Effects of Local Environmental Regulations on the Sustainability of Green Supply Chain System in the Floriculture Industry in Kenya

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Abstract: *This is an empirical research with an overall objective of studying the sustainability of green supply chain systems in the floriculture industry in Kenya. The floriculture industry is a crucial sector in the country since it is a key export contributing a significant percentage of the Gross Domestic Product (GDP) and creates employment for tens of thousands of workers. There have, however, been pressing concerns in the country about the non-sustainability of green supply chain systems in the industry. This study focused on local environmental regulations as one of the study variables and employed survey design where a total of 127 flower farms were sampled; 14 during the pilot study and 113 during the main research. The data collection was done with the aid of questionnaires, observation guides and interviews. The resultant data was analyzed to test the hypotheses. The study, ultimately, came up with recommendations based on the research findings to solve the research problem.*

Keywords: *Local Environmental Regulations, Green Supply Chain System, Floriculture, Sustainability.*

1. INTRODUCTION

Horticultural supply chains have transformed Kenya and cut flowers are an important export for the country (Marwa & Zairi, 2008, Nyangena & te Velde, 2012). The cut-flower industry, mainly owned by private entrepreneurs, generates approximately 11% of Kenya's total foreign exchange revenue (Nyangena *et al*, 2012). Due to the growth of the industry, environmental concerns are growing particularly with regard to the use of pesticides and chemical fertilizers, disposal of waste materials, and the protection of water bodies (Getu, 2009). Becht (2007) states that the large flower farms in Kenya pollute the water, environment and destroy the surrounding biodiversity. Environmental issues such as water quality, greenhouse emissions, chemicals and exotic pests have been implicated as factors that pose a great challenge to the future of the industry (Kargbo, Mao & Wang, 2010).

Globalization, cultural exchanges, and celebrations enhancing fraternity such as New Year, Valentine's Day, Christmas and weddings have induced people globally to use flowers as a means of sharing their feelings (Belwal & Chala, 2008). Increased use of flowers and ornamental plants makes the marketing of flowers a lucrative business (Belwal *et al*, 2008). Kafa, Hani and Mhamedi measure green supply chains based on Green Purchasing, Eco-Design, Green Production, Green Distribution and Reverse Logistics (Kafa, Hani & Mhamedi, 2013). Any firm with a score below 4/5 (0.8) is considered as falling below the sustainable green supply chain system standards (Kafa *et al*, 2013). Failure to meet the sustinability standards in the suppply chain systems can lead to diminishing demand and gradual erosion of earnings from the sector (Government of Kenya (GOK), 2013).

2. STATEMENT OF THE PROBLEM

The floriculture industry plays a pivotal role in Kenya's economy since it is a leading foreign exchange earner and employs thousands of people (Sipalla, 2012, GOK, 2013). There was a seven percent (7%) decline in exports in the sector over the period 2011-2013 partly due to inability to sustainably meet the green supply chain standards instituted by the European Union (EU), the largest market for the export (Ndege, 2014). The industry's supply chains are characterized by non-green practices culminating in customer and government complaints (Chrintz, 2001, Dey *et*

al, 2011, KFC, 2013). Non-green supply chains affect the ecology, the flower farm workers, surrounding communities and the ultimate customers (Sipalla, 2012, Gudeta, 2012, Getu, 2009) and have the potential of damaging the brand value leading to shrinkage in flower demand with consequent decline in revenue (Dey *et al*, 2011). They frustrate the achievement of the United Nations Millennium Development Goals (MDGs) on environmental sustainability (Maathai, 2011).

3. RESEARCH OBJECTIVES AND HYPOTHESIS

This study had the overall objective of establishing the determinants of the sustainability of green supply chain system in the floriculture industry in Kenya. One of the specific objectives was to determine whether local environmental regulations affect the sustainability of green supply chain system in the floriculture industry in Kenya. The study on the local environmental regulations variable was guided by the null hypothesis:

H_0: *Local environmental regulations do not affect the sustainability of green supply chain systems in the floriculture industry.*

4. THEORETICAL REVIEW

There are several models on the local environmental regulations. This study spotlighted on two: The Porter Model of Environmental Regulation and the Causal Map of Regulation Model. The Porter Model explains the impact of environmental regulation on supply chains and focuses on the benefits that an organization can reap from environmental regulation. Porter (2009) stated that there are at least five reasons that properly crafted regulations may lead to successful outcomes: (a) Regulation signals companies about likely resource inefficiencies and potential technological improvements; (b) Regulation focused on information gathering can achieve major benefits by raising corporate awareness; (c) Regulation reduces the uncertainty that investments to address the environment will be valuable; (d) Regulation creates pressure that motivates innovation and progress; and (e) Regulation levels the transitional playing field (Ambec *et al*, 2011).

The causal map of regulation model was presented by Coglianese (2012). The basic elements of regulation, behavior, and outcomes form the core of any model on how regulations are supposed to work. The Causal Map Model builds on the core elements to present a relatively simple schematic of regulation and its impacts. It maps out in a general way the relationships between distinct steps in the development and implementation of any regulation, leading to its eventual effects. The schematic shows that regulation itself comprises not only a rule – but also that its effects will be influenced by how that rule is implemented and enforced (Coglianese, 2012).

These models led to the choice of the research hypothesis: *H_0: Local environmental regulations do not affect the sustainability of green supply chain systems in the floriculture industry.*

5. SECONDARY RESEARCH

According to Hitchcock (2012), international environmental protocols are important, both in terms of providing a continuing international framework for action on climate change, and in terms of eliciting a stimulus for further legislation at regional and national level which is likely to reinforce the need for low carbon and sustainably green supply chains. At its most basic level, regulation is designed to work according to three main steps (Coglianese, 2012): firstly, regulation is implemented, which leads to changes in; secondly, the behaviour of individuals or entities targeted or affected by regulation, which ultimately leads to changes in; thirdly, outcomes, such as amelioration in an underlying supply chain problems or other (hopefully positive) changes in conditions in the world.

Green Laws are the regulatory measures taken to restrict activities that cause damage to the natural environment (UN, 2012). According to Hitchcock (2012), supply-chain pressures are driven by regulatory developments relating to specifications for products to be placed on the market and the EU is particularly important in this respect because of the size of the single market, which it represents. There are more indirect regulatory pressures affecting products (Hitchcock, 2012). A regulation works when it solves the supply chain problem (s) that prompted the concerned government to adopt it in the first place (Delmas & Montiel, 2011). According to Getu (2009), horticulture producers can self-regulate by developing their own codes of practice.

According to Nyangena *et al* (2012), the Kenya Flower Council (KFC) has designed a codes of conduct, the Good Agriculture Practices (GAP) which primarily aims to achieve sustainable green supply chain systems. By being compliant with the GAP code of practice, the flower farms promote green supply chains and ensure good working conditions (Nyangena et al, 2012).

The imposition of law and penalties provides a powerful incentive to behavioral change, and is very effective in focusing attention with regard to green supply chain management (Dheeraj & Vishal, 2012). There are a multiplicity of local regulations in Kenya that help regulate environmental conservation and enforce green supply chain systems in Kenya (GOK, 2013). The legal instruments used to implement these legislations are fines, surcharges, penalties and levies (Barczewski, 2013). Environmental Audits assist in the implementation of green supply chain systems as they define the gaps and enable management to develop remedial action plans to scale-up the achievement of sustainablity objectives of the green supply chain systems (Environmental Protection Agency (EPA), 2000, Coglianese, 2012, Cavinato, 2004).

6. EMPIRICAL REVIEW

There was a research conducted by Barczewski (2013) on the Thika superhighway in Kenya to establish how well implementation and enforcement, of local environmental regulations were working and the extent of communication and cooperation between the National Environment Management Agency (NEMA) and other lead agencies involved in the construction of the highway. The research adopted a descriptive case study approach and used questionnaires as the main tool for data collection. The research established that the bodies charged with environmental protection were largely not up to the task. It also established that green supply chain management was impeded by underfunding of NEMA leading to amputated ability to execute its primary mandate of ensuring the implementation of green supply chain systems.

A research conducted in Uganda by Akello (2007) focused on the implementation of local environmental regulations and zeroed in on the policy framework, the constitution, the framework environmental law, various sectoral environmental laws and regulations providing a basis for environmental regulation in the country. The literature review study established that green laws were effective but there were implementation bottlenecks due to poor compliance culture in the country. The research pointed to a general lack of respect for established environmental authorities and laws coupled with political interference which undermined compliance as a mechanism for environmental regulation.

7. RESEARCH METHODOLOGY

This study adopted a descriptive research design. A descriptive study describes the state of affairs as it exists and results in the formulation of important principles of knowledge and solution of significant problems (Kombo & Tromp, 2006). The target population of the study constituted the 137 flower farms which form the total membership of Kenya Flower Council (KFC, 2013) (major flower farms in Kenya). The research adopted the survey design approach in the data collection process and used semi-structured questionnaires and interview guides to gather the data for analysis. Interviews were also conducted to obtain expert views from the concerned lead organizations: the KFC, National Environmental Management Authority (NEMA), Horticultural Crops Development Authority (HCDA) and a floriculture consultancy. Secondary data was collected through the theoretical and empirical review. A pilot study was conducted using 14 flower farms to establish the reliability of the research instrument. Cronbach alpha was used and it gave a result of 0.802 for the Local Environmental Regulations variable which implies that the research instrument could provide consistent results (Huber, 1981). This research used descriptive, requisite and inferential statistics to analyze the data. These computations were performed using the Statistical Program for Social Science (SPSS).

8. RESULTS AND DISCUSSION

The pilot study of this research involved 14 flower farms whereas the main study involved 113 flower farms across the country with the initial survey target being 139. Hence, 88% of the target flower farms were reachable (sampled) during the pilot survey and the main study. The mean score of all the variables was calculated to aid in the computation of inferential statistics. It was

evident that local environmental regulations had the highest mean score of 4.0597 compared to other variables; Environmental Risk Management Policies, Customer Feedback and the Level of Technology having mean scores of 3.8009, 3.8230 and 3.8473,. Cost economics had the least mean score of 3.7965 with the independent variable having a mean score of .6478 on a 2 point scale.

The study sought to find out the significance of the local environmental regulations and established a Cronbach Alpha of .918 meaning that the variable was significant in determining the sustainability of green supply chain systems. The study also conducted a Multicollinearity Analysis between the local environmental regulations and other study variables. Multicollinearity is the undesirable situation where the correlations among the independent variables are strong (Cooper & Schindler, 2008). Multicollinearity increases the standard errors of the coefficients. The study used tolerance and Variance Inflation Factor (VIF) values for the predictors as a check for multicollinearity. The tolerance values were between 0.650 and 0.924 with corresponding VIF values between 1.083 and 1.539 implying that there was no multicollinearity in the model.

A Confirmatory Factor Analysis (CFA) was ran using a loading factor of 0.800 as recommended by Zikmund (2008) for a study of this nature. The CFA tool helps in the identification of variables that would best explain the variance observed in each variable (Cooper *et al*, 2008). There was a result of 0.903 for the Local Environmental Regulations implying that the variable explained a high percentage of the total variance and, hence, relevant for making the research inferences. The hypothesis was tested by regressing Local Environmental Regulations on the sustainability of green supply chain systems. The results of the regression are presented in the following table:

Regression Results for the Local Environmental Regulations and Sustainablity of Green Supply Chain System (Model Summary)

Model	R	R Squared	Adjusted R Squared	Std. Error of the Estimate	
1	.922[a]	.850	.844	.18256	

Anova					
	Sum of Squares	df	Mean Square	F	Significance
Regression	20.355	4	5.089	152.685	.000[b]
Residual	3.599	108	.033		
Total	23.955	112			

a. Dependent Variable: Green Supply Chain System

b. Predictors: (Constant), Frequency of Environmental Audits, Obsevance of Local Environmental Regulations, Whether Firm gets Penalised Regard to Environmental Regulations, Environmental Codes and Standards (Environmental Self-Regulation).

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.865	.129		6.726	.000
Green Laws	.096	.032	.277	3.041	.003
Environmental self-regulation	.246	.044	.735	5.602	.000
Penalties for Non-Compliance	.160	.035	.486	4.527	.000
Environmental Audits	.005	.054	.014	.100	.921

a. Dependent Variable: Green Supply Chain System

The results show that the influence of local environmental regulations was significant (F = 152.685, p < 0.05). The coefficient of determination (R Squared) is 0.850 implying that it explains the variability of the independent variable by up to 85% (R Squared = 0.850, p < 0.05). The sub-variables, green laws, environmental self-regulation, penalties for non-compliance and environmental audits explain the variability in the dependent variable (sustainability of green supply chain system). With a change in one unit (1) of the green laws, the dependent variable varies by 0.096; with a unit change in environmental self-regulation, the dependent variable varies by 0.246; with a unit change in penalties for non-compliance, the dependent variable varies by 0.16; and with a unit change in environmental audits, the dependent variable varies by 0.005.

The overall, regression results presented demonstrate that local environmental regulations is affects the sustainability of green supply chain system in the floriculture industry. The hypothesis that local environmental regulations do not affect the sustainability of green supply chain systems in the floriculture industry was therefore rejected. As local environmental regulations increase, the sustainability of green supply chain systems increases too. These research findings are a clear indicator that implementation bottlenecks and content deficiencies of the local environmental regulations affect the sustainability of green supply chain systems in the floriculture industry in Kenya.

These findings confirm the view by Nyangena *et al* (2012) that flower farms face challenges on issues of traceability and environmental accountability. The findings also tally with Barczewski (2013) research which established that the implementation of green supply chain systems is impaired by the complexities of multiple stakeholder involvement and competing interests. The study confirms the Porter model (Porter, 2009) and the Causal Map of Regulation schematic (Coglianese, 2012) that provide outlines on the complex nature of implementing changes to embed sustainably green supply chain systems.

9. SUMMARY OF FINDINGS AND RECOMMENDATIONS

The findings of the study indicated that local environmental regulations determine the sustainability of green supply chain systems in the floriculture industry in Kenya. The local environmental regulations explain the variability in the sustainability of green supply chain system by up to 85%. The research established that there were varying degrees of influence by the local environmental regulations sub-variables on the sustainability of the green supply chain system. Green laws and environmental self-regulation have a positive influence whereas penalties for non-compliance and environmental audits have a negative influence. The flower farms have not created the necessary structures to ensure seamless compliance with the local environmental regulations. The regulations effected to safeguard and ensure green supply chains (green laws) have a positive effect (0.096) on the sustainability of green supply chain systems in the floriculture industry. The requirements of these regulations constrain the flower farms to follow prescribed environmental standards to avoid sanction by governmental authorities.

Many flower farms have taken the initiative to bind their commitment to green supply chain systems by subscribing to local and international certifications such as Fair Trade Mark, KFC Code of Practice (CoP), and Fair Flowers Fair Plants (FFP) that require adherence to green standards. These have not necessarily enhanced the sustainability of green supply chain systems in the sector. The industry lacks rigorous green supply chain audits and there are no penalties structures imposed by governmental authorities for non-compliance to environmental requirements. The study confirms the Porter model (Porter, 2009) and the Causal Map of Regulation schematic (Coglianese, 2012) that provide outlines on the complex nature of implementing changes to embed sustainably green supply chain systems.

Based on the research findings, several recommendations can be made. The government and flower farms should put in place a regular calendar for green supply chain audits. The audits should be comprehensive and evaluate all aspects on the level of compliance to green supply chain standards. The audit reports would form the basis for closing gaps and developing actions to raise the sustainability standards of the green supply chain systems in the industry. The responsible department in government should come up with clearly defined penalties for non-compliance to green standards. This will encourage the flower farms to strengthen their initiatives

in ensuring sustainability in their green supply chain systems. The flower farms need to develop mechanisms for gauging their level of compliance to the green standards enunciated by the certifications for which they subscribe to. Strengthening self-regulation and implementation of a regular audit regime can assist flower farms attain, or maintain, sustainability in their green supply chain systems. Future researchers should consider carrying out a similar study in a different sectors to establish the variation in responses.

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