Original Research Article

ENVIRONMENTAL MANAGEMENT SYSTEM'S IMPLEMENTATION AND PRODUCTION OF GOODS IN SELECTED INDUSTRIES IN UGANDA

ABSTRACT

Environmental management systems (EMS) were of less significant focus in the earlier times because of the less degradation the industrial activities caused to the environment. However, the EMS evolved over time due to a variety of factors, including changing consumer demands, regulatory requirements, and increased awareness of environmental issues.The current study was set to examine the EMS implementationduring the production processesin selected industries in Uganda. The study was based on three objectives: to determine the types of pollution control environmental management systems implemented in the selected industries in Uganda; to explore the benefits obtained as a result of the implementation of the pollution control environmental management systemsduring the production of goods in Uganda; and to examine the challenges faced during the implementation of the pollution control environmental management systems in the selected industries in Uganda. The study randomly selected three industries, X, Y, Z and targeted a population of 100 members of staff. A total of the 76 respondents participated in the study. A case study research design was employed and both quantitative and qualitative approaches of data collection were used. A questionnaire and interview guide were used to collect data from the respondents. Data were entered into a Statistical Package for Social Scientists (SPSS) for analysis. Data were analyzed using descriptive statistics and multiple regression. The study findings revealed that scrubbers and filters, regulatory command and control, use of energy efficient technologies and efficient waste management systems are some of the pollution control mechanisms implemented by the industries. The benefits that accrued as a result of implementing the EMS on production processes within the factories include: cost savings due to efficient resource use, enhanced industry's reputation, improved product quality, customer satisfaction among others. The challenges encountered during EMS implementation include; insufficient technical expertise, inadequate infrastructure, high operational costs, limited financial resources, and employee resistance to embrace the new technologies. The presence of the challenges encountered during EMS implementation are likely to stifle full attainment of the associated outcomes among the industries in Uganda. Hence, awareness of the benefits as a result of implementation of EMS should be created amongst all the employees for effective implementation. Also, industries should create a clear environmental policy that aligns the industrial goals and regulatory requirements. The institution concerned with implementation of the EMS should constantly monitor all the industries operating in Uganda for the uniform implementation of the systems.

Key Words: Environmental Management System; Pollution Control Mechanisms; Production Process; Uganda.

1. Introduction

Environmental management systems (EMS) have evolved over time due to a variety of factors, including changing consumer demands, regulatory requirements, and increased awareness of environmental issues. Prior to the 1970s, environmental concerns were not a significant focus in industries. Companies primarily focused on production and profitability (Cheremisinoff, 2010; Edwards, 2014). Quality control systems were mainly driven by internal company standards and specifications. The 1970s witnessed a growing awareness of environmental issues, such as pollution and resource depletion, leading to the establishment of environmental regulations in many countries. Manufacturing companies began to face pressure to address their environmental impacts and adopt sustainable practices. Quality control systems expanded to include regulatory compliance and adherence to safety standards (Edwards, 2014).

The concept of EMS has gained significant recognition and adoption globally. One widely recognized standard for EMS is ISO 14001:2015, developed by the International Organization for Standardization (ISO). This standard provides a set of guidelines and requirements for organizations to establish, implement, maintain, and improve their environmental management systems (Thomas, 2019).The primary goal of an EMS is to assist organizations in identifying and controlling their environmental impacts while also increasing their operational efficiency. By implementing an EMS, organizations can systematically address environmental issues and develop sustainable practices (Barakagira and Paapa, 2023). The EMS acts as a management tool that helps organizations of all sizes and types to monitor and manage the environmental impact of their activities, products, or services. The ISO 14001 framework provides a structured approach to environmental management. It includes elements such as establishing an environmental policy, conducting environmental risk assessments, setting objectives and targets, implementing operational controls, monitoring and measuring performance, conducting internal audits, and undertaking periodic reviews. This systematic approach ensures that organizations actively assess and manage their environmental responsibilities throughout their operations (Theuvsen, 2019).

An environmental management system is a framework or process that organizations use to manage and continually improve their environmental performance (ISO 14001:2015, International Organization for Standardization; European Commission, 2021). Similarly, González-Benito, 2019) define an environmental management system as a set of policies, practices, and procedures that enables an organization to reduce its environmental impacts and increase its operating efficiency. In this study, an environmental management system was taken to mean a management tool enabling an organization of any size or type to identify and control the environmental impact of its activities, products, or services, and to continuously improve its environmental performance.

Organizations from various industries are increasingly adopting EMS frameworks like ISO 14001 to enhance their environmental performance. By implementing such systems, companies

can effectively identify and monitor their environmental aspects, such as energy consumption, waste generation, emissions, and resource usage (Ameny and Barakagira, 2021). Through this identification process, organizations can evaluate their environmental impacts and develop strategies to mitigate and control them. Furthermore, an EMS enables organizations to align their environmental goals with their overall business objectives. By integrating environmental considerations into their core operations, companies can drive sustainable practices and improve their overall environmental performance. This approach not only enhances the organization's environmental credibility but also contributes to cost savings, regulatory compliance, and increased stakeholder trust (Barakagira and Paapa, 2023; Sheldon, 2021).

The study's theoretical framework draws from Stakeholder theory, emphasizing the importance of considering the interests of all parties affected by or affecting a firm's performance (Donaldson & Preston, 2021). This theory extends beyond shareholder wealth maximization to recognize various stakeholder groups (Freeman, 2002). Acknowledging the influence and legitimacy of different stakeholders, it highlights the need for organizations to manage relationships effectively to achieve success (Daugaard& Ding, 2022).

Additionally, the study incorporates management systems theory, which provides structured processes to meet stakeholder demands systematically (Mahesh & Kumar, 2016). Management systems, including quality, environmental, and occupational health and safety systems, aim for continuous improvement and are often standardized through management system standards (MSSs) like ISO 9001 and ISO 14001 (ISO, 2021; Karapetrovic& Jonker, 2003). These systems, when implemented effectively, offer benefits such as enhanced efficiency, customer satisfaction, and environmental responsibility (Nanda, 2019; Watson et al., 2023).

In Uganda, EMS have been emphasized by the regulatory authorities including Ministry of Trade and Industries aimed at the smooth operations of the industries and ensuring that their operations does not lead to environmental degradation. It is against this background that the study was set out to was to investigate the implementation of the Environmental Management System (EMS) in some selected industries in Uganda. Specifically, the study, (i) determined the types of pollution control environmental management systems implemented in the selected industries in Uganda, (ii) explored the benefits obtained as a result of the implementation of the pollution control environmental management systems in Uganda, and (iii) examined the challenges faced during the implementation of the pollution control environmental management systems in the selected industries in Uganda.

2. Research methodology

The study randomly selected three industries located in central Uganda, named as X, Y, Z. Central Uganda was considered because, it is where majority of the industries are concentrated (Calabrese et al., 2019). A total of 966 employees existed in the three industries. Industry X had 155 employees, Y had a total of 597 employees, and Z had a total of 214 employees. The study

targeted a population of 100 employees and using Yamane formula; n= $N/1+Ne^2$, then n= 80. When the questionnaires were distributed, only 76 questionnaires were filled and returned, marking a response rate of 95% which is deemed desirable.During data collection, each study participant was informed that the study's purpose was for only academic purposes and that their responses would remain confidential and anonymous.

The study employed a cross-sectional design because it drew qualitative and quantitative data from different categories of respondents at one point in time. It was also analytical because it examined the relationship between implementation of EMS and quality in the selected industries. The subjects of the study were drawn from among staff of selected industries in Uganda and their customers. The reason of choice of the design was to capture the views and opinions of the respondent'sconcerning implementation of EMS, benefits and challenges faced during the implementation of the EMS in the selected industries.The study participants were randomly selected, where each individual has an equal chance of being chosen. This method was chosen because the researcher felt that this would avail the information needed from the respondents selected. The data collected enabled the researcher to generalize the findings to the entire population.

Another research tool used in the study was a semi-structured interview guide which was used to collect data from some key informants, who were purposively selected as guided by Hyman *et al.* (2001). The key informants included some top managers of some departments.Interviews were conducted to obtain in-depth insights and perspectives directly from the participants through one-on-one interactions. Additionally, secondary data was utilized to supplement the primary data collected through questionnaires.

Quantitative data were analyzed using the Statistical Package for Social Sciences (SPSS) version 26.0 to generate descriptive statistics in form of univariate and inferential statistics in form of bivariate, and multivariate to establish the relationship between variables (Mindrilla, 2021). The Pearson coefficient was used to determine the strength of the relationship between the independent and dependent variables of the study (Oteng, 2022). Regression analysis was established to determine the how environment management system impacts on product quality in the selected industries.

Qualitative data analysis involved; thematic analysis, context analysis, and content analysis where themes that come in the topic were discussed, then familiarization with data collected from the field was followed based on the notes and interview scripts, classifying major issues covered, summarizing the findings, and coding the different sections of data relevant to the study.

The overall Content Validity Index (CVI) of 0.80 was achieved which guaranteed the validity of data as recommended by Robert Heale (2022), who argued that content validity of 0.70 measures

the degree to which the test measures or is specifically related to the traits for which it was designed.

3. Results

3.1 Types of environmental management systems employed in industries

The results obtained showed that 63.2 percent of the respondents implemented effective effluent treatment plants (ETPs) to control water pollution; 63.1 percentusedboth scrubbers and filters, and advanced waste management practices to minimize solid waste pollution; and 65.8percentused energy-efficient technologies to reduce environmental impacts as a result of the industrial activities. Concerning compliance, about 57.9percentstated that the industries follow strict regulatory compliance for pollution control as shown in Table 1. The results reveal that, although industrial actors are practicing measures that are aimed at protecting the environment, they are not aware that what they are practicing are in conformity to adhering to environmental standards.

Table 1: Types of Environmental Management Systems used in the industries, n= 76 (Questionnaire survey, 2024)

Types	Frequency*	Percentage
Effluent treatment plants	48	63.2
Scrubbers and filters	47	63.1
Waste management practices	47	63.1
Energy efficient technologies	50	65.8
Regulations' adherence	43	57.9
Others	12	15.5

*Multiple responses

3.2 Benefits as a result of implementing Environmental Management Systems

Results on the benefits of implementing environment management systems revealed that 56.5 percent of the respondents were in agreement that implementing EMS has led to improved environmental quality while 68.3 percent of the respondents stated that industries have experienced cost savings due to more efficient resource use. Among the respondents, 57.9 percent statedthat compliance with environmental regulations has improved industry's reputation, while 59.2 percent believe that there has been an increase in employee morale due to a cleaner work environment. In addition, 60.5% of the respondents agreed that product quality

was improved as a result of the implementation of the EMS. The 63.2 percent of the respondents were in concurrence that the industry has seen a reduction in health-related issues among employees, and the 55.2 percent agreed that customer satisfaction has increased due to commitment to environmental management as shown in Table 2. Majority of the employees from the three industries stated that stronger relations between them and the employees improved operational efficiency and hence tended to conform to the guidelines set aimed at promoting some policies implemented within the industries for environmental sustainability.

In relation to some of the findings, one key informant had this to say:

"We have implemented most of the EMS required by the industries to conform to. Our involvement in adhering to the call put forward by the regulating agency has enabled our industry to develop strong ties the surrounding community and has increased on the sales of our products".

Table 2: Benefits of implementing Environmental Management Systems, n=76 (Questionnaire Survey, 2024)

Benefits	Frequency*	Percentage
Improved environmental quality	43	56.5
Cost savings	52	68.3
Improved Industry reputation	44	57.9
Increase in employee morale	45	59.2
Improved product quality	46	60.5
Reduction in health-related issues	48	63.2
Customer satisfaction	42	55.2

*Multiple response

An ANOVA test was carried out to determine the relationship that existed among the benefits the three industries achieved which accrued from the implementation of EMS and the results in Table 3 were obtained.

Table 3: Relationship between the benefits obtained as a result of EMS implementation (Questionnaire survey, 2024)

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	179.956	2	59.985	3983.394	.018[b]
	Residual	1.687	73	.015		
	Total	181.643	76			
a. Dependent Variable: Environmental Management Systems						
b. Predictors: (Constant), Benefits						

The results indicate that there was no significant difference between the benefits obtained by the different industries as a result of the implementation of EMS at P>0.05. This is because, even if the benefits obtained may slightly vary in one way or the other, generally, they tend to be the same amongst the industries.

3.3 Challenges encountered during implementation of Environmental Management Systems

The current study set out to determine the challenges faced by the industrial actors during the implementation of the EMS in the three industries. Among the respondents, 61.8 percent stated lack of funding for an effective implementation of EMS while 59.1 percent noted that insufficient technical expertise for managing advanced EMS technologies stifled EMS implementation. Additionally, 68.4 percent of respondents affirmed that employee resistance to implementation of new EMS prevented attainment of goals related to EMS. Relatedly, 59.2 percent and 56.6 percent argued that inadequate infrastructure and high operational costs respectivelylimited effective enforcement of EMS in the industries. Lack of awareness about the EMS (63.1%) and inadequate monitoring by government agencies (59.2%) also contributed to un effective implementation of EMS in the industries as shown in Table 4.

Table 4: Challenges encountered during implementation of Environmental Management Systems, n=76 (Questionnaire Survey, 2024)

Challenges	Frequency*	Percentage
Lack of funding	47	61.8
Insufficient technical expertise	45	59.1
Employee resistance	52	68.4
Inadequate infrastructure	45	59.2

High operational costs	43	56.6
Lack of awareness	48	63.1
Lack of monitoring by Agencies	45	59.2

*Multiple responses

The three variables under study, which include types of EMS used, benefits obtained and the challenges encountered during implementation of EMS were compared to determine which variable had a significant effect towards implementation and the results are as shown in Table 5.

Table 5: Level of significance of the variables under study (Questionnaire Survey, 2024)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.178	.031		5.748	.000
	Types of EMS	.593	.078	.611	7.623	.000
	Challenges	.531	.078	.537	5.687	.094
	Benefits	.524	.086	.523	6.111	.000
a. Dependent Variable: Environmental Management Systems' Implementation						

The results revealed that both the types and the benefits that accrued had a positive and significant effect towards the implementation processes at $P<0.05$. On the other hand, challenges encountered did not have a significant effect to the implementation processes of the EMS. Therefore, despite the challenges in place, the implementation processes of the EMS still took place in the industries, though with the lens of environmental sustainability.

4. Discussion of the findings

An array of the types of EMS including effluent treatment plants, scrubbers and filters, waste management practices and others were being implemented in the study areas. The implementation of the EMS amongst the industries accrued some benefits including but not limited to cost savings, improved reputation of industries, customer satisfaction. The findings are in agreement with scholars like Barakagira and Paapa (2023), Hermawan *et al.* (2020) and Al-Juboori*et al.* (2020) who stated that implementation of EMS ensures environmental sustainability

through lowering of greenhouse gas emissions, and also leads to cost savings and improves on the reputation of the industries involved in the manufacturing. In addition, Moise *et al.* (2021) and Abdou *et al.*, 2020 state that when companies implement EMS, there is an increase on the customer satisfaction and ties between customers and industries become strengthened. Mohamed (2020) in his study revealed that pollution prevention systems are likely to reduce or eliminate pollutants by using cleaner alternatives like use of scrubbers and filters as compared to those that lack such systems.Ferron, Funchal, Nossa and Teixeira (2022) stated that companies that invest in EMS are more likely to perform well and have direct positive impact on return on investments.

However, some challenges encountered during the EMS implementation include lack of funding, high operational costs, employee resistance, lack of awareness and others as observed during the study. The results are in concordance with some other authors like Barakagira and Paapa (2023), Abdou*et al.* (2020), Dwivedi *et al.* (2022) and Yusuf *et al.* (2020) who commented that several bottlenecks tend to hinder smooth implementation of the EMS and hence leads to negative effects to the environment.

The above findings were supported by the study of Hansen and Lehmann, (2021) which stated that manufacturing industries have become aware of their environmental impact, together with their social and environmental responsibilities. Environmental Management Systems (EMSs) have been implemented on a large scale to improve companies' environmental performance and to certify their achievements. They added that EQMS can be certified, and it proves that the company has good environmental awareness and quality control. The purpose of EQMS itself should enable the company to provide good service and products and minimize environmental degradation.Okemba and Namusonge (2021) in their study on EMS and Performance of Manufacturing Companies stated that most of the industrial managers are not conversant with production of green products, sensitizing employees and the general public about environmental conservation.

5. Conclusion and recommendations

The study concludes that the types of EMS are in various forms and those industries which implement them tend to have a positive impact on the environment. Also, implementing EMS offers numerous benefits which tend to improve on the performance of the industries and cooperation with the broader community.Although there are challenges encountered during the implementation of the EMS in industries, addressing them enable industries achieve significant economic, operational and reputational benefits.

Industries should therefore be able to create a clear environmental policy that aligns with industrial goals and regulatory requirements that emphasize commitment to pollution prevention, compliance, and continuous improvement by setting up measurable environmental objectives and targets based on the company's pollution sources and environmental impacts. In addition, industries should involve employees at all levels in the environmental management efforts,

encouraging their participation in identifying problems and suggesting solutions, provide regular training to employees on environmental policies, procedures, and best practices hence ensuring environmental compliance.

Data availability:

The data presented in the manuscript is available on request.

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