African nations as well as urbanization has presented itself at a high cost of increased greenhouse gases emissions and waste generation in the region. It can be argued that stricter environmental laws would be introduced in African nations as a result of the increasing environmental impacts which are in correlation to the increase in industrial activities experienced in the region. Therefore, it is imperative that companies within the region have measures put in place to ensure that they meet present and future environmental laws without compromising the quality of their products, whilst remaining competitive.

The implementation of GSCM practices have proven successful in various ways in the developed world. There has been in the developed world, proper collaboration between the environmental management of enterprises and other external facets of their supply chain, the proper implementation of GSCM practices and increase in awareness (with respect to GSCM practices and its benefits), which in turn has led to an increase in the adoption of GSCM practices. In contrast to the developed world, the adoption of GSCM practices has been minimal in the developing world. Furthermore, in the developing world, there has not been the proper implementation of GSCM practices, there has not been significant improvements

attained with respect to performances and there has not been the required commitment exhibited on the part of top managements within organisations.

There are benefits to be attained at both organisational and national level from the implementation of green procurement, green manufacturing, green logistics, reverse logistics, eco design and investment recovery in Africa. These benefits includes creation of new markets, reduction in waste generation, reduction in cost of waste disposal, improvements in company image, staff morale and brand value etc.

A proactive approach by the federal governments in African nations would play a contributing role in tacking the environmental issues that the region is faced with today. There should be proper collaboration between governments and enterprises towards environmental sustainability. The government should impose Strict but rational environmental laws and a system should be put in place to ensure that enterprises abide by these laws. Companies that fail to adhere to these laws should be penalised. The federal governments of nations within the region should have a system put in place to monitor and measure performances.

POTENTIAL FUTURE WORK

There are a number of potential aspects to be explored beyond this point. They include;

- ❖ Getting organizations involved in future research
- ❖ Using primary data to further research
- ❖ Expanding and elaborating further on the frameworks proposed in this paper
- ❖ Testing frameworks
- ❖ Carrying out further investigation into GSCM implementation at national level.
- ❖ Investigating the implementation of GSCM beyond the manufacturing industry

REFERENCES

1. Arimura, T.H., Darnalln N., Katayama, H., (2011) “Is ISO 14001 a gateway to more advanced voluntary action? The case of green supply chain management”, *Journal of Environmental Economics and Management*, 61, pp 170–182.
2. Bhattacharya, A., Jian, R., and Choudhary, A., (2011). BCG: Green Manufacturing Energy, Products and Processes (Online). Available at: <http://www.cii.in/webcms/Upload/BCG-CII%20Green%20Mfg%20Report.pdf> [Accessed 27 March 2017]
3. Chiou, T.Y., Chan, H.K., Lettice, F., & Chung, S.H., (2011) “The Influence of Greening the Suppliers and Green Innovation on Environmental Performance and Competitive Advantage in Taiwan”, *Transportation Research Part E*, 47, pp 822-836.

4. Dyson, J. (2017). Ethiopia pushes on with textile and clothing expansion plan. [online] Just-style.com. Available at: https://www.just-style.com/analysis/ethiopia-pushes-on-with-textile-and-clothing-expansion-plan_id116368.aspx [Accessed 20 August. 2017].
5. Eltayeb, T. K. and Zailani, S.H.M., (2011) "Greening Supply Chain through Supply Chain Initiatives towards Environmental Sustainability" (Online). Available at: <http://esatjournals.org/Volumes/IJRET/2013V02/I11/IJRET20130211037.pdf>. (Accessed 20 Aug. 2015)
6. G.E. (2016). GE Nigeria (Online). Available at: <http://www.ge.com/africa/company/nigeria>. [Accessed October 2, 2016]
7. Kumar, R. and Chandraker, R., (2012). Overview of Green Supply Chain Management: Operation and Environmental Impact at Different Stages of the Supply Chain. International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-1, Issue-3, February 2012
8. Liu, X., Yang, J., Qu, S., Wang, L., Shishime, T., & Bao, C., (2011) "Sustainable Production: Practices and Determinant Factors of Green Supply Chain Management of Chinese Companies", Business Strategy and the Environment.
9. Li, Y., (2011) "Research on the Performance Measurement of Green Supply Chain Management in China", Journal of Sustainable Development, Vol. 4, No. 3, pp 101-107.
10. Large, R.O. and Thomsen, C.G., (2011) "Drivers of Green Supply Chain Management Performance: Evidence from Germany", *Journal of Purchasing and Supply Management* Vol.17, pp 176-184
11. Menezes, J., Reis, E., Valle, P. and Rebelo, E., (2009). Reverse logistics for recycling: The customer service determinants. Int. Journal of Business Science and Applied Management, Volume 4, Issue 1, 2009
12. Mbaabu, D.K. (2016). A concept paper on Green Supply Chain Management practices in Kenya. DBA Africa Management Review June Vol 6 No.3, 2016 pp 74-84
13. Nawrocka, D., Brorson, T., & Lindhqvist, T., (2009) "ISO 14001 in environmental supply chain practices", *Journal of Cleaner Production*, 17, pp 1435–1443.
14. Ninlawan C., Seksan P., Tossapol K., and Pilada W., (2010). The Implementation of Green Supply Chain Management Practices in Electronics Industry. Proceedings of International Multi Conference of Engineers and Computer Scientist 2010 Vol III, IMEC 2010, March 17 – 19, 2010, Hong Kong.
15. Ojo, E., Mbowa, C., Akinlabi, E. (2014). Barriers in Implementing Green Supply Chain Management in Construction Industry (Online). Available at: <http://www.iieom.org/ieom2014/pdfs/432.pdf> (Accessed 20 March 2017)
16. Ojo, E., Mbowa, C., Akinlabi, E. (2014). Green Supply Chain Management in Construction Industries in South Africa and Nigeria. Available at: <http://www.isaet.org/images/extraimages/P614076.pdf> (Accessed 20 March 2017)

17. Sanyé-Mengual, E., Pérez-López, P., González-García, S., et al. (2014). Eco-Designing the Use Phase of Products in Sustainable Manufacturing. *Journal of Industrial Ecology*. 18(4): 545–557. DOI:10.1111/jiec.12161.
- Saroah, R. (2014). *International Review of Applied Engineering Research*. ISSN 2248-9967 Volume 4, Number 1, pp. 89-92
18. Saroha, R., (2014). Green Logistics & its Significance in Modern Day Systems. *International Review of Applied Engineering Research*. ISSN 2248-9967 Volume 4, Number 1 (2014), pp. 89-92
19. Seman, N. A. A., Zakuan, N, Jusoh, A., Arif, M. S. M. D., (2012). Green Supply Chain Management: A Review and Research Direction. *International Journal of Managing Value and Supply Chains (IJMVSC)* Vol. 3, No. 1, March 2012.
20. The Economist. (2014). Manufacturing in Africa: *An awakening giant*. [online] Available at: <http://www.economist.com/news/middle-east-and-africa/21595949-if-africas-economies-are-take-africans-will-have-start-making-lot> [Accessed 26 Oct. 2016].
21. Zhu, Q., Qu, Y., Geng, Y., and Fujita T., (2015). Comparison of Regulatory Awareness and Green Supply Chain Management Practices Among Chinese and Japanese Manufacturers. *Business Strategy and the Environment* Volume 26, Issue 1, pages 18–30, January 2017