

# **Environmental Issues in Construction industry**

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## **Abstract**

The construction industry has been considered as a source of environmental impact globally. Impact such as massive use of natural resources, pollution of environmental and high energy consumption. This research addresses such issues using content analysis of t company reports published by construction companies in Nigeria and South Africa. The purpose of this research is to investigate the strategies used by the construction industry regards environmental issues. To achieve this aim, a case study was utilized. The results of the study are useful for construction industry and stakeholders to become aware of environmental impacts in construction industry.

**Keywords:** Construction industry, Environmental issues, Nigeria, South Africa and Strategies.

## **1. Introduction**

The construction industry is one of the most important sectors for the human civilization by improving society's physical environment: its output is used for production, commerce and shelter, and for providing vital utilities (Moavenzadeh, 1994). However, construction usually has a significant and irreversible impact on the environment. Impact such as massive use of natural resources, pollution of the environment, and high energy consumption are among the whole supply chain from production of construction materials to the end user (CEIC, 1992). Gangoellis et al. (2011) agreed with Zolfagharian (2012) that enhancing the identification of the major environmental impacts of construction processes will help to improve the effectiveness of environmental management systems. Unfortunately developing countries are suffering from the limited scientific data about the impacts of building materials and technologies on the environment and it is difficult to make informed choices aiming at reducing such impacts (Pittet and Kotak, 2009). This study aims to assess the environmental issues in Nigerian and South African construction industry.

## **2. Environmental Management Systems**

According to Generic ISO 14001 EMS templates, an environmental management system is defined as the continual business cycle of planning, implementing, reviewing and improving the processes and actions that a company undertakes to meet its environmental obligations and continually improve its environmental performance. Also, it is a tool for communicative action and organizational learning, it can make people aware of environmental issues related to more or less business of the organization (Burstrom

von Malmberg, 2002). An effective EMS is developed on “*Plan, Do, Check, Act*” (PDCA) model which embodies the concept of continual improvement.

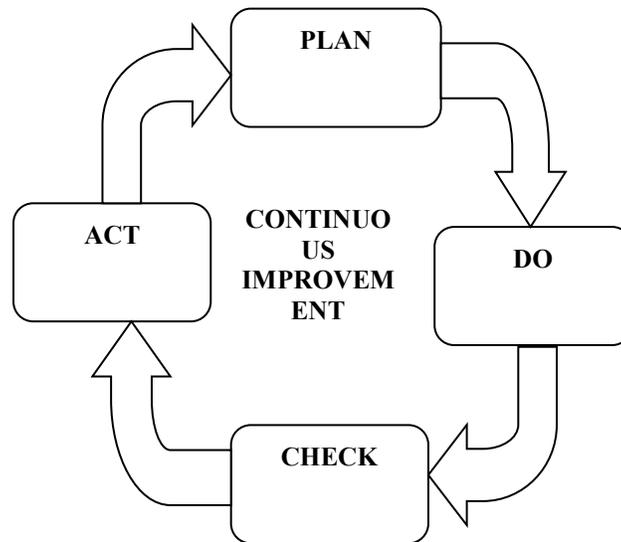


Figure. EMS Model (Adapted from Generic ISO 14001 EMS template, 2005)

This strategy aims to address the key concerns and constraint within environmental impact management system and will shape the manner in which impacts are managed in the future.

Reasons for implementing an EMS (Ammenberg, 2004) are:

- i. Economic reasons cost reductions and increased income.
- ii. Communication easier communications with authorities
- iii. Competence to better utilize employees competencies
- iv. Competitive argument to seem better or as good as competition
- v. Customer demand marketing arguments trustworthiness and image
- vi. Environmental reasons: to decrease environmental impact and increase environmental performance
- vii. Demands from authorities and limitations of risk: It improved handling of risks related to the environment.

There are several standards for EMS, the most well known is ISO 14001 and Economic Management and Audit scheme (EMAS). These two standards are very similar. The difference is that EMAS is not really a standard but a regulation, and is only possible in EU countries to participate. EMAS also requires initial review and publication of environmental statement and independent verification, which is not required for ISO 14001 (Welford, 1998). An EMS is used to address an organizations impact on the environment. It typically consists of policies, goals, information systems, task lists, data collection & organization, emergency plans, audits, regulatory requirements and annual reports. (Stapleton et al., 2001).

## 2.1 ISO 14001

It is an international standard which specifies the requirements of an environmental management system. Also enables an organization to establish and assess the effectiveness of procedures, to develop an environmental policy and objectives achieving conformity with them and demonstrate such conformity to others. ISO 14001 was first published in 1996 and has been technically revised in 2004. This EMS standard is adopted worldwide by organizations for certifying ISO14001 EMS.

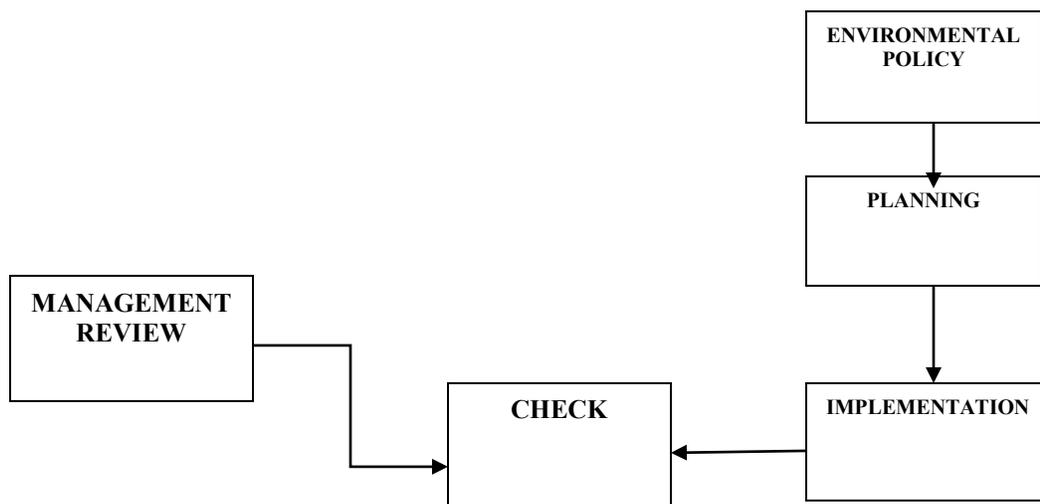


Figure: Iso 14001 Template (Adapted from Iso 14001: 2004 version. User Manual, 2005)

### **3. Case study**

The case study methodology provided an opportunity not only to contextualize survey findings, but also to explore issues of interest in greater details and identify environment issues in construction industry. The two companies selected which represent the two countries; case study for the research has substantial effort in managing their construction in a sustainable way. Case studies were conducted in order to investigate various sustainably supply chain management practices or related works that are environmentally friendly. These studies are based on published document such as reports and publications. Description of the cases is given below:

#### ***Company A***

Company A is a Nigerian company offering integrated solutions and related services. The company's scope covers all areas of construction including the pre & post phases. The head office is located in Abuja FCT, with additional permanent locations in Lagos and Uyo. The company is also represented across the nation in structural engineering and infrastructure works southern Nigeria through oil and gas industry projects.

Company A traces its operations back to the company of the Eko Bridge in 1965, a major infrastructure project in the megacity of Lagos. Years of steady growth followed this pioneer project during which the company grew to become the dynamic Nigerian company it is today.

Throughout this, the company has deployed progressive construction methods to ensure the innovation and quality is prioritized for the benefit of clients. The company's business is built on the strategy of having vertically integrated operations which improve efficiency and timeliness of project execution.

The company is very conscious on environmental issues and take serious responsibility to conduct their operations with proper regard for environment.

The major core focus and strength of the company are:

- Listed on the Nigerian stock exchange with a majority Nigerian shareholding
- Construction portfolio comprised of infrastructure, building and industry works
- Services include engineering, design and maintenance

- Proven commitment to leading health, safety and environment standards
- Quality management certified to full requisitions of ISO 9001:2008
- Operating in Compliance with Nigerian contract Act

**Quality:** The Company's leading quality management systems conforms to requirements set by the standards organization of Nigeria (SON) and the international standard organization (ISO) as well as additional domestic and international standards.

Its quality management system serves as a structural underpinning for the delivery of distinct solutions in all operations. Product facilities and laboratories guarantee consistency in manufacturing through the testing of construction-related materials and strict adherence to set any standards.

**Reliability:** It provides Clients with optimized and tailored solutions to construction challenges. It has built a seamless logistics chain. If procurement with Nigeria is not possible, it turns to its subsidiary and key logistics partners, which takes on the procurement and purchase of materials globally.

**Health, Safety & Environment:** Achievement of excellence in Health, Safety & Environment (HSE) is a fundamental component of the company's business principles and corporate culture. The company places highest priority on the health and safety of all employees, subcontractors and contractual partners as well as the people and the environment that may be affected by company's sphere of activity. The company dedicates the resources necessary to promote increased Health, Safety and Environment awareness based on best practice standards at all levels within the organization.

**Monitoring & Control:** procedures including site inspections and audits, regular safety meetings, in addition to targeted education company's support the implementation of HSE policy and ensure compliance set guidelines.



Figure 3: The Lekki-Ikoyi (Admiralty Alexander) Link Bridge, Lagos.

## **Company B**

It is a multi-disciplinary construction and engineering group that offers specialist services in building, civil engineering, earthworks, mechanical and electrical engineering, mining and property development in South Africa.

Its vision is to create sustainable value for all stakeholders by being the leading South African based multidisciplinary construction group.

The company is one of the South Africa's largest infrastructure company listed on the JSE in 1999 and operates in over 30 countries across the globe.

The group has built many of the iconic structures landmark buildings, bridges, dams, airports and power station and today form the backbone of the economies of many developing world countries.

With its broad exposure across the infrastructure value chain, it has the capability to deliver multi-disciplinary projects in construction, engineering, mining, water, power steel and manufacturing.

As one of the largest infrastructure development companies in South Africa, the group recognised the positive contributions it can make to the broader social transformation agenda. Without taking care of our planet and people there cannot be hope for sustainable growth in the long term.

The major core focus of the company are listed and explained below:

- Quality Management
- Health & Safety
- Environment
- Behaviour Risk Management

**Safety: Quality Management:** The group is committed to supplying professional services that comply with ISO 9001. It is an ISO 9001: 2008 certified company systems and procedures are in place for tendering engineering, procurement, projects management and construction management that satisfy the ISO 9001: 2008 requirements. Internal and external audits are carried out as a part of quality assurance to ensure the system is working. The industry sets the standard:

**Health and Safety:** These are integrated components to safety as a core value. It is a core value of the group and integral to the way they do business, never compromised in the pursuit of any other objectives. The industry accreditation standard is OHAS, ISOO1:2007. The value the group places on the safety and health of employees, subcontractors, partners and visitors to site, is reflected in the safety vision "Home without harm everyone everyday".

**Environment:** It recognises the impact of their activities and operations on the environment, and subsequently embarked on a journey towards environmental stewardship. The group's environmental policy and framework sets the standard to minimize environmental degradation and improve our environmental; practices, management and performances. This includes responding to climate change risks and opportunities. It is accredited to ISO 14001: 2004.

**Behaviour Risk Management:** It is an integral part of safety, Health, environment and quality management system. Making use of a behaviour based process allows the organization to proactively create a safety culture that ensures positive, efficient and effective performance that will benefit the entire organizations and its clients.

One of the constructions done by the company B.



Figure 4: FNB Stadium, Johannesburg, South Africa

#### **4. Discussion**

The two companies have several variables in common. They are both located in a developing countries; Nigeria and South Africa. The vision of their companies' anchors on sustainability; Quality management, health & safety and environment. They contribute to the economy of each country. They handle gigantic projects in the country and environmental issues are in the company's policy.

#### **5. Conclusion**

This research evaluated the environmental management systems practice and factors that influences its adoption on construction in Nigerian and South African Construction firms. Construction firms are realizing that environmental management is a primary key to success, they understand that it will minimize harmful environmental impacts for construction. It was concluded from the case studies that large construction firms takes environmental issues into consideration as seen in their vision and mission statement. EMS program should be developed and implemented with define goals and commitment. Iso14001 allow construction firms to determine what EMS level is right for their organization, so that they can maintain an even balance between costs and benefits. Organization should ensure they become more educated and aware of the benefits of GSCM. Also important to note that putting environmental issues into company's vision is not enough, ensuring it is implemented across the supply chain that translate to sustainability.

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## References

- Barrie, G. (1999b), Contractors and clients unveil green measures. *Building*, March, 13.
- Ballou, H., Gilbert, M. and Mukherjee, A. (2000) 'New Managerial Challenges from Supply Chain Opportunities' *Industrial Marketing Management*, 29, pp. 7-18.
- Burström von Malmborg, F. (2002) 'Environmental management systems, communicative action and organizational learning', *Business Strategy and the Environment*, Vol. 11, No. 5, pp.312–323.
- Construction Research and Information Association (CIRIA), 1994. *Environmental Handbook for Building and Civil Engineering Projects: Volume 1, Design and Speciation*, Special Publication 97. London.
- CIEC (Construction Industry Employers Council) (1992) *Construction and the Environment*, Building Employers Confederation, London.
- Deif, A. M., 2011. A system model for green manufacturing. *Journal of Cleaner Production*, 19(14), pp. 1553-1559.
- Falatoonitoosi, E., Leman, Z., Sorooshian, S., and Salimi, M. "Decision making trial and evaluation laboratory," *Research Journal of Applied Sciences, Engineering, and Technology*, vol. 5, no. 13, pp. 3475–3480, 2013.
- Hammer, B., Del Rosario, T., 1998. Green purchasing: A channel for improving the environmental performance of SMEs. In *OECD, Globalization and the Environment: Perspectives from OECD and Dynamic Non-Member Countries*. OECD, Paris, pp. 75-90.
- Linton, J.D., Klassen, R., and Jayaraman, V., "Sustainable supply chains: an introduction," *Journal of Operations Management*, vol. 25, no. 6, pp. 1075–1082, 2007.
- Lippmann, S. (1999) 'Supply Chain Environmental Management: Elements for Success' *Environmental Management*, 6, (2), pp. 175-176.
- Min, H. and Galle, P.W. (1997). *Green Purchasing Strategies: Trends and Implications*. *International Journal of Purchasing and Materials Management*, Iss. 4.
- Moavenzadeh, F. (1994) *Global Construction and the Environment: Strategies and Opportunities*, Wiley, New York.
- Muya, M, A.D.F. Price, A. (1999) 'Thorpe, Contractors' supplier management, *Proceedings of a Joint CIB Triennial Symposium* Cape Town, vol. 2, pp. 632– 640.
- Ofori, G (2000), Greening the Construction Supply Chain in Singapore, Original Research article, *European journal of purchasing and Supply Management*, Volume 8, Issues 3 -4, December 2000, pages 196-205.
- Ofori, G., 1999. Satisfying the customer by changing production patterns to realise sustainable construction. *Proceedings, Joint Triennial Symposium of CIB Commissions W65 and 55*, Cape Town, Vol. 1, 5}10 September, pp. 41}56.
- Ofori, G., 1992. The environment: the fourth construction project objective? *Construction Management and Economics* 10, 369}395.
- Ojo, E, Akinlabi E.T and Mbohwa C (2012), Benefits of green supply chain management in construction firms – a review, 2<sup>nd</sup> Nelson Mandela Metropolitan University, Construction management conference.
- Rao, P., and Holt, D. "Do Green Supply Chains Lead to Competitiveness and Economic performance?" *International Journal of Operations & Production Management*, 2005, 25, 898-916.
- Salam, M. A., "Corporate Social Responsibility in Purchasing and Supply Chain," *Journal of Business Ethics*, 85, 2009, 355–370.
- Stenberg, A.-C., Kadefors, A., 1999. Procurement for ecological housing: a case study of a developer competition. In *Brochner, J., Josephson, P.-E. (Eds), Construction Economics and Organisation*, Chalmers University of Technology, Goteborg, 12}13 April, pp.113.120.
- Shi V.G. and Lenny Koh S.C., Baldwin J. and Cucchiella F. (2012) *Natural Resource Based Green Supply Chain Management*. *Supply Chain Management: An International Journal* Volume 17 No 1 pp 54-67, 2012.
- Thipparat T. (2011) *Evaluation of Construction Green Supply Chain Management*. *International Conference on Innovation, Management and Service IPEDR* vol 14(2011).
- Westling, H., 1998. Collaborative performance-based purchasing for sustainable innovation. *Proceedings, CIB World Building Congress 1998, Symposium C*, pp. 1485}1494.
- Wyatt, D.P. (1994) 'Recycling and Serviceability: The Twin Approach to Securing Sustainable Construction. In *Proceedings of First International Conference of CIB TG 16 on Sustainable Construction*, Tampa, Florida, 6-9 November, pp. 69-78.
- X., Li, X., Shen, Q. and Wang, Y. (2005) 'An agent-based framework for supply chain coordination in construction' *Automation in Construction* 14: pp. 413-430.
- Zhu, Q. and Sarkis, J. (2004) 'Relationships between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises' *Journal of Operations Management*. 22: pp. 265-289.

Zhu, Q.H, Sarkis, J., Lai, K. (2008), Confirmation of a measurement model for green supply chain management practices implementation, *International Journal of Production Economics*, Vol. 111, pp. 261-273.

Zhu, Q. H., Sarkis, J. and Lai, K. H. 2012. Environmental management innovation diffusion and its relationships to organizational improvement: an ecological modernization perspective, *Journal of Engineering and Technology Management*, 29 (1), pp. 168-185.