

Effectiveness of ISO 14001 in the South African chemical industry

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Abstract

The chemical industry is one of the important industries in the South African industrial base, continuously being pressured to operate in an environmental friendly manner. Business with a good environmental practice in the South African chemical industry has become a key aspect for investors, customers and other stakeholders. In response to this challenge, chemical companies have implemented Environmental Management Systems into their businesses and getting certified to the various international standards. The ISO 14001 has been the leading international standard with the key purpose of progressively controlling environmental impacts while ensuring that objectives and targets are met. In this paper, the benefits of implementing and integrating ISO 14001 in the chemical industry are discussed. ISO 14001 gives the competitive advantage in the marketplace and the company benefits economically covering the whole organization's scope that including its products, operations, services, facilities, activities and transportation. South African companies have implemented the ISO 14001 EMS as a result of their response to the demand from customers and market for higher environmental reliability. This paper aims at educating about effectiveness of implementing ISO14001 standard in the companies that manufacture chemicals.

Keywords

Chemical industry, Environmental Management System, Environmental standards, ISO 14001

1. Introduction

The Chemical industry and its products have given various benefits that mostly improve and support human wealth with employment, better quality health and nutrition opportunities. There are however, concerns against the chemical industry due to that it is greatly relying on non-renewable energy, resources, and production processes producing toxic products & waste that damage the environment.

Recently, a range of methods, tools and measures have been developed, each focusing on the on the challenge of being environmentally sustainable, these include ISO 14001 Environmental Management systems (EMS) (O'Rourke, 2014). ISO 14001 is an international standard aiming for better environmental performance and sustainability. According to Puvanasvaran et al. (2014), the implementation of ISO 14001 as a sustainability initiative has extended impact as it improves company's daily operation thus requiring less immediate financial efforts. This paper aims to highlight the benefits of the use of ISO 14001 standard within the South African Chemical industry.

2. Environmental Standards in the Chemical Industry

Standards and policies were designed to safeguard human beings and environment from hazardous releases during chemical production and the threats manufactured by the chemicals industry (OECD, 2001). The chemical industry has progressed in reduction of environmental footprint; however, the negative impacts are still felt on the environment and humans when the responsibility of the chemicals production and use of these chemicals is not properly managed (OECD, 2001).

In all the industries, the chemical industry happens to be the most regulated, these regulations' emphasis is mainly on the control of air and water emissions and waste disposal (Morrow & Rondinelli, 2002). In many countries, chemical companies are implementing Environmental Management Systems into their business and getting certified to the various international standards (Morrow & Rondinelli, 2002). The environmental standards in the chemical sector include: ISO 14001, Responsible Care, European Eco-Management and Audit Scheme (EMAS) (Prakash, &

Potoski, 2002).

ISO 14001 has been the leading standard globally for evaluating environmental management system (Morrow & Rondinelli, 2002). ISO 14001 requires that the company describes the plans and procedures that form the environmental management system before certification (Darnall, 2006). The EMS standard is based on continuous improvement principle, encouraging companies to improve their environmental management systems continually (Darnall, 2006).

The Eco-Management and Audit Scheme became available in mid- 1990 along with the ISO 14001 (Bracke & Albrecht, 2016). The EMAS is also a voluntary European standard that has requirements similar to those of ISO 14001, initially the standard was only applicable to the site level, then later revised to be applicable the entire organization. EMAS needs companies to provide an environmental statement and it is stricter in reducing environmental impacts (Morrow & Rondinelli, 2002). Companies needing to be EMAS registered must publicise more information about their EMS.

Responsible Care standard was established by the Chemical Producer's Association from Canada, however being used worldwide including South Africa (Dwarika, 2015). This standard also has requirements like ISO 14001 and it has the objective of making sure that environmental legal compliance and environmental impacts are reduced (Dwarika, 2015).

3. ISO 14001

The International Organization for Standardisation developed the ISO 14001 Environmental Management System (EMS) standard in 1996 as a structure for management of environmental issues (Yin & Schmeidler, 2008). It requires that an organization is certified by third party independent auditing body, thus ensuring that the EMS conforms to the guidelines stated in the ISO 14001 standard (Darnall, 2006).

The ISO 14001 requires that organization to create the following (Dwarika, 2015):

- Environmental policy
- Environmental objectives
- Environmental targets
- Develop a plan & implement it
- Effectiveness of the system be monitored & measured
- Corrects problems
- Conduct review for continuous improvement

The ISO 14001 voluntary international standard was established to incorporate environmental features into organization processes and products (Dwarika, 2015). The key purpose of this standard is to progressively control environmental effects while ensuring that objectives and targets are met (Dwarika, 2015). It assists in inspecting the environmental operations and performance more especially when frequently revised to continuous improvement (Dwarika, 2015). ISO 14001 requires that the Environment Management System is audited and top management continuously assess the effectiveness and suitability of the EMS, this is in support of continuous improvement (Morrow & Rondinelli, 2002). ISO 14001 functions on the Plan, Do, Check & Act cycle (PDCA), the cycle is demonstrated on figure 1 which focuses on the continuous improvement (Hikichi et al, 2017). It is defined by:

- **Plan** – Creation of environmental objectives , targets and the policy
- **Do** – Execution planned objectives and targets
- **Check** – Monitoring and measurement of implemented procedures
- **Act** – Maintaining continuous improvement



Figure 1 – PDCA cycle

4. Benefits of ISO 14001

Organizations that integrate the ISO 14001 standard into daily operation of their business experience an environmental performance improvement (Yin & Schmeidler, 2008). Their image in environmental marketplace is enhanced and the internal productiveness is increased as well. ISO 14001 gives the competitive advantage in the marketplace and the company benefits economically (Darnall, 2006). ISO 14001 is highly in support of continuous improvement; facilities benefits from this process by implanting environmental concerns in their business strategy (Darnall, 2006). Environmentally unsafe inputs are replaced with more environmentally safe ones by preventing pollution, thus costs of environmental accidents are reduced.

According to Dwarika, (2015) and Massoud et al. (2010), the advantages gained from integrating ISO 14001 EMS standard into the business processes are as follows:

- Minimized regulatory surveillance audits
- Prove to the stakeholders the company's responsibility towards environmental initiative.
- Waste reduction
- Organization becoming highly competitive
- Business's profit increase through improvement from the process
- Reduced environment liability

- Reduced costs and insurance rates become lower
- Much focus on chemicals' safety
- Much focus on products safety from their design to final disposal

The standard is beneficial because it covers from cradle to grave, the whole organization's scope is covered that including its products, operations, services, facilities, activities and transportation (Massoud et al. 2010). ISO 14001 improves performance environmentally by the advantages of reducing costs in (McLuhan, 2013):

- Usage of water, energy and other essential resources.
- Waste accumulation
- Government fines

5. Barriers of implementing ISO 14001

This standard demands that the senior management shows commitment towards to the company's environmental management system since the success of implementing depends their commitment. Research has proven that there is lack of commitment from the management, making this a great barrier (Childers et al., 2014). The certification process of ISO 14001 standard requires an extensive support from the company, resilient employees' commitment and good internal communication (Childers et al., 2014). ISO 14001 requires the organization to set environmental objectives and targets; this can be a barrier if these are not efficiently identified or set. According to Hikichi et al. (2017), documentation for the implementing the environmental management systems is inadequate, this becomes a challenge for developing countries like South Africa. Hikichi et al. (2017) further mentions that ISO 14001 standard gives a list of resources required in the company's environmental management system however failing to define what techniques can be used for successful implementation.

6. ISO 14001 in the South African Chemical Industry

Chemicals improve our overall standard of living however, the great benefits that the industry have historically come at great cost mostly to the environment. The industry is faced with several high-

profile incidents arising from poor management of safety and environmental performance. The release of produced chemicals whether intentionally and unintentionally has contributed to environmental pollution and in many cases the impact will be continuously be felt for generations (Manda & Mohamed-katerere 2006). Doing business with a good environmental practice in the South African chemical industry has become a key aspect for investors, customers and other stakeholders. South Africa currently adopts its environmental policies from first world standards, where guidelines for hazardous waste disposal and principles for the promotion of supportive environmental management are introduced. Globalization and an increasing awareness of environmental concerns are putting pressure on companies to obey to global environmental standards with growing interest of customers in environmental effects of products and services (Massoud et al. 2010).

A number of South African companies have implemented the ISO 14001 EMS as a result of their response to the demand from customers and market for higher environmental reliability (Massoud et al. 2010). However, South Africa has been late in adopting EMS as compared to other first world countries, the country started in the 2000s to see the significance of an environmental management systems for guaranteeing environmental legal compliance (Dwarika, 2015).

The South African Chemical and Allied industries association decided on the adoption of the ISO 14001 and Responsible Care; both standards ensured that companies environmental objectives are met (Dwarika, 2015). However, research states that the favored standard in the South African chemical industry is the ISO 14001, this is because it is recognized internationally. It is also easy and flexible to implement EMS (Dwarika, 2015). South African companies acquired an added advantage by adopting the EMS standard on exporting products (Dwarika, 2015).

As much as the ISO 14001 is a voluntary standard most chemical industry customers demand that their suppliers get certified to it (Morrow & Rondinelli, 2002). Even investors and insurance firms demand a recognized Environment Management System that is effective like ISO 14001 (Morrow & Rondinelli, 2002).

7. Conclusion

The chemical industry globally has contributed greatly to current quality of life, for the development of the chemical sector while considering the environment as a crucial factor. Consideration for environmental issues is important in chemical company's activities because it acts as surety for stakeholders that within and outside the company. The release of produced chemicals in the South African chemical industry whether intentionally and unintentionally has contributed to environmental pollution and in many cases the impact will be continuously be felt for generations. Adoption of the ISO 14001 Environment Management System standard ensures effective running of the businesses within the South African chemical industry, since it covers the entire scope of the company's activities.

References

Bracke, R. and Albrecht, J. 'Competing environmental management standards : how ISO 14001 outnumbered EMAS in Germany, the UK, France, and Sweden', *Journal of Environment and Planning C: Politics and Space*, vol. 25, pp. 611–627, 2016.

Childers, D. L., Pickett, S., Grove, M. . . and Ogden, L. (2014) 'Advancing urban sustainability theory and action : Challenges and opportunities', *Advancing urban sustainability theory and action: Challenges and opportunities*, (MAY). doi: 10.1016/j.landurbplan.2014.01.022.

Darnall, N. 'Why Firms Mandate ISO 14001 Certification', *Business & Society*, pp. 354–381, 2006.

Dwarika, R. 'A Comparative Study of Responsible Care and ISO 14001 as an Effective Environmental Management System in the Chemical and Allied Industry in South' Masters thesis, University of KwaZulu-Natal, 2015.

Hikichi, S. E., Salgado, E. G. and Beijo, L. A. (2017) 'Characterization of dissemination of ISO 14001 in countries and economic sectors in the Americas'. Taylor & Francis, 568(May). doi: 10.1080/09640568.2016.1240070.

Manda, N. and Mohamed-katerere, J. 'Chemicals' in Our Environment, Our Wealth Chemicals-United Nations Environmental Programme', pp. 350–374, 2006.

Massoud, M. A. Y. A., Fayad, R. and El-fadel, M. (2010) 'Environmental Management System (ISO 14001) Certification in Developing Countries : Challenges and Implementation Strategies', *Journal of Environmental Science and Technology*, vol. 44(6), pp. 1884–1887, 2010.

McLuhan, H. M. (2013) 'Chapter 14', *Environmental Management and ISO 14000 family*.

Morrow, D. and Rondinelli, D. 'Environmental Management Systems : Motivations and Results of ISO 14001 and EMAS Certification' *Journal, European Management*, vol. 20(2), pp. 159–171, 2002.

O'Rourke, D. 'The Science of Sustainable Supply Chains', *Science*, vol. 344, pp. 1124–1127, 2014.

OECD, 'OECD Environmental Outlook for the Chemicals Industry' 2001.

Prakash, A. and Potoski, M. 'Racing to the Bottom? Trade, Environmental Governance, and ISO 14001', *American Journal of Political Science*, vol. 50(2), pp. 350–364, 2006.

Puvanasvaran, P., Tian, R. K. S. and Vasu, S. A. L. (2014) 'Lean environmental management integration system for sustainability of ISO 14001:2004 standard implementation', *Journal of Industrial Engineering and Management*, vol. 7(5), pp. 1124–1144, 2014.

Yin, H. and Schmeidler, P. J. (2008) 'Why Do Standardized ISO 14001 Environmental Management Systems Lead to Heterogeneous Environmental Outcomes?', *Journal of Business strategy and the Environment*, vol. 18, pp. 469 – 486, 2008.

Biography

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