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Factors influencing the implementation of environmental management practices among small and medium sized enterprises in Nakuru town

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Abstract
A Logit regression model was used to analyse the influence of attributes of environmental awareness, age of firm, size, regulatory pressure and financial resources towards the implementation of environmental practices. A stratified and simple random sampling procedure was used to select thirty-two (32) manufacturing SMEs in Nakuru Municipality. Primary data was collected through structured questionnaires, face to face interviews and observations. Secondary data was collected from literature review, company reports and from the relevant publications. The findings revealed that the level of environmental awareness, the size of the firm and the availability of finances had significant influence on the implementation of environmental management practices. Such environmental practices include environmental audit, implementation of environmental management policies and resource minimization measures. However, the age of the firm and the regulatory pressure did not have significant influence on the implementation of environmental practices. We recommend increased efforts in raising environmental awareness of among the SMEs employees and managers as well offering incentives to SMEs to support programs that promote sustainable development.

Keywords: small and medium manufacturing enterprises, environmental management practices, environmental awareness, environmental management systems

Introduction

Environmental management deals with effects of an organization activities on nature. The Environmental Management System (EMS) is an organized methodology to arranging and actualizing environmental management measures. It involves establishing programs, monitoring and measuring progress to achieve the desired objectives and targets. The components of EMS cycle require environmental policy, planning, implementation, checking/corrective actions and management reviews (Plan-Do-Check-Act). All these characteristics have the objective of continual improvement. Francesco *et al.*, (2015) [7], Moorthy *et al*., (2012) [14], Tambovceva (2016) [20] identified factors that influence pro-environmental engagement originating from the external and internal environments of the enterprises. These include stakeholder pressure (shareholders, government customers, NGOs), economic opportunities (e.g., finances, competitive advantage) and ethical or ecological motives which are driven by leadership and corporate values. It has been shown that small and medium sized enterprises are less engaged with environmental issues than their larger counterparts (Brammer *et al.*, 2012; Revell *et al*., 2009) [2, 19]. The obstacles that limit implementation of environmental management policies include costs, lack of awareness, lack of resources and the level of the manager's knowledge (Moorthy *et al.*, 2012; Redmond *et al*., 2008; Revell *et al.*, 2009; Cronstam and Grönberg, 2017) [14, 17, 19]. However, with the current global emphasis on green economy, there is a growing concern among small and medium-sized enterprises seeking to reduce the impacts of their activities to the environment. The green economy is geared towards supporting sustainable consumption and production. An inclusive green economy is low-carbon, resource-conserving, diverse and circular. Many economies especially in the developed world are embracing gradual change towards the goal of climate friendly production methods. These efforts involve pollution abatement programs, voluntary environmental initiatives, or reduction of waste and emissions (Brammer *et al*., 2012; Lawrence *et al*., 2006) [2, 11]. The study was based on the Environmental Management System framework. The framework includes the organizational structure, planning and resources for developing and implementing and maintaining policy for environmental protection. It was assumed that implementation of environmental management practices is influenced by certain obstacles. This is because the activities involved in the Plan-Do-Check-Act (EMS Cycle) require resources, training, audits, keeping records, compliance, and conformity, among many. All these are cost related factors which may not be embraced by some organizations. While there is substantial information and interest on the environmental practices among the small and medium-sized enterprises in the developed economies, the case in developing countries is limited. In Kenya, the majority of enterprises is SMEs and contributes approximately to 18% of the Country's growth domestic product (UNIDO, 2013) [22]. However, their practices and effort towards environmental management have not been established. This study assessed the factors that influence the implementation of environmental practices among select SMEs in Nakuru Town, which may otherwise limit the efforts towards the goal of sustainable environmental management.

Methodology

The survey covered manufacturing and processing industries with less than 250 employees within Nakuru

Town where data was collected through structured questionnaire, face to face interviews and observations. Stratified and simple random sampling procedure was used to select 32 manufacturing SMEs in Nakuru County. The respondents were owners of the industry, technical managers or administrative staff. Since these categories of respondents are not many, all the managers/administrative staff in all the organizations sampled were considered for the study.

Data Analysis

A logit regression model was used to identify the factors that have significant influence on the implementation of environmental practices among the selected SMEs. The factor of implementation of environmental practices was taken to be the independent variable. The dependent variable (implementation of environmental practices) was then regressed against the relevant demographic, socio-economic and environmental factors relating to environmental management. The study assessed the linkage between the decision to undertake environmental practices with age of the industry, size of the firm, awareness among the managers, existing regulation/policies and availability of financial resources. Age of firm was a measure of number of years since inception while size of the firm was measured in terms of number of employees. Environmental Awareness was measure based on the knowledge on environmental issues (EMCA, NEMA, EMS, EIA/EA). The variable of awareness was treated as a dummy, which assumed two values; one (1) for being aware and zero (0) for not being aware. Age and size were taken as continuous variable. Other factors such as regulatory pressure and resource availability (finances) also play a role in firms' decision to adopt environmental practices. Thus, the firm either complies with the regulations (1) or does not (0); and either adapts to the environmental practices (1) or does not (0).

Results and discussion

Table 1 shows demographic features of the selected small and medium-sized manufacturing industries. The size of firm was based on the number of employees classified as micro (with less than 10 employees), small (with 11-49 employees) and medium-sized enterprises (with 50-249 employees). The findings show that 18.8% of the selected SMEs had less than 10 employees (micro), 50% had between 11-50 employees categorized as small enterprises while 31.2% had over 51 employees but less than 250. This implies that majority of the selected SMEs were either small or medium sized based on the number of employees.

Age of firm was measured based on the number of years of operation since inception. Our results show that 28.1 % of the selected SMEs were less than 5years, 37.5% were between 6-10 years while 34.4 % were above 10 years. This implies that over 70% of the selected firms were more than 6 years old.

Table 1: Characteristics of SME in Nakuru Town

	No. of Employees	**Frequency**	**Percentage**
Size of the Firms	1-10 (Micro)	6	18.8%
	11-50 (Small)	16	50%
	51-250 (Medium)	10	31.2%
	Total	32	100
Age of SMEs Based on Years of Operation	Age of the Firm	Frequency	Percentage
	0-5 years	9	28.1%
	6-10 years	12	37.5%
	Above 10 years	11	34.4%
	Total	32	100

The likelihood of undertaking environmental practices was studied using several logit models. The model considered how firms' size, age of firm, environmental awareness, financial resource and regulatory pressure influences the likelihood of implementing environmental management practices. The coefficients of these predictor variables have significant values at 5% and 10% significance level.

We consider environmental awareness as having or showing realization, or knowledge about the environment and related issues. That is knowledge on local legislation e.g., EMCA, NEMA, EIA/EA and environmental standards such as ISO 14001. The findings (Table 2) reveal that environmental awareness had a significant influence on the adoption of environmental management practices. The results of the model estimations indicate the odds ratio of conducting environmental audits and implementing EMS measures increases with increase in environmental awareness of SMEs managers/owners. That is, managers who are more aware are twice (2.030) more likely to conduct environmental audit than those who less aware. Similarly, managers who are more aware are three times (3.019) more likely to implement an EMS when compared with managers with low awareness level. The results imply that the implementation of environmental practices is more on firms with managers who have high level of environmental awareness. In other words, increase in the level of awareness among SME owners/managers increases the likelihood of the implementing environmental practices in those firms.

Environmental awareness is aligned with the individual's convictions regarding environmental concerns, demonstrated through their actions and attitudes, and the way in which they actively participate in environmental initiatives (Mei *et al.*, 2016) [13]. The more knowledge one has on environmental management, the greater the attitude towards the environment. For example, those who are aware of environment issue and are concerned about the impact of their business on the environment will be more likely to act to reduce the impact of their business activity. Other studies have documented positive correlation between the level of environmental awareness and the adoption of environmental practices and the protection of natural resources (Gadenne *et al.*, 2009; Weerasiri & Dissanayake, 2011) [8, 25].

Williams & Schaefer (2013) [26]. Pointed out that personal attributes such as individual values, beliefs, and personal commitment also help in shaping the environmental orientation of a firm Values and beliefs reflect general attitude towards the environment and therefore is perceived as a precondition for achieving environmental behavior. While some researchers have claimed a positive correlation between environmental attitude and implementation of environmental practices (Gadenne *et al.* (2009) [8], others have concluded that high degree of environmental attitudes would not necessarily result in implementation of environmental initiatives (Weerasiri & Dissanayake, 2011) [25]. Thus, managers having highly positive environmental attitude may not necessarily translate into them introducing environmental management practices into their organizations. Comparing this with the relatively low uptake of environmental initiatives within SMEs (Walela *et al.*, (2017) [23], suggests that, while leadership is an important factor for environmental initiatives other factors present greater influence.

In relation to the firm size, it was also revealed that firm's size affects the environmental management of an enterprise. Size was based on the number of employees. The logit

analysis results indicate that increase in size increases the likelihood of implementing environmentally friendly practices such that firms that are smaller in size are less likely to engage in environmental practices. The results from the analysis show significant and positive effect of company´s size on adoption of EMS and undertaking of environmental audits. The adoption of these practices (conducting environmental auditing and implementing EMS) was observed more between medium-sized and large companies. The results imply that larger firms tend to integrate environmental practices into their organization than smaller firms. Walela *et al.*, 2017 [23] revealed that the adoption environmental practices were witnessed more on medium-sized industries than micro and small firms. This was attributed to size related constraints such lack of resources (finances, human capacity and knowledge). This finding concurs with Cassels & Lewis (2009), Cosmina *et al.*, (2020), Trencansky & Tsaparlidis, (2014) [3, 4, 21]. Cosmina *et al*. (2020) [4] revealed that a tenfold increase in the number of employees resulted to an estimated 8% increase in environmental performance. Thus, companies with more employees implemented more environmental management policies and standards. It could be also that large firms produce more output per given level of inputs, therefore use more resource (water, energy, raw materials) and produce more waste than small firms. Thus, they face more pressure from the public/regulatory authorities to address environmental concerns than smaller firms (Labonne, 2006; Walker *et al.*, 2008) [12, 24]. According to Rehfeld *et al*., (2007) [18] and Revell *et al*., (2009) [19], larger firms enjoy greater access to financial and human resource therefore tend to respond better to environmental issues than micro/ smaller firms.

The analysis of how finances affect the adoption of environmental practices revealed a significant relationship between availability of finances and the adoption of environmental practices. We observed that availability of finances increases the likelihood of adopting and implementing environmental practices (conducting of environmental audit and adopting of resource conservation initiatives). Th opposite of this is also true, where lack of financial resources could deter a SMEs from adopting some of the environmental initiatives. Having financial resources could mean acquiring more competences, knowledge, and resources to support environmental strategies. This could be the reason why the SMEs were not incorporating environmental initiatives such environmental audit and environmental management systems into their business strategy as pointed out by Walela *et al.* (2017) [23].

The influence of financial resources on environmental management has been viewed in two perspective: as a driver and a barrier to adoption of environmental practice Redmond *et al* (2008) [17]. According to the study by Rademaekers *et al.* (2012) [16], saving on costs was a key driver among small and medium- sized industries towards the implementation of environmentally initiatives. Therefore, firms adopted some environmental practices primarily to save on costs which in the long run reduces operation costs. On the other hand, lack of financial resources inhibits firms from undertaking environmental practices (Cronstam & Grönberg, 2017; Draper and Ngarachu 2017; Walker *et al*., 2008) [5, 6, 24]. Undertaking some environmental initiatives may require substantial capital investments. For example, majority SMEs often cannot afford to employ a full-time environmental officer (Walela *et al*., 2017) [23] or invest in pollution prevention technologies (Rademaekers *et al.*, 2012) [16]. Some voluntary environmental initiatives such as EMS certification are expensive venture for many firms irrespective of their size (Tambovceva, 2016) [20].

In light of the effect of firm's age on adoption of environmental management, there was no significant relationship between age of company and adoption of environmental practices. That is, the decision to undertake environmental audit or implement environmental management systems and resource conservation measures such as energy, was not significantly influenced by the age of the firm. Age is considered as a measure of experience, indicating how long a firm has been operating. From the descriptive statistics, the results show that the youngest industry was less than one year old, while the oldest was over sixty years old at the time of the study. Meanwhile, majority of the selected SMEs had existed for more than five (5) years. Comparing this with the logit model, we see that the implementation of environmental initiatives is not affected by how long a firm has been in existence. In other words, younger firms are expected to comply with environmental requirement just as much as older firms. The finding concurs with Trencansky & Tsaparlidis (2014) [21] that age of company only had a minor influence on sustainability performance. However, the results contradict the study by Julie & Tim, (2016) [9] that found positive relationship between increased age and pro-environmental engagement. The study highlighted that increase in age increases the likelihood of being environmentally responsible. As a firm grows older, they also grow in size developing resources that enable them to integrate management systems based on their interaction with the natural environment and relevant stakeholders (Arago´n-Correa & Sharma 2003) [1].

On the role of environmental regulation on the adoption of environmental practices, we observe that regulatory pressure did not have significant influence on the decisions to implement environmental initiatives. In other words, the implementation of environmental practices in the Nakuru town was not significantly influenced by regulatory pressure. The implication of this is that while environmental regulations are important in environmental management, they alone cannot cause SMEs to be environmentally responsible. A study by Walela *et al.* (2017) [23]. On environmental initiatives adopted by SMEs in the Nakuru revealed that most of the initiatives adopted were focused on resource conservation and minimization (Table 2).

Table 2: Environmental conservation and minimization Practices

Practices	Percentages (%)
Water conservation	62.5
Energy conservation	56.3
Water recycling	62.5
Rain water harvesting	65.5
Environmental Officer employed	34.4
Undertaking environmental audit	56.3
Implementation of EMS (ISO-14001	3.1

The study revealed that majority of these practices were implemented in order to reduce cost and not for environmental improvement. Our finding is also consistent with the study by Zhang *et al.*, (2008) [27] who also revealed

that regulation did not have significant influence on why firms engage in environmental management in China. According to Zhang *et al*., (2008) [27], the effect regulation is often reduced the moment firms comply with basic requirements of the law. Therefore, in the absence of stringent enforcement of legislation, firms may feel less to pressure to behave environmentally responsible. Zhang *et al.,* (2008) [27] suggested further that institutional pressure such pressures from supply chain, customers, and the community had significant positive influence on the firms engaging in improving environmental performance improvements. Firms would improve environmental management performance if there were environmental requirements from the supply chain purchasers and customers. Thus, consumers exhibiting greater willingness to pay for products or services produced in an environmentally conscious drive firms into becoming environmentally responsible (Kim and Ham 2010) [10].

Table 3: Regression Analysis of Environmental Practices among SME in Nakuru Town

	Conducting Environmental Audit		**Implement Environmental Management Systems**		**Implementing Resource Conservation measures**	
Predictor Variables	**Coefficient**	**Exp. (B)**	**Coefficient**	**Exp. (B)**	**Coefficient**	**Exp. (B)**
Awareness	0.708 *0.069***	2.030	1.105 *0.040**	3.019	0.721 *0.139*	0.486
Age	-0.002 *0.159*	0.998	-0.011 *0.988*	1.011	-0.721 *0.326*	0.485
Size	1.361 *0.075***	3.902	1.555 *0. 082***	4.735	-0.010 *0.094*	1.010
Finances	0.580 *0.075***	1.786	0.333 *0.176*	1.403	1.814 *0.071***	6.132
Regulatory Pressure	0.413 *0.239*	0.234	0.346 *0.671*	1.511	0.650 0.301	1.916
Constant	-1.586 *0.210*		3.368 *0.406*	3.368	-0.996 *0.124*	1.525
2 log likelihood % Correct prediction N	59.120 65.6% 32		37.033 71.9% 32		35.549 75% 32	

*significant at p<0.05, **significant at p<0.10

Our study focused the factors that were considered important in driving SMEs to become proactive in an environmental management. However, firms in different sectors face different environmental challenges that vary considerably in scope and intensity, which, in turn, affect their environmental activities (OECD, 2001) [15]. For example, the manufacturing sector have to deal with major environmental issues, while other sectors such as services sector have fewer environmental problems to address. Therefore, while the factors highlighted in our study are important and interrelated, other factors may also be crucial to firms implementing environmental management practices. A study by OECD (2001) [15] pointed out that firm's ownership structure also affects how firms behave environmentally. The study highlighted that higher environmental performance is associated with publicly traded firms or foreign owned firms usually perform better when it comes to environmental management than privately or family businesses. This implies that SMEs ownership has effect on the environmental orientation of the firm, in that private firms/family business/unlisted firms are less likely to lag behind on environmental management.

Conclusion

In this paper, we studied how firms' size, age of firm, environmental awareness, financial resource and regulatory pressure affects the implementation of environmental management practices using a series of logit models. The level of environmental awareness had a significant influence on the adoption of environmental management practices in that the odds ratio of implementing environmental practices increases with increase in environmental awareness of SMEs managers/owners. We also conclude that firm's size affects the environmental management of an enterprise in that increase in size increases the likelihood of implementing environmentally friendly practices. In relation to the effect of financial resources, we observe a significant relationship between availability of financial resources and the implementation of environmental practices. Therefore, the likelihood of adopting environmentally friendly practices significantly reduces in the absence of sufficient financial resources. On the relationship between age of firm and adoption of environmental practices, we conclude that there was no significant association. That is, the decision to undertake environmental audit or implement environmental management systems and resource conservation measures such as energy, was not determined by how long the firms have been in existence. Therefore, all industries have the responsibility to address pertinent environmental issues irrespective of their age. We also observed that while important in environmental management, environmental regulation did not have significant influence on the implementation of environmental practices among the SMEs. Therefore, there is need for increased efforts in raising awareness levels among the owner/managers/ employees of SMEs especially on the environmental practices that are appropriate to SMEs. There is also need for stakeholders such as the National and County Governments to provide financial incentives on programs that supports sustainable practices such implementation of environmental management systems.

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