Journal of Energy Technologies and Policy
ISSN 2224-3232 (Paper) ISSN 2225-0573 (Online)
Vol.4, No.4, 2014

Transforming Sugarcane By-Products into a Sustainable Energy Source in Kenya: Strategic and Managerial Implications

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Abstract

This article discusses how conventional energy sources based on oil, coal, and natural gas have proven to be highly effective drivers of economic progress, but at the same time damaging to the environment and to human health besides being cyclical in nature, due to the effects of oligopoly in production and distribution. These traditional fossil fuel-based energy sources are now facing increasing pressure globally from a host of environmental fronts hence need to study alternative sources. The main objectives of this article will be determination of how different factors will influence the adoption and use of sugar cane by products as source of sustainable energy and relevant managerial implications influencing management decisions. The study adopted a cross-sectional descriptive research design in which qualitative and quantitative data will be collected. The target populations were employees' of Mumias Sugar Company in Kenya. A random sample of 63 employees at the sugar Company was selected through stratified sampling. Questionnaires and personal interviews was used to collect primary data from respondents. Secondary data was gathered from Mumias Sugar Company (MSC) and other sources. The study collected both primary and secondary data. Before the questionnaires were finally administered to participants, pre-testing was carried out to ensure that the questions were relevant, clearly understandable and made sense. Quantitative data collected was analyzed using descriptive statistics. The study also covered methods used for data collection that involved observation, questionnaires and interviews. Data analysis methods included manipulation of data into a structural form suitable for descriptive analysis through SPSS software.
Key words: Sustainable energy, sugarcane by-products, renewable energy

1. Introduction

There is wide consensus that energy is directly linked to the key global challenges faced by the world today and as such, the development of sustainable and long-term solutions to meet these growing, diverse and urgent energy needs. Many countries all over the world have continued to face critical challenges in the energy sector with the existing energy policies and systems failing to provide the platform needed to support the economic development. More than ever there is need to scale up renewable energy to levels that would have a significant impact on the energy scene through deliberate interventions on policy and institutional environment; technology acquisition, development and integration; investment mobilization; and regional integration, networking, and capacity building (Robustell, 2006).

According to Xiang (2007), many developing countries energy has been supplied in insufficient quantity, at a cost, form and quality that has limited its consumption by the majority of the population, making the continent the lowest per capita consumer averaging about 0.66 Tons of Oil Equivalent (TOE) compared to the global average of 1.8 toe in 2008 . Over the past four decades, the gap between energy supply and demand in Africa has actually widened, while it has narrowed in other developing countries. Unless drastic interventions are made, recent trends indicate that this gap will continue to grow, and a majority in Africa will continue to lack access to basic energy services and hence would have limited chances of realizing any meaningful social and economic development.

Africa is endowed with vast renewable and non-renewable sources of energy. It is estimated that the continent has 1,750TWh potential of hydropower and 14,000 MW of geothermal potential. The continent receives abundant solar radiation through the year, and recent studies have confirmed the availability of abundant wind energy resources along some of the coastal and specific inland areas of Africa. With respect to non-renewable energy, coal resources are available in abundance in Southern Africa. At the end of 2007, the continent had over 117 billion barrels of oil of proven oil reserves and over 14.6 trillion cubic meters of proven gas reserves.

On their part Dweck and Leggett (2008) argue that renewable energy sources such as biomass, wind, solar, hydropower, and geothermal can provide sustainable energy sources, based on the use of routinely available, indigenous resources. A transition to renewable-based energy systems is looking increasingly likely as their costs decline while the price of oil and gas continue to fluctuate. In light of recent high and volatile oil prices, renewable energy has emerged as a viable option at most places that can effectively contribute towards addressing the continent's energy challenges. Efforts to develop renewable energy in Africa have, so far, focused on removing barriers, and much more still needs to be done. What is also now clear is that sufficient good lessons learned from projects implemented across the continent and elsewhere can be instructive in defining a more proactive, concerted and continent-wide effort to scale up the deployment of renewable energy technologies.

In a bid to transform Kenya into a newly industrialized middle income country, its development blueprint, Vision 2030, highlights the path that must be followed. This development blueprint identifies agriculture as one of the key sectors that will advance Kenya to a projected growth rate of 10% annually. Foreign direct investment is one of the strategies that will enable Kenya to achieve its goals. To this end, the Investment Promotion Act was enacted in 2004 giving legal mandate to Kenya's investment agenda (GoK 2010). Foreign investors in agriculture only have to prove that their investment will contribute towards creation of employment, acquisition of new skills or technology for Kenyans, contribute to tax revenues, increase foreign exchange or utilize domestic raw materials like sugar cane by products as upheld by Murphy (2004). Investment legislation and policy does not require that the investor looks into the economic, social, cultural and environmental impacts and implications of their investment particularly on local communities.

2. Literature review

2.1 Social and environmental development

According to Okech, (2010), environmental conservation where biodiversity is protected is more likely to demonstrate the dilemma between conservation and restitution claims under land reform in developing countries a factor that is key to social development of any community. Any activity that seems to promote social development is likely to be manifest in the growth of small towns and urban areas a perspective shared by (Westoby, 1989).

Webourne (1990) notes that the growth of urban areas is likely to lead to negative implications for the hydrological cycle since the water catchment areas are interfered with due to pollution and other deforestation activities. To address such problems in Kenya it is necessary to map out the biomass energy characteristics in each County, District, and Location as the beginning of a process of identifying key problem areas and identifying specific intervention points. A study was done for two districts to identify key characteristics and causes of biomass energy scarcity and possible intervention points the debate on sugarcane ethanol contains several major issues. The first one is impact of sugarcane production on land use change and climate. Here the assumption is made that land use for sugarcane implies serious impacts on the carbon stock, GHG missions, and water and soil conditions. (Macedo et al , 2004). The other issue is the impact of new technologies on the efficiency of biomass for biofuels and the conversion of biomass for ethanol. Here the assumption is that new technologies may provide not only higher efficiency, but also the need for larger scale of operations. (Faaij, 2006).

The partnership of the Government of Kenya in the Mumias Sugar Company (M.S.C.) has been described as one of the most imaginative and successful examples of transnational private participation in agricultural development (Hertel *et al.,* 2008). It provided productive employment for an area of the country previously neglected, was highly labour-intensive in its operations, made up a deficit in supplies of a major food that would otherwise have had to be imported, and paid over to the government in taxes a substantial part of its gross income.

In general renewable forms of energy are considered "green" because they cause little depletion of the Earth's resources, have beneficial environmental impacts, and cause negligible emissions during power generation. Yet, while biomass is in principle renewable and can have positive environmental impacts if managed properly it also shares many characteristics with fossil fuels, both good and bad. While it can be transported and stored allowing for heat and power generation on demand, modernized bioenergy systems can also have negative environmental impacts associated both with the growing of the biomass and with its conversion to energy carriers.

Environmental impacts of biomass production must be viewed in comparison to the likely alternative impacts (locally, regionally, and globally) without the Bioenergy system in place. For example, at the local or regional level, the relative impacts of producing Bioenergy feedstock's will depend not only on how the biomass is produced, but also on what would have happened otherwise. Through life cycle analysis (LCA) studies it has been found that where biomass displaces fossil energy systems there will be a reduction in the impact on global climate through a reduction in overall greenhouse gas emissions, but for other types of emissions (i.e., NOx, SO2, N2O) the picture is less clear and is strongly dependent on the source of the biomass, technical details of the conversion process, and the fossil fuel being displaced. Many bioenergy conversion technologies offer flexibility in choice of feedstock and the manner in which it is produced. In contrast, most agricultural products are subject to rigorous consumer demands in terms of taste, nutritional content, uniformity, etc. This flexibility makes it easier to meet the simultaneous challenges of producing biomass energy feedstocks and meeting environmental objectives. For example, unlike the case with food crops, there are good possibilities for bioenergy crops to be used to revegetate barren land, to reclaim water logged or salinated soils, and to stabilize erosion-prone land. Biomass energy feedstocks when properly managed can both provide habitat and improve biodiversity on previously degraded land. Erosion and removal of soil nutrients are problems related to the cultivation of annual crops in many regions of the world. While relative to a healthy natural ecosystem bioenergy systems may increase erosion and deplete soil nutrients and quality, Bioenergy production on degraded or erosion-prone lands can instead help stabilize soils, improve their fertility, and reduce erosion.

Perennial energy crops (unlike food crops) improve land cover and form an extensive root system adding to the organic matter content of the soil. Also removal of soil during energy crop harvest can be kept to a minimum since roots are left in place, and twigs and leaves can be left to decompose in the field enhancing the soil's nutrients. This helps prevent diseases and improve the soil fertility and quality. Environmental benefits of biomass crops, for carbon sequestration, biodiversity, landscape and soil stabilization can be particularly significant if plantations are established on intensively managed agricultural land.

While energy crops can be harvested by coppicing every few years (three or four) the stools (rootstocks) can survive for many decades or even centuries becoming significant carbon sinks. In addition, there are considerable benefits for both landscape and biodiversity when native species are used. For example in Europe it would be preferable to grow willows and poplars rather than eucalyptus. Willows in particular support a high biomass and diversity of phytophagous insects, which in turn can support an important food web with many bird species. Also when feasible the recycling of ashes from the biomass combustion can return crucial trace elements and phosphates to the soil.

2.2 Business environment

Once an organization has acquired competence in making a certain product, it can maximize productivity by procuring the latest and modern technology. Ohmae (1985) describes Japan as an example of unforgiving economy, where thousands of corporations are destroyed. People determine ultimately whether or not competitive advantage is created and sustained.

This depends on the human resource practices adopted within the organization. People are able to create and implement strategies in a supportive culture. It is not a marketing practice to identify and interact with very precise target markets.

Traditionally, marketers who gain processing efficiencies, create databases, and perform various forms of customer analysis have used technology (Michelle et al, 2003). Marketing automation is the next logical step, because it helps one to do something with that insight (Bailor, 2005). Drucker captures an environmental scanning analysis that depicts leadership as that, which should manage the fundamentals like people, inflation among others (Drucker, 1994). Strategic leadership should ensure that values and culture within an organization are appropriate for satisfying key success factors. (Harvey and Maylor, 2007).

It is now widely recognized that climate change is having and will have significant impacts on social, economic and ecological systems and processes as socio-economic inequalities widen locally as well as globally (Intergovernmental Panel on Climate Change, IPCC, 2007). Thomas and Twyman (2005:122) state that an examination of climate change needs to include the relationships between global processes (including emission effects and international conventions), national responses and local outcomes, and particularly the effects of national decisions and policies on local opportunities and abilities to adapt. Thus, aspects relating to environmental conflicts are important to consider.

Steffen *et al.* (200) identify a range of proximate/direct (immediate human activities that drive a particular change) and underlying (fundamental needs and desires of individuals and groups) drivers affecting the natural environment and intensifying climate change. The direct drivers of human activities associated with climate change are land clearing (especially removal of forests/ natural ecosystems) and land cover conversion, introduction of alien species, agricultural practices, fossil fuel and biomass burning, and poor water use and management practices (including groundwater removal). The underlying human-induced drivers include an increase in demand for a wide range of goods and services including basic needs (food, water, clothing, shelter, health and, transport, recreation and leisure activities, safety and security, and entertainment and luxury items. The impacts of climate change on socio-political systems are not new.

For example, Davis (2001, cited in Barnett and Adger 2007) shows how the El Niño events and famines of the 19th century, triggered by droughts, resulted in political and economic colonization that deprived local people of their entitlements to natural resources. Barnett and Adger (2007) further argue that it is important to consider how violent conflict is itself a powerful cause of human insecurity and vulnerability to climate change. Thomas and Twyman (2005) identify the implications of climate change for equity and justice among vulnerable groups at local and sub-national levels. Equity and justice, they assert, are important to consider because the poorest and most vulnerable groups (especially in developing countries where natural resource dependency is high) will disproportionately experience the negative effects of climate change.

Barnett and Adger (2007) state that climate change is increasingly being called a 'security' problem because there is concern that climate change may increase the risk of violent conflict. The underlying proposition is that climate change is likely to undermine human security by reducing the natural resource base and limiting access to existing natural resources which are central to sustainable livelihoods, especially in developing contexts as indicated earlier. In specific contexts, direct and indirect impacts of climate change on human security may in turn increase the risk of violent conflict (Barnett & Adger 2007). Nordås and Gleditsch (2007) state that conflict-inducing effects of climate change have emerged in the literature and although several causal chains and/or paths to these conflicts have been suggested, there is a gap in terms of providing substantial evidence for these claims.

This point is mirrored in Omolo's (2010) empirical study in this issue. In light of increased droughts in the area, and given that livestock forms the foundation for food security in Kenya, competition over grazing land and water has increased, leading to violence. While the author reports that people have adopted a number of coping strategies to deal with climatic variability,

Environmental conflicts: Key issues and management implications such as diversification into agriculture, vulnerability is intensified because of an increase in militarized cattle raiding, attributed in part to economic decline in the Horn of Africa. Moreover, Reuveny (2007) illustrates that climate change-induced migration (referred to as environmental migration), which is likely to be more frequent given the increase in extreme weather events, can create and intensify violent conflicts. This will be particularly acute in lesser developed countries where, because of limited options to adapt to or mitigate climate change, people are more likely to leave affected areas.

Drucker captures an environmental scanning analysis that depicts leadership as that, which should manage the fundamentals like people, inflation among others (Drucker, 1994). Strategic leadership should ensure that values and culture within an organization are appropriate for satisfying key success factors. This should lead to environmental-value-resources (E-V-R) congruence. John Kao, Chief Executive Officer (CEO) of the Idea Factory, a consulting organization , says that a number of firms have come to him asking how do design an innovation engine and capability. He recommended the following (i) Develop crossfunctional teams; (ii) Explore factors outside the firm's usual perspective e.g. customer attitudes, new technologies, industry trends. The differentiation strategy appeals to a sophisticated or knowledgeable consumer interested in a unique quality product or service and willing to pay a higher price for these non-standardized products (Drucker, 1994).

Organizations need to acquire markets that provide more avenues for more sales through various forms of promotion and distribution. This is the department that acts as a window for the firm and should be strategic in capturing all important information that can be fed back on tastes and preferences of various customers. For example, Pizza Hut, a differentiator that continually innovates with new products to keep customer's interest, builds and managers customer elationships. From customer orders, Pizza Hut has competitive intelligence that predicts trends and behavior to better manage targeted direct mail campaigns. The company claims to have the largest fast-food customer data warehouse in the world with almost 50 percent of the US market and some 40 million households included (Brown, 2003).The key to using the tactic of leveraging a diverse workforce to

build market share goes beyond simply hiring people of color. It also encompasses inviting minorities to do business with them as opposed to waiting until they simply discover you.

Culture refers to a shared meaning, shared understanding and shared sense making. The value any organization places on role models, through the system of complements, and coupled with employee expectations has a big impact on developing the morale of workers. Mullins says that culture impacts on most aspects of organizational life, such as how decisions are made, who makes them, how rewards are distributed, who is promoted, how people are treated and how organization responds to environmental changes (Morgan, 1998).

Microsoft developed a culture of hiring creative, hardworking individuals. Gerald says that management systems should be developed that which motivates employees from top to bottom to pursue growth oriented, innovation focused competitive strategies (Cole, 2004). Relationship marketing theory can be used to explain these phenomena (Morgan and Hunt, 1994).One reason why workforce diversity leads to increased sales and profits is because buyers are better able to bond with salespeople that share their cultural values.

Michael porter says that firms can take variety of actions to influence these perceptions (Porter's, 1985). He further alludes that 5 forces of competition that emanates from the environment determine competition in the market. As a result of these forces, the concept of differentiation was curved out to bring more prosperity in markets. Chamberline and Robinson coined in organizational competences, personnel, leadership, finances, to bring out a differentiated product that can be more competitive to make them gain more competitive advantage (Chamberline and Robinson). They argue that a well-established organization, with well trained and motivated personnel can be able to initiate strategies that can effectively be sustained. The driving forces manifest this concept, which may be from suppliers (Harvey, Maylor, 2007).

Environmentally related conflicts are linked to political, economic, social and ecological contexts. Very few studies or intervention strategies to address these conflicts adopt an integrated and interdisciplinary approach. Rather, one aspect is focused on in a fragmented manner and the others are neglected. However, it is important to emphasize that a focus on ‘conflict’ underscores the social and political aspects. The power dynamics and social components are crucial. Not all environmental conflicts have negative impacts, however. Conflicts can be important focal points to highlight social, economic and environmental problems. For example, from an ecological perspective, conflicts can draw attention to environmental problems and result in conservation efforts. White et al. (2009) state that conflict management is necessary to reduce negative impacts (and promote positive effects).

While planning is a prerequisite for effective management and implementation in any context, it often remains an ideal rather than a reality (Paterson 2007:4). Ahmed (2008:45) reveals that although environmental concerns and agendas are increasing and management is being advocated by governments worldwide, current approaches remain regional, sectoral and unsustainable despite the proliferation of international policies and treaties.

Furthermore, improper land use planning and ineffective implementation of policies are worsening the situation and contributing to *ad hoc* (and often inappropriate) interventions. This has devastating impacts on the biophysical environment and the long-term sustainability of the environment. Additionally, the impacts on people, especially the poor and vulnerable, can be dire. Environmental Impact Assessments, Social Impact Assessments and Strategic environmental Assessments remain important legal and procedural tools to manage the environment, particularly with regard to current and intended development

3. Methodology

The research design used in this study was a descriptive survey with collected data from respondents through mailed questionnaires on how different managerial implications of using sugar cane by products in generating sustainable energy. The research targeted employees from Mumias Sugar Company who were drawn from the top management, middle and the lower cadre. The researcher obtained the total number of employees in the organization from their approved establishment. The population was randomly sampled and 10% of each category was arrived at according to (Mugenda, 2003) 10% is representative for large population. The data collected was cleaned, coded and processed by SPSS software to build a database of statistics that was used to describe, analyze and present the data. Regression analysis using ordinary least squares (OLS) was used to analyze the effects of the independent variables on the dependent variable.

4. Discussion of findings and results

4.1 Operational costs

Table 1.0 below indicates that, 37.7% of the respondents felt that operational costs have significantly reduced as 26.4% agreed while 20.8% were indifferent as 11.3% disagreed and 3.8% strongly disagreed that adoption of sugar cane bye products as a source of energy.

Table 1.0: Adoption of sugar cane by products and operational cost reduction

	Frequency	Percent
S Agree	20	37.7
Agree	14	26.4
Indifferent	11	20.8
Disagree	6	11.3
S Disagree	2	3.8
Total	53	100

Table 2.0: operational costs

	SD		D		Moderate		Agree		SA		No response	
Statement	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
The adoption of sugar cane by products has significantly reduced operational costs.	5	10.6	6	12.8	11	22.9	17	36.2	10	20.3	1	2.1
Sugar cane bye products as a source of energy are not only effective but also efficient in large scale production.	4	8.5	3	6.4	10	21.3	9	19.1	10	21.3	1	2.1
Comparatively production of sugar is cheaper in Mumias than completion	6	12.8	21	44.7	11	23.4	8	17.0	-	-	1	2.1
A sugar cane bye product as a source has limited social costs and is environment friendly.	3	6.4	2	4.3	18	38.3	8	17.0	15	31.9	1	2.1

KEY: SD- Strongly Disagree, D- Disagree, A- Agree, SA – Strongly Agree Source: (Author, 2012)

4.2 Social development

Table 3.0: Social development

Statement	SD		D		Moderate		A		SA		No response	
	F	%	F	%	F	%	F	%	F	%	F	%
Adoption of sugar cane bye products as a source of energy has transformed the life of people living around Mumias.	10	21.3	8	17	11	23.4	17	36.2	-	-	1	2.1
The cost saving index is high as it is a source of energy that is friendly to the environment.	13	27.7	11	23.4	7	14.9	11	23.4	4	8.5	1	2.1
Energy generated by Mumias has helped in lighting of homes and business premises	10	21.3	7	14.9	14	29.8	15	31.9	-	-	1	2.1
Use sugar cane bye products as a source of energy has contributed to more funds being available for social corporate responsibility.	5	10.6	10	21.3	15	31.9	14	29.8	2	4.3	1	2.1
Energy being generated from such a source is eco friendly.	2	4.3	1	2.1	3	6.4	9	19.1	31	66.0	1	2.1

KEY: SD- Strongly Disagree, D- Disagree, A- Agree, SA – Strongly Agree

According to the findings, 36% of the respondents Mumias sugar operations have undergone a transformation as the source of energy is not only effective but also efficient thus making Mumias more competitive. Meanwhile 23.7% disagreed that sugar cane bye products is the single factor that can contributed to a good market index.

4.3 Business environment

The study found out that, majority of the respondents 26.4%, strongly agreed that business environment has changed since the adoption of sugar cane bye products as a source of sustainable energy 34% agreed while 17% were indifferent and only 7 % and 5% respectively dint agree and strongly disagreed that there has been a social transformation due to adoption of sugar cane by products as a source of energy.

Table 4.0: Business environment change

	Frequency	Percent	Cumulative Percent
S Agree	14	26.4	26.4
Agree	18	34.0	60.4
Indifferent	9	17.0	77.4
Disagree	7	13.2	90.6
S Disagree	5	9.4	100
Total	53	100	

Table 5.0: Business environment

Statement	SD		D		Moderate		Agree		SA		No response	
	F	%	F	%	F	%	F	%	F	%	F	%
The business environment has substantially changed since adoption of sugar cane bye products as source of energy.	5	10.6	6	12.8	16	34	17	36.2	2	4.3	1	2.1
There is a relationship between new strategy adopted by Mumias sugar and competiveness of Mumias sugar company.	4	8.5	3	6.4	10	21.3	9	19.1	20	42.6	1	2.1
Adoption of sugar cane bye products as a source of energy has led to increased efficiency in operations of the plant.	3	6.4	15	31.9	3	4.3	8	17.0	18	38.3	1	2.1
Since the adoption of the strategy profitability has been greatly enhanced.	3	6.4	13	27.7	21	44.7	9	19.1	-	-	1	2.1

KEY: SD- Strongly Disagree, D- Disagree, A- Agree, SA – Strongly Agree Source: (Author, 2012)

4.4 Regression Analysis

Adjusted R^2 is called the coefficient of determination and tells us the various management implications since the adoption of sugar cane bye products as a source of energy. From the table below, the value of adjusted R^2 is 0.828, which implies that, there was a variation of 82.8% between the dependent and the independent variables. This simply means that, when strategic goals and objectives, operational costs, social development and business service development are jointly applied, efficient capital allocation would be achieved at 82.8%.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.910[a]	.828	.809	.861

Predictors: (Constant), Business environment, Social development, Operational costs, Goals and objectives

Dependent Variable: Cost effectiveness

Anova

The study used ANOVA to establish the significance of the regression model from which an f-significance value of $p<0.001$ was established. This shows that the regression model has a less than 0.001 likelihood (probability) of giving a wrong prediction.

Table 6.0: ANOVA table

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.944	4	2.986	4.026	.001[a]
	Residual	35.603	48	.742		
	Total	47.547	53			

a. Predictors: (Constant), Business environment , Social development, Operational costs, Goals and objectives

4.5 Coefficients

coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.193	.564		2.117	.001
Social development	.198	.194	.128	1.021	.312
Operational costs	.339	.106	.416	3.189	.003
Goals and objectives	.195	.120	.220	1.623	.001
Business environment	-.187	.111	-.231	-1.690	.002

a. Dependent Variable: Cost effective

$Y = 1.193 + 0.195X_1 + 0.339X_2 + 0.198X_3 - 0.187X_4$ p=0.001

Whereby Y is management implications, X_1 is strategic goals and objectives, X_2 is operational costs, X_3 is social development and X_4 is business environment. The model illustrates that when all variables are held at zero (constant), the value of efficient management implications would be 1.193. However, holding other factors constant, a unit increase in goals and objectives, would lead to a 0.195 increase in management implications, a unit increase in operational costs would lead to a 0.339 increase in management allocations, a unit increase social development would lead to a 0.198 increase in management implications. On the other hand, a unit increase in business environment would lead to a -0.187 decrease in management implications. This suggests that increased objectives, operational costs and social development, would increase management implications while increased business environment would negate management implications.

5. Conclusion and recommendations

5.1 Conclusion

From the above findings, it was concluded that adoption of sugar cane by-products as a source of sustainable energy as a strategy can be influenced by multiple factors including goals and objectives, operational costs, social development, and business environment among others.

5.2 Recommendations

Regulation needs to go beyond the establishment of regulatory agencies and the passage of laws and regulations. In the Kenyan sugar industry, there is need for adequate laws to maintain market integrity. This requires a strengthening of the monitoring and surveillance activities of regulatory agencies, reform of judiciary systems and more reliance on regulatory rules.

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