

**ADOPTION OF GREEN ENERGY AND PERFORMANCE OF BUTALI SUGAR
COMPANY IN KAKAMEGA COUNTY, KENYA**

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DECLARATION

I declare that this project is my original work and has never been presented in any other university for any other award. No part of this proposal should be produced without authority of the author or/and Kenyatta university

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This research project has been submitted for examination with my approval as the University Supervisor.

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DEDICATION

This project is dedicated first and foremost to the Almighty God whose providence, grace, and care I cherish. I sincerely dedicate this work to my family for their understanding while I was away from them pursuing the studies and for their support. If it were not for you I would not have gone this far.

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ABBREVIATIONS AND ACRONYMS

CEO	Chief Executive Officer
FAO	Food and Agriculture Organization
GOK	Government of Kenya
IGCC	Integrated Gasification Combined Cycle
KPLC	Kenya Power and Lightening Company
MW	Megawatts
NACOSTI	National Commission for Science, Technology and Innovation
RBV	Resource-Based View
SPSS	Statistical Package for Social Sciences
USD	United States Dollars
VRIN	Valuable, Rare, Inimitable, And Non-Substitutable

OPERATIONAL DEFINITION OF TERMS

- Adoption:** This refers to the application of technologies and products that are effective in maximizing production of bagasse as the main green energy.
- Cost of Production:** This refers to the amount of money that sugar processing companies put in their annual budget towards the generation of green energy from bagasse. It involves investment on material and technology.
- Green energy:** It refers to alternative sources of energy that replaces non-renewable energies. In this study, this type of energy is specifically related to bagasse as the main raw material.
- Organizational Capacity:** the resource ability, knowledge and experience of a firm to execute and implement a project. This can be through staff training, experience and education related to bagasse related green energy generation.
- Organizational policy:** The study refers to this term as available regulations that either hinder or support the generation of bagasse related green energy, and the major focus being operational and energy generation policies.
- Pollution reduction:** this is the process of controlling the type, amount and condition of emissions and waste products from a firm to ensure they do not degrade the environment.
- Bagasse** This is the dry pulpy residue left after the extraction of juice from sugar cane

ABSTRACT

There is increased number of sugar companies that have failed despite advance increase in strategic management best practice. Several studies on organisational performance have revealed that in Kenya, performance is non linear despite numerous initiatives. A few studies have tried to account for the mixed performance especially in the context of cost cutting approach in understanding the effect of adoption of green energy on performance. Successful green practices helps firms to achieve greater efficiency, establish and strengthen their core competencies, enhance their green image, all of these may eventually combine to contribute to firm profitability. Environmental sustainability in any given production is very important. The low adoption of green energy has led to high charges on electric units especially during low rainy seasons, and high prices of petroleum and electricity in operations of the company which accounts for poor performance that has necessitated closure of many sugar companies. The study sought to bridge the gap by establishing the effect of green energy adoption on the performance of Butali Sugar Company in Kakamega County, Kenya. The specific objectives were to establish the effect of pollution reduction, cost of production, organizational policy and organizational capacity on the performance of Butali Sugar Company in Kakamega County, Kenya. The study was anchored on three theories which include green economic theory, resourced based view theory and the Innovation Diffusion theory. The study used descriptive research design. The target population was 204 respondents. The sample size was 134 which was developed using Yamane's formula. A semi-structured questionnaire was used. After data collection, data will be edited, referenced coded to facilitate statistical analysis. Data collected was analyzed using both qualitative and quantitative methods. Data was analyzed using Statistical Package for Social Sciences (SPSS version 21). The data was analyzed using both descriptive and inferential statistics and presented using tables, charts, frequencies, percentages and graphs. The study established that green energy adoption had a positive and significant effect on the performance of Butali Sugar Company. It was concluded that the firm had significantly reduced emissions to the atmosphere by adopting green energy, enhanced use of renewable energy, improved environmental conservation, recycles wastes, embraces environmental friendly waste disposal and collaborates with other firms on waste management. It was further concluded that green energy adoption had significantly reduced the cost of production in the firm despite their being inadequate finances for the project, cost of transportation being slightly higher and the price of license to produce power being moderately higher. The study concluded that the firm has a clear policy guideline on green energy adoption, complies with government policy and regulations governing the project. The study recommends that the management of the Butali Sugar Company Limited should ensure that the production of green energy is maximized to economically viable levels to improve firm returns. The firm also needs to enhance human resource, technological and infrastructure capacity to facilitate the green energy adoption process and effectiveness.

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Research has shown that through proactive environmental management and strategies, firms can achieve positive economic performance outcomes (Aragon-Correa & Sharma, 2003). More specifically, acting in an environmentally sustainable fashion provides an opportunity for firms to create value by enhancing revenues and/or reduce costs (Ambec & Lanoie, 2008). Through targeted environmental actions and initiatives, firms can create demand for new, environmentally friendly products which can open up new markets leading to enhanced revenues. Firms can also achieve substantial reputational benefits from environmental action which in turn can lead to increased sales and thus enhance revenues (Dowell, et al., 2000).

On the cost side of the equation, environmental initiatives can help firms to reduce costs through waste and pollution reduction, improved energy efficiency, and improved business processes throughout their operations and supply chains (Rao & Holt, 2005). Moreover, from a long-term perspective, such initiatives can help to avoid potential future costs related to compliance, environmental crisis, and liabilities (Lott, & Wehrly, 2005)

Firms, however, cannot delay new practice adoption for too long because over time institutional pressure increases on firms that have not yet adopted the common practices and such firms become increasingly pressured to do so. Thus, late adopters often adopt a dominant practice because other organizations have already done so and as a way to achieve legitimacy within the organizational field. Late practice adoption is, therefore, frequently viewed as a symbolic rather than substantive action that delivers few performance benefits (Naveh, et al., 2004).

According to Botha (2006) green energy is a subset of renewable energy and represents those renewable energy resources and technologies that provide the highest environmental

benefit. Green energy is electricity produced from solar, wind, geothermal, biogas, eligible biomass, and low-impact small hydroelectric sources. It can also be defined as an alternative power that comes from natural sources such as sunlight, wind, rain, tides, plants, algae and geothermal heat (Hugo, 2010). Green energy is also defined as power that comes from resources, which are renewable or naturally replenished (Leibbrandt, 2010). In this study, from the outlined definitions, the right definition of green energy could be as follows: the power generated from bagasse (the fibrous remains after sugarcane or sorghum stalks are crushed to extract their juice).

Globally, green energy is highly produced in different countries. In terms of ranking of countries generating green energy, United states (77,660 gwh), China (63,729 gwh), Germany (57,379 gwh), Japan (41,460 gwh) are highly ranked. Regionally, Brazil produces the highest amount of green energy at the national grid, with a measure of about 48,802 gwh; followed by India at 26,542 gwh, then Thailand at 7,731 gwh. Other countries are still below the 5000 gwh. In Africa, Mauritius was recorded to have produced about 530 gwh, which is the highest in African countries, followed by South Africa at 310 gwh, Cameron at 103 gwh, then Senegal at 66 gwh and other countries being below the 100 gwh.

In the United States, sugar mills take advantage of bagasse for power, making improvements to their plants to enable the enter process more efficient through project management. Mackay Sugar in Australia has constructed a \$120 million cogeneration power plant in Racecourse Mill in Queensland that can provide 1/3 of the Mackay city region's electricity requirements. The project uses efficient technologies such as high-pressure boiler and a new steam turbine generator, capable of generating 36 megawatts (MW), exporting 27 MW to the national grid. In the United States, the Florida Crystals, uses bagasse to power its sugar mills, in the New Hope Power Co. biomass cogeneration plant. The project is the largest in North America, and accounts for 800,000 tons of sugarcane bagasse and 700,000 tons of wood

waste per year. About 8.8 tons of sugarcane required at each plant per day, about one-third will consist of bagasse that will be converted into power.

In Africa, only few sectors can generate production of green energy. One of the main producers of green energy is the sugar milling industry. In Africa, sugar cane is grown for commercial purposes. The sugar milling industry is one of the largest industries in several African countries, as it is the case of Swaziland in South of Africa (Deepchand, 2010). It is one of the plants having the highest bioconversion efficiency of capture of sunlight through photosynthesis and is able to fix around 55 tonnes of dry matter per hectare of land under this crop on annually renewable basis.

Several countries have implemented energy conservation and efficiency measures to minimize co-generated energy utilized in cane processing and to export excess electricity to the grid. In Mauritius 10 out of 11 factories export electricity to the grid during crop season (725 GWh including 318 GWh from bagasse) accounts for 40% of the total generated (Lichts, 2014).

In Kenya, there are limited renewable energy resources and no certainty in oil, gas or coal reserves. Meaning that the current genesis of oil exploration which was flagged of in Turkana to be refined in Mombasa and then used in local sectors is still not determined as a finished product by the oil refineries and the government of Kenya. Hydropower is thus the main locally available energy resources, followed by geothermal energy and the recent development of wind milling. Sugar cane biomass (bagasse and cane tops and leaves) (Belward *et al.*, 2011). Hydropower is almost fully exploited. But other forms of green energy have not been fully explored (Ministry of Energy, GOK, 2012).

Bagasse represents 30% on cane can be used to meet internal power requirement for cane processing. Hydro power and power exported to the grid from sugar factories amounted to 22% and 13% of power supply to the public grid. This contribution is not linked to the sugar-

milling sector in Kenya, with a large margin of these sectors making adequate energy if presently conducted on the use of bagasse (Wanjiru & Ochieng, 2013). An increase in fossil fuel import could be prevented by a more efficient exploitation of bagasse energy for electricity generation, which has been less exploited in most sugar milling projects in Kakamega County.

Sustainable economic growth is also threatened by Kenya's vulnerability to climate change. It is estimated that 42% of Kenya's GDP and 70% of overall employment is derived from natural resource related sectors, including agriculture, mining, forestry, fishing, tourism, water supply and energy. This study therefore sought to establish the effect of green energy adoption on the performance of Butali Sugar Company Limited.

1.1.1 Green Energy Adoption

One of the biggest firm spending items is on energy consumption. Electricity in particular is a major source of energy for firms from retail to manufacturing; it is essential that they use electricity in order to perform their daily production and service. The biggest source of electricity comes from burning coal. However, mining is likely to deteriorate the environment and burning coal also pollutes the air. There are other sources of electricity such as wind and solar energy; however, the cost of those sources is much higher than the cost of conventional energy gained from mining and burning coal.

It is also not impossible for electrical companies to be environmentally less destructive in mining and burning coals, and mines can be reconfigured in a more environmentally friendly manner. Firms can also take other steps in order to minimize pollution from burning coals to make electricity, but all of these are costly.

However, energy sources from mining and burning coals are a significant threat when it comes to environmental protection. For this reason the US Environmental Protection Agency

(EPA) initiated a voluntary programme called the green power partnership. The EPA's green power partnership, a voluntary programme, helps firms using green power sources.

The EPA defines green power as a subset of renewable energy and represents those renewable energy resources and technologies that provide the highest environmental benefit. EPA defines green power as electricity produced from solar, wind, geothermal, biogas, biomass, and low-impact small hydroelectric sources. Customers often buy green power for avoided environmental impacts and its greenhouse gas reduction benefits (EPA, 2012a). On the other hand, according to the EPA conventional power includes the combustion of fossil fuels (coal, natural gas, and oil) and the nuclear fission of uranium. Fossil fuels have environmental costs from mining, drilling, or extraction, and emit greenhouse gases and air pollution during combustion. Although nuclear power generation emits no greenhouse gases during power generation, it does require mining, extraction, and long-term radioactive waste storage." (EPA, 2012a)

There are stark differences between green energy and conventional energy sources in terms of their environmental impacts. However, the real problem for these firms is that regardless of how much it cost to generate a kilowatt of environmentally friendly and sustainable energy, in the end electricity is electricity.

Using green energy has no immediate benefits for firms than using conventional energy such as coal energy. Using green energy also cannot be a source of differentiation advantage since regardless of the source all firms use the same electricity and there is no product difference from using green energy.

There are ways to be environmentally friendly and at the same time gain a financial advantage. For example, bottled water producers have reduced the size of water bottle caps in reaction to criticism from environmental protectionists. This kind of change can enhance a firm's financial performance as well as stock performance. However, this is not

the case when it comes to green energy use since it is inevitable that firms must incur a higher cost for using green energy without differentiation opportunities. Firms accordingly, use green energy as their focus on environmentally responsible behaviour that costs firms and does not add value in differentiating them. Since its beginning, green operations have adopted mainly a process based approach. Environmental operations management (EOM) is the integration of environmental management principles with the decision making process for converting resources into usable products. EOM is positioned at the strategic level of operations management since its primary concern is product and process design. The operations function of a company encounters environmental protection issues directly because it is the main source of harmful emissions, and thus environmental management programmes and policies should be carefully developed to strengthen its operations strategy (Nunes & Benet, 2010)

Green economy adoption should be an integral part of business but integration will be favored when decision makers in the firms realize that the implementation of proactive environmental strategies and pollution prevention initiatives may help firms to reach a situation in which both the company's financial performance and the environment will benefit. Some authors suggest that environmental management may be a tool, which helps organizations to improve their competitiveness (Jose et al, 2009). Business organizations should adopt green operations so that they can set a positive example by employees that help boost morale and company loyalty and Gaining competitive advantage by differentiating the business from its competitors, improving efficiency and lowering operating costs and providing a cleaner and healthier work environment (Bose & Luo, 2012)

Going green is not a term that managers can avoid any longer. For years environmental responsibility has been increasing in importance not only with managers but also consumers who grow more aware as well as other stakeholders affected by unsustainable business

(Nunes& Benet, 2010). Businesses are progressing towards environmental sustainable solutions for their operations. Government and Non-Governmental organizations attend to this topic of resources through legislations and restrictions regarding carbon credits and waste emission (Menzel, Smagin& David, 2010). This study therefore sought to establish the effect of green energy adoption as a project on the performance of Butali Sugar Factory.

1.1.2 Organizational Performance

Organizational performance comprises the actual output or results of an organization as measured against its intended outputs (or goals and objectives). According to Richard et al. (2009) organizational performance encompasses three specific areas of firm outcomes: financial performance (profits, return on assets, return on investment); product market performance (sales, market share); and shareholder return (total shareholder return, economic value added).

According to Munir (2014) the term organizational effectiveness is broader. Specialists in many fields are concerned with organizational performance including strategic planners, operations, finance, legal, and organizational development. In recent years, many organizations have attempted to manage organizational performance using the balanced scorecard methodology where performance is tracked and measured in multiple dimensions

Traditionally, financial performance of manufacturing firms and other firms has been measured using a combination of conventional accounting measures and risk and return measures. Further analysis of financial performance has used methodologies such as financial ratio analysis, benchmarking, measuring performance against budget or a combination of these (Duncan & Elliot, 2004). Profit is the ultimate goal of firms hence all the strategies designed and activities performed thereof are meant to realize this grand objective. To measure the profitability of firms, there are varieties of ratios used of which return on asset (ROA), return on equity (ROE) and net interest margin are the major ones. The accounting

based financial measures are direct indicators of a firm's financial condition from different perspective. ROA and ROE are usually used to examine a firm's asset and capital utilization, while profit margin, cost of goods sold and economic value added are common measures of a firm's capability to make profits. A few studies therefore propose financial measures based on cash flow to directly evaluate a firms profit and liquidity (Shi & Yu, 2013).

Users of financial statements evaluate the financial statements of companies to determine liquidity, leverage, asset activity, profitability, and performance. Users of financial statements use traditional balance sheet and income statement ratios for performance evaluation (Jooste, 2006). Operating activities are defined as the principal revenue-producing activities of a company. Therefore, along with traditional ratios operating cash flow is also important when evaluating a company's performance. Relative performance evaluation proceeds from the assumption that with the comparison of a company's performance to a norm, general uncertainties are eliminated and only specific performances with regard to the company remain. The performance of other companies or the industry then provides information regarding a specific company's performance (Jooste, 2006).

1.1.3 Butali Sugar Limited

Butali Sugar Mills Limited is currently the largest sugar producing private firm after West Kenya Sugar. It is located in Kakamega County. Kakamega is found at a geographical coordination of latitude 0.28422 and longitude 34.7522888. The factory becomes the second after Mumias in producing its own electricity from waste products and also embracing green energy. Butali Sugar Company has constructed a power generation plant that has seen it add 12 megawatts (MW) of electricity to the national grid. This has cushioned Butali from the lifting of Comesa safeguards.

The reason for selecting Butali Sugar Mills Limited is because of the fact that bagasse is being wasted or disposed as waste and not being used in massive production of green energy. Another reason is that the company is lacking several factors that are required for sustainable adoption of green energy, and thus depends on hydro-electric power and diesel which is a non-renewable energy for its operations. Butali Sugar Mills Limited has a low rate of adoption of small scale-green energy, if compared to other sugar processing companies in Kenya.

1.2 Statement of the Problem

There is increased number of sugar companies that have failed despite advance increase in strategic management best practice. Several studies on organisational performance have revealed that in Kenya, performance is non linear despite numerous initiatives. A few studies have tried to account for the mixed performance especially in the context of cost cutting approach in understanding the effect of adoption of green energy on performance. Successful green practices helps firms to achieve greater efficiency, establish and strengthen their core competencies, enhance their green image, all of these may eventually combine to contribute to firm profitability. Environmental sustainability in any given production is very important. The low adoption of green energy has led to high charges on electric units especially during low rainy seasons, and high prices of petroleum and electricity in operations of the company which accounts for poor performance that has necessitated closure of many sugar companies. The study seeks to bridge the gap by establishing the effect of green energy adoption on the performance of Butali Sugar Company in Kakamega County, Kenya.

Past related studies reveal that; Menzel et al. (2010) investigated whether companies could profit from greener manufacturing and found out that there was no significant relationship between greener manufacturing and corporate performance. Nune and Bennet (2010) did a

study green operations initiatives in the automotive industry and established that the major vehicle manufacturers used green power like land fill gas, wind and solar energy as opposed to oil. Wong (2012) examined the influence of competitiveness on the success of green product innovation. The study revealed that green product and process innovation are positively associated with green product competitive advantage and green new product success. Ngniatedema and Li (2014) conducted an investigation on green operations and organization performance. The study established that companies in the manufacturing industries have a lower score in environmental impact and a higher score in green reputation than those in the services industry.

Studies in Kenya have been less explorative in the adoption of green energy. The existing gaps include lack of business administration approach on the issues discussed (Ochieng, 2014; Lichts, 2014; Deepchand, 2016). This study intends to improve the field of research by applying an entirely different perspective of proving the actual problem that exists in Butali Sugar Company, and thus findings, conclusions, and recommendations will be of significant to future researchers, Butali Sugar Company management and other sugar production companies. It is due to the outlined problems that this study was undertaken to establish the effect of adoption of green energy and on performance of Butali Sugar Company in Kakamega County, Kenya.

1.3 Objectives of the Study

1.3.1 General Objective

The main objective of the study was to establish the effect of green energy adoption on performance of Butali Sugar Company, Kenya.

1.3.2 Specific Objectives

- (i) To assess the effect of pollution reduction on performance of Butali Sugar Company, Kenya.

- (ii) To determine effect of the cost of production on performance of Butali Sugar Company, Kenya.
- (iii) To establish the effect of organizational policy on performance of Butali Sugar Company, Kenya.
- (iv) To examine the effect of organizational capacity on performance of Butali Sugar Company, Kenya.

1.4 Research Questions

- (i) What is the effect of pollution reduction on performance of Butali Sugar Company, Kenya?
- (ii) How does the cost of production affect performance Butali Sugar Company, Kenya?
- (iii) To what extent does organizational policy influence the performance of Butali Sugar Company, Kenya?
- (iv) What is the effect of organizational capacity on performance of Butali Sugar Company, Kenya?

1.5 Significance of the Study

The study will be of great significance to the Butali Sugar Company, other sugar processing companies, the stakeholders in the sugar cane production sector, and finally other researchers. To the Butali Sugar Company, the study will provide findings which will be used to address the current issues which lead to the drop in the level of adoption of green energy. The study will approach with the aim of making the management and project teams understand the statistical outcome of all the variables that will be used to measure the production of green energy. Thus, they will use the study to make relevant changes and thus become efficient enough.

To stakeholders, the study will be of importance as it will be used to provide information on the need to positively contribute to green energy adoption within different sectors. Finally,

researchers will use the study to add knowledge of the topic of the research in different gaps that will exist during their time, location and content of study. They will also criticize this work and make adequate contributions to their study. They will also use this study for literature and thus citing the author.

1.6 Scope of the Study

The study was conducted on the effect of green energy adoption on the performance of Butali Sugar Company. The study was carried out in Butali Sugar Company in Kakamega County, Kenya. The study sought to establish the effect of pollution reduction, waste management, and cost of production and use of alternative energy sources on the performance of the sugar firm. The research employed descriptive research design, with 134 respondents to answer questionnaires and finally make observations during data collection. On time scope, the study assessed the performance of the firm for the last 5 years.

1.7 Limitations of the Study

The study faced limitations such as high level of suspicion by staff on the motive of the study. Most respondents were not willing to disclose the information for fear of giving sensitive information, which is restricted or due to confidentiality. The study overcame this by accessing deeper information from past records and assuring the participants of confidentiality upon their acceptance to take part in the study.

The study was also limited by the distance and financial capacity of the student. The researcher overcame this by seeking funds from different sources; including seeking donor funds and personal savings. The study also sought to conduct data collection from a smaller number of respondents in order to reduce loss of time. The researcher made both time plans and budget so as to make sure it is followed to save cost.

1.8 Organization of the study

The study has been organized into five chapters that is, the introduction, and literature review, research methodology, findings and discussions and summary, conclusion and recommendation. Introduction covers the background of the study, statement of the problem, research objectives, and research questions, significance of the study, scope of the study and limitations of the study. Literature review discusses the theoretical review, empirical review, summary of literature review and knowledge gap and conceptual review. Research methodology discusses the research design, target population, sample design, data collection, validity and reliability and data analysis. Chapter four presents the study findings and relevant discussions while chapter five gives the summary of findings, conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter provides both theoretical and empirical literature reviews that are related to green energy adoption and organizational performance. The first section focuses on the theories and conceptual framework. The second section focuses on empirical literature that was developed in relation to the independent variables in the conceptual framework.

2.2 Theoretical Literature Review

The study was guided by the green economic theory, resource based view theory and the innovation diffusion theory. The theories explain how the use of green energy can influence organizational growth and performance.

2.2.1 Green Economic Theory

Cato (2009) argues that Green economics seeks to move the target of our economy away from economic growth and towards flourishing, convivial human communities which do not threaten other species or the planet itself. It is inherently concerned with social justice since for a green economist equality and justice are at the heart of what we do and take precedence over considerations such as efficiency (Cato, 2009).

Green growth theory then starts from the simple observation that the natural environment is also a factor of production, but one which both classical growth theory, and historic patterns of economic growth in practice, have largely ignored (Nordhaus 1974, Solow 1974, Smulders 1999, Brock and Taylor 2005). The environment acts as a form of capital in three ways: it provides resources, it assimilates wastes, and it performs various ‘environmental services’ which sustain life, including climatic regulation and ecosystem health. This ‘natural capital’ has been undervalued both in economic theory and practice because it has been largely unpriced, provided as an apparently free gift of nature. Many of the environment’s functions

occur as common or collective goods without the property rights which attach to other factors of production, and without therefore the private incentive to value them properly in economic terms (Jacobs, 1991).

The standard economic concept to describe this is that of 'market failure'. Markets 'fail' when they do not take into account the full value of the activities within them. The production and consumption decisions which economic actors take are therefore distorted relative to those they would take if the environment were properly valued, in a whole series of ways. Natural resources tend to be over-exploited: soil eroded, fisheries depleted, water over-abstracted. Ecosystems which provide valuable services, such as wetlands and forests, are allowed to be degraded or destroyed. Resources such as energy and materials are used inefficiently, with an excessive generation of waste (and therefore pollution). And the amenity, health and cultural value of natural environments are under-appreciated.

In all these ways, green growth theory argues that current patterns of economic growth are *prima facie* sub-optimal. They misallocate resources between the different factors of production. They under-invest in natural capital, and over-invest in activities which cause its degradation. If these systematic market failures were corrected, growth might be higher. Indeed, the situation is worse than this, because in many countries the environmental costs of using natural resources are not just unpriced, but their exploitation is actually subsidized. Subsidies for extracting and using fossil fuels, and for other forms of resource extraction and agriculture, are estimated at around \$1.1 trillion per annum (Dobbs et al. 2011). Such subsidies further distort production and consumption decisions away from their optimal path. From these premises, advocates of green growth argue that a range of different environmental measures and policies can be growth generating. In developing countries, much of the emphasis has been on the conservation and enhancement of natural capital, such as soil quality, fisheries, forests and habitats such as mangrove swamps and coral reefs. Arguing that

in economies dependent on these resources, the net depreciation of natural capital is a retardant of growth in the same way that the net depreciation of physical capital would be.

The United Nations Environment Programme has gathered considerable evidence on the positive growth impact available from the conservation and sustainable management of natural resources (UNEP 2011). In some cases this arises from higher productivity in production of the resource; in others from the development of secondary, value adding, products which conservation of the resource allows; in some from the development of related industries, such as tourism. The UNEP report points out that many of these resources are controlled by the poor, and so strategies to conserve them and enhance their productivity are poverty-reducing as well as growth enhancing. Some of these growth benefits clearly show up in higher incomes, so are captured by the conventional growth indicator of GDP (gross domestic product). But others are unmeasured: it is difficult to capture the value which preservation of a mangrove swamp has for coastal defense, for example, or a forest for water supply

2.2.2 Resource-Based View Theory

The theory was published by Barney in 1991 (Cited in Barney, 2011) as a managerial framework used to determine the strategic resources' potential to compete comparative high for the benefit of a firm. It examines how resources can drive competitive advantage. Competitive advantage is the ability to create more value than rivals, and therefore generate higher returns on investment. Sustainable competitive advantage requires enduring benefits through capabilities that are not easily imitated (Killen et al., 2012). The theory of resource-based view (RBV) posits that each organization is endowed with a finite amount of resources. RBV theoretically predicts intangible resources as the important factors for firm success (Amit and Schoemaker, 1993). Penrose (1959) is identified as one of the earliest major contributors to the theoretical underpinnings of the RBV (Kor and Mahoney, 2000). The

heterogeneity approach posits that a firm does not achieve competitiveness because of their resources but because of its competence in making better use of its resources whereby the productive services of resources must be discovered over time as entrepreneurs interact with its resources and make subjective decision about resource allocation, deployment and maintenance (Penrose, 1959).

Technological leads, Production/process experience, customer loyalty and machine capacity are also resources of the firm (Wernerfelt, 1984). Wernerfelt (1984) further states that resources and products are two sides of the same coin for a firm. By specifying the size of the firm's activity in different product markets, it is possible to infer the minimum necessary resource commitments. Conversely by specifying a resource profile for a firm, it is possible to find the optimal product market activities. To address key issues in the formulation of strategy for diversified firms by Wernerfelt (1984) propose that firms should look at its resources rather than the traditional product perspective so as to achieve different immediate insights.

Firms can also be able to identify types of resources which can lead to high profits. Adopting and implementing green operations practices while striking a balance between exploitation of existing resources, development of new strategies and purchase of a bundle of resources in a highly imperfect market by basing the purchase on rare resources can maximize this imperfection increasing chances of buying cheap and getting good returns.

The resource-based view of a firm predicts that certain types of resources owned and controlled by firms have the potential and promise to generate competitive advantage and eventually superior firm performance (Tesot, 2012). These resources must be identified with key potentials, that is, valuable, rare, inimitable, and non-substitutable without great effort. Barney (1991) explains that resources are valuable if they help organizations to increase the value offered to the customers. This is done by increasing differentiation and decreasing the

costs of the production (Rapert, Lynch & Suter, 1996). Resources that can only be acquired by one or few companies are considered rare. A company that has valuable and rare resource can achieve at least temporary competitive advantage (Porter, 1985).

The resource must also be costly to imitate or to substitute for a rival. The resource itself does not confer any advantage for a company if it's not organized to capture value (Barney, 1991).

Only the firm that is capable to exploit the valuable, rare and inimitable resources can achieve sustained competitive advantage. To transform a short-run competitive advantage into a sustained competitive advantage requires that these resources are heterogeneous in nature and not perfectly mobile. If these conditions hold, the firm's bundle of resources can assist the firm to sustain above average returns (Porter, 1985).

In relation to this study, it can be noted that this theory is applied in that the use of green energy is meant to increase the use of locally available resources. The theory defines the characteristics of what a resource entails for it to be considered applicable in the resource based theory; and they included being less costly, capability of the firm to process or use, heterogeneous in nature and finally not perfectly mobile. These characteristics are rather borrowed in this study to represent the independent variables of the study, which are cost, existence of physical materials, knowledge or skills and policy on the adoption of green energy. In general, the Resource based theory is largely outlined to the study to show that locally available resources can be used for better processes of several aspects such as green energy. When establishing green energy, the benefits are meant to represent competitiveness to sugar processing companies. In this case, competitiveness is meant to represent the dependent variable, which is adoption of green energy; which entails amount of energy, operational benefits, and surplus.

2.2.3 Innovation Diffusion Theory

The theory was first Rogers' 1995, and states that innovation process is made up of stages as a process which relay on knowledge, persuasion, decision, implementation, and confirmation. The theory explains how, why, and at what rate new ideas and technology spread. Innovation in this case refers to establishing changes or new ideas in terms of methods, products and processes. Thus, in this study, the innovation referred to is green energy.

According to Rogers, knowledge to innovation being possible is observed. Knowledge in this case involves individual's ability to innovate and operate project functions. This is normally not the case of most organizations as they tend to lacks information about the innovation. Persuasion is the interest in the innovation. Thirdly, decision is adopted in the process of taking the concept of change, which weighs the advantages/disadvantages of using the innovation and decides to determine whether to adopt or reject the innovation. Implementation stage employs the innovation to a varying degree depending on the situation. It makes the adopter to determine the usefulness of the innovation and may search for further information about it. Finally, the confirmation stage finalizes decision to continue using the innovation and may end up using it to its fullest potential.

In this study, the theory can be used to address the relationship between the independent and the dependent variables. That the theory explains of innovation being passed through stages including knowledge, persuasion, decision, implementation, and confirmation. In this study, such elements form the independent variable in this study. Having the approach of the two relations, the study finds it fit to address the aspect of the study to be as follows: that knowledge is highly linked to the existing knowledge or skills (which is the third objective), that persuasion is largely linked to the ability to convince the use of innovation which is a general focus on all the objectives of the study (affordability in terms of cost, availability of material, supporting policy and staff competence). It can also be established that decision is

meant to focus on persuasion levels. In regards to implementation and confirmation, the application is that this study intends to investigate the level to which independent variable has been adopted to adequately fill the need for the factors affecting the adoption of green energy in Butali Sugar Company.

2.3 Empirical Review

2.3.1 Pollution Reduction and Organizational Performance

Manrique & Carmen-Pilar (2017) conducted an analysis on the effect of corporate environmental performance on corporate financial performance in developed and developing countries. The main objective of the study was to examine the effect of corporate environmental performance on corporate financial performance during a global crisis, depending on the economic development level of the country where a firm is located. A sample of 2982 large firms from 2005 to 2015 globally was used to collect panel data. Petersen's approach to these data was used by adjusting the standard errors for clustering by both firm and year. The study established that adoption of environmental practices significantly and positively affects the corporate financial performance in developed and developing countries. However this effect is stronger for firms located in developing countries than those located in developed countries. The study concluded that the implementation of environmental practices such as waste management and reduction of pollution could have an important effect on the financial performance of a firm, because the profitability could be decreased by high production costs linked to environmental innovation according to neoclassical economic theory. However, from a natural-resource-based view and instrumental stakeholder theory, the adoption of environmental practices by core business strategy allows firms to save production costs by reducing environmental risks, while enhancing their relationship with the key stakeholders, which contributes to achieving competitive advantages and thus improves their corporate financial performance in the long term.

Dang, Wang and Zigan (2018) conducted a study on the effect of mandatory pollution abatement on corporate investment and performance based on the USA regulation. The study sought to establish the effect of mandatory pollution abatement on USA corporate investment and performance. The study carried out an empirical and theoretical analysis. The study established that environmental regulation can stimulate investment in innovation. For

financially unconstrained firms, mandatory pollution abatement leads to more current R&D investment, more future investment in pollution abatement, reduces current profits, increases future profits and reduces the market value of the firm. However, if firms are financially constrained three of the five consequences are different. IT leads to less current R&D investment, less future investment in pollution abatement and lower future profits.

Graham & McAdam (2016) carried out a study on the effects of pollution prevention on performance. The study was based on two main objectives which included the effect of energy reduction and waste reduction on environmental performance which as a result affects cost performance. The moderating variables were environmental integration and environmental learning. The study was based on resource-based view theory and dynamic capabilities theory. The study used a descriptive research design. A semi-structure pre-defined interview guide was used to collect data. The data was analyzed using inferential and descriptive statistics. The study established that the implementation of pollution prevention practices may lead to improvements in environmental performance.

Mahapatra (2014) accordingly argues that investors view pollution control expenditures as a drain on resources that could have been invested profitably, and do not reward the companies for socially responsible behaviour. From this perspective is accordingly evident that firms engaging in using green energy would fail in maximizing shareholder value. However, this may not necessarily be true because shareholders are people who are not only trying to maximise profit, but maximise utility gains. Not purchasing the stocks of firms that engage in green energy use would be an ideal choice given that it is a costly proposition for firms and accordingly hurt profits if the sole purpose of purchasing stocks is to maximise profits. However, profits and money are only two of the factors that satisfy people. Mackey et al. (2017) explain that the opportunity to invest in a firm that is engaging in specific socially responsible activities can be thought of as a 'product' that is sold by firms to potential equity investors as customers.

Currently, more and more people are aware of the need to be environmentally responsible. For example, according to the syndicated Green Gauge survey item asking who should take

the lead in addressing environmental problems, Americans ranked individual Americans only after the federal government (SC Johnson, 2012). Individuals in the USA strongly believe that each individual should be actively engaging in environmentally responsible behaviour. One way of achieving this goal is being active in environmentally responsible behaviour such as purchasing stocks for firms that are environmentally responsible. Individuals can also buy products and services from environmentally responsible firms, but the impact is limited since one can only buy so much and products and services have low fluidity. On the other hand, purchasing stocks not only boasts high fluidity, but also gives flexibility in the amount of investment one can make.

2.3.2 Cost of Production and Organizational Performance

Green et al (2012) conducted a study on the relationship between use of renewable energy and cost performance of firms in the UK. The study focused on establishing the effect of environmental conservation practices and performance of firms. The study assessed the performance of 52 manufacturing firms in the UK. A descriptive research design was used. Data was collected using semi-structured questions. The study established that there was a direct relationship between environmental protection and cost performance.

However, De Burgos-Jiminez et al (2014) in their study on environmental performance and firm financial performance in Mexico City, found no support for a direct link between environmental efforts and financial performance but strong support for a link between environmental performance and leaner performance. These studies have highlighted that improving environmental performance may be the key to improving cost and financial outcomes. The current study takes a step further by seeking to identify the relationship between pollution prevention through green energy adoption and cost performance.

Michaelowa (2007) conducted a study on the bagasse project in the Mumias Sugar Company. The bagasse project is being funding this project through equity and commercial loans. A

huge amount of capital is obviously required to reap the benefits of the cogeneration potential of bagasse. There is need for capital to set up new cogeneration plants and to expand on the existing ones. The current sugar plants require conversion to accommodate condensing turbines and this requires significant capital injection. The success of the project also depends on a viable unit price for the sale of electricity generated from cogeneration. The cost of electricity from cogeneration will be more expensive than that from conventional fossil fuels. Electricity from cogeneration would invariably be more expensive than the average Eskom charge tariff, since much of Eskom's infrastructure is already fully depreciated, while operating costs are lower. Cogeneration would also involve more capital expenditure per unit since plants would produce smaller amounts of electricity than coal-fired power stations (Ministry of Energy, 2012).

There is only need to for enough capital to source appropriate technology for the energy conversion of bio energy to electricity. A viable price unit per unit of electricity generated from cogeneration has to be expeditiously agreed upon in order to encourage the private companies to invest in this project (Moomaw, 2017).

In order to determine the total investment costs for the dryer and turbine need to be calculated. The cost of capital for the considered pellet plant investment has been determined to 3.3 million USD and the breakeven investment cost to 4,7 million USD. Yet the economical calculations regarding the pellet plant investment have been based on a modest scenario it is profitable. Considering the vast difference between the nominal and the practical amount of excess bagasse Carlos Baliño has a great potential in increasing the amount of bagasse energy produced as well as the financial gain (Silva, 2017).

Although the efficiency rate differs this much, other circumstances like production variety, production stops and investment costs plays a big role in which boiler eventually is being used. Furthermore, the bagasse should be compressed to avoid the costs of big buildings for

storage (Hugot, 1986). The properties and the chemical composition of bagasse combined with the low cost have made it an interesting environmental friendly alternative option to the materials being used today in several applications.

The focus of significance when mapping costs drivers and sources of income within the frames of production of bagasse energy can in an overall way be described as techno-economical. This as the techniques used in the production and in the manufacturing are of immense importance concerning the economical perspectives. Conversely, the interests within the market as well as the structure of the market are of equal prominence when overlooking the economics of pelletizing (Pirraglia et al., 2010).

When examining the costs for the production of bagasse energy there are several areas that need to be observed. A techno-financial analysis is required to map the various costs and areas of interest. In order to in an adequate way overlook the financial it is a necessity to observe mass balance, power use and furthermore analyze this financially (Pirraglia et al., 2010).

When overlooking the total costs for bagasse energy production the cost of raw biomass represents approximately 27%, which makes it greatest cost driver followed by labour costs depending on the location of the facility (Pirraglia et al., 2010). However the percentage of each cost driver changes depending on the capacity scale of the pellets factory. The capacity of the bagasse energy factory is therefore vital in order to find an optimum

2.3.3 Organizational energy policy and Organizational Performance

Ngniatedema and Li (2014) carried out a study on the relationship between green operations and organizational performance in top 500 publicly traded companies in the United States of America. Based on metrics for environmental impact and green reputation, manufacturing companies scored lower on the environmental impact metric and higher on the green reputation metric than companies in the service industries. The overall impact of green

operations was found to be different between the manufacturing and service firms studied. For manufacturing firm's environmental impact score and green policies and performance score were found to have an impact on organizational performance; while green reputation plays a more important role in impacting the organizational performance of service firms.

In Kenya, due to the policy framework, pricing, statutory requirements that allow only KPLC to buy and distribute power from other alternative sources and other limitations on the sale of electricity, sugar factories in Kenya have been unable to exploit all the bagasse produced during sugarcane processing to produce sugar. These constraints continue to negatively impact bagasse based cogeneration of electricity in Kenya. (Refer attached document Cogeneration) (Araújo, 2017).

A barrier arising from the fact that still the government does not have a comprehensive policy on price that KPLC is to pay on power from cogeneration sources and this has made it difficult to have strict and precise projection on sales revenue and profits, this fact can also deter investors and financiers. The pricing aspect has made cogeneration projects not to be pursued by most sugar companies in the country, as KPLC tends to offer a lower price for cogenerated power than from fossil fuel sources on the assumption that production costs are low. Recently, the Government ordered Kenya Electricity Generating Company not to charge KPLC the earlier agreed rates, as it was felt this would destabilize KPLC commercial recovery (Wainaina, et al., 2012).

It is difficult to convince the KPLC (local power distributor) that the energy to be acquired, which is generated during the harvest season, is sufficiently reliable to be accounted in the distributor's planning. Other barriers have more to do with the lack of adequate commercial contractual agreements from the energy buyer, KPLC (i.e. bankable long-term contracts and payment guarantee mechanisms for noncredit worthy local public-sector and private customers) making it much more difficult to obtain long term financing from a commercial

bank and/or a development bank. Some other financing barriers occur simply due to prohibitively high transaction costs, which include the bureaucracy to secure the environmental license and electricity generation license (KPLC, 2016).

Skills development systems need time to respond to the new needs and confidence that policies will sustain the transition and continue to create demand for new skills. An efficient training system for renewable energy must be integrated within overall policies to support the growth of the sector, involve social partners in the design and delivery of training, and include a good combination of practical and theoretical knowledge. There is a need for policy to focus on ensuring that the transition to renewable sources of energy is a Just Transition for those working in fossil energy sectors. There is a need for policy-makers promoting the transition to renewable energy to take account of Decent Work principles when designing policies and interventions (Balachandra, 2009).

Policy support has led to high rates of investment, and growing numbers of people employed in the sector. For a number of important technologies, manufacturing is limited to a small number of developed and emerging economies. Emerging economies are rapidly catching up, and have surpassed developed countries in deployment and number of installed capacity in some areas (Garcia-Perez, 2010).

2.3.4 Organizational Capacity and Organizational Performance

Jose et al. (2009) did a literature review of the quantitative studies that have analyzed the impact of green management on financial performance. A total of 32 studies were identified, examining the environmental variables used, the financial performance variables, the statistical analyses, and the main findings obtained by the studies. Some of the studies quoted in the literature are Hutchinson (1996) analyzed the integration of environmental policy with business strategy studying several firms. Marcus and Geffen (1998) studied the processes by which distinctive competencies are acquired based on the case of pollution prevention in

electric generation. Enz and Siguaw (1999) examined four hotels that agreed that cost savings, operating efficiencies and excellent marketing opportunities derived from their environmental initiatives. The Findings were mixed, but studies where a positive impact of environment on financial performance is obtained were predominant. In addition, the findings show that the set of firms, industries and countries are varied. Some studies use environmental management variables and other works employ environmental performance variables, and regression analysis prevails. The study however does not consider studies that analyze the influence of environmental management on environmental performance. The study offers interesting implications for managers, pointing out that a real commitment to green management may result in a positive influence on financial performance.

Nishant (2012) did an empirical examination on green information system and organizational performance by using data from secondary sources. The study found out that research in the area was relatively sparse. Bose and Luo (2012) found out that the likelihood that companies would adopt green IT initiatives depend on both environmental and organizational factors of which the primary one being champion support. The support of a champion is very critical since he is the one who coordinates the implementation process based on his education and attitude (Bose & Luo, 2012).

Menzel et al. (2010) did a study to investigate the trend and effect of environmentally friendly manufacturing on the financial performance of companies in the European automotive and pharmaceutical industries specific attention given to resource utilization. The method of research was a survey of annual and sustainability reports published by companies and recording the change in resource usage as well as the financial performance of the companies. The study showed no significant relationship between greener manufacturing and corporate performance. However, a trend in decreasing resources, specifically electricity was found. Furthermore, a trend in reducing carbon was also found.

Demand for people depends on the level of deployment and the level of maturity of the technology. Modern bioenergy involves advanced technologies, and several such technologies are expected to mature in the years to come. Amongst these are cellulosic ethanol, biomass integrated gasification combined cycle (IGCC), advanced automated small gasifier systems, biomass-fired Stirling engines, biochar production, torrefaction and biogas-based fuel cells. Almost all development work on these technologies is being undertaken in industrialized countries. While energy consumption in the emerging economies has been growing rapidly, consumption of modern bioenergy in most of these countries is still generally low, with the exception of ethanol use in Brazil. Most developing countries have yet to start deploying modern and advanced bioenergy technologies (Ahmed, 2016).

From the sugar mill point of view, the great majority of sugar mills do not consider investment in cogeneration (for electricity sale) as a priority. The sector even in the new political context, does not seem to have motivation to invest in a process that it sees with mistrust and no guarantees that the product will have a safe market in the future". Moreover, "the sugar mills are essentially managed by the government, which hurdles the association with external financial agents" that would allow the sector to be more competitive and diversifying its investment. From the point of view of the economic agents, the excessive level of guarantees required to finance the projects is a common barrier to achieving a financial feasibility stage (Dallemand, et al., 2011).

Due to the nature of the business in the sugar industry, the marketing approach is narrowly focused on commodity type of transaction. Therefore, the electricity transaction based on long-term contract represents a significant breakthrough in their business model. In this case, the electricity transaction has to represent a safe investment opportunity from both economic and social environmental perspective for convincing the sugar mills to invest in (FAO, 2017). There are also questions regarding the managerial capacity of the companies that

comprise the Kenyan sugarcane industry. Companies have in many cases demonstrated the will to undertake investments in new technologies, but without sufficient financial and entrepreneurial capacity to complete such projects (KPLC, 2016).

2.4 Summary of Literature Reviewed and Research Gaps

Table 2.1: Research Gaps

Author	Title	Findings	Gap
Manrique& Carmen-Pilar (2017)	An analysis on the effect of corporate environmental performance on corporate financial performance in developed and developing countries.	Implementation of environmental practices such as waste management and reduction of pollution could have an important effect on the financial performance of a firm	The study studies corporate environmental performance in general while the current is specific on green energy adoption and firm performance
Graham &McAdam (2016)	The effects of pollution prevention on performance	The implementation of pollution prevention practices may lead to improvements in environmental performance	The study context was the USA while the current is in the sugar industry in Kenya
Green et al (2012)	The relationship between use of renewable energy and cost performance of firms in the UK	There is a direct relationship between environmental protection and cost performance.	The study dependent variable was cost performance while the current is organizational performance
Ngniatedema and Li (2014)	The relationship between green operations and organizational performance in top 500 publicly traded companies in the United States of America.	Green operations have a more significant and positive effect on manufacturing firms than service firms	The study result compared service and manufacturing firms while the current is on one case, sugar firm
Menzel et al. (2010)	The trend and effect of environmentally friendly manufacturing on the financial performance of companies in the	No significant relationship between greener manufacturing and corporate performance. However, a trend in decreasing resources, specifically	The study didn't find any kind of relationship between the variables

	European automotive and pharmaceutical industries specific attention given to resource utilization	electricity was found.	
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Source: Literature Reviewed and Researcher, 2019

2.4 Conceptual Framework

The conceptual framework draws the picture after identifying the independent variables, which are. Conceptual frame provides clear diagrammatic expression on how these variables relate to performance. Figure 2.1 is the conceptual framework if the study.

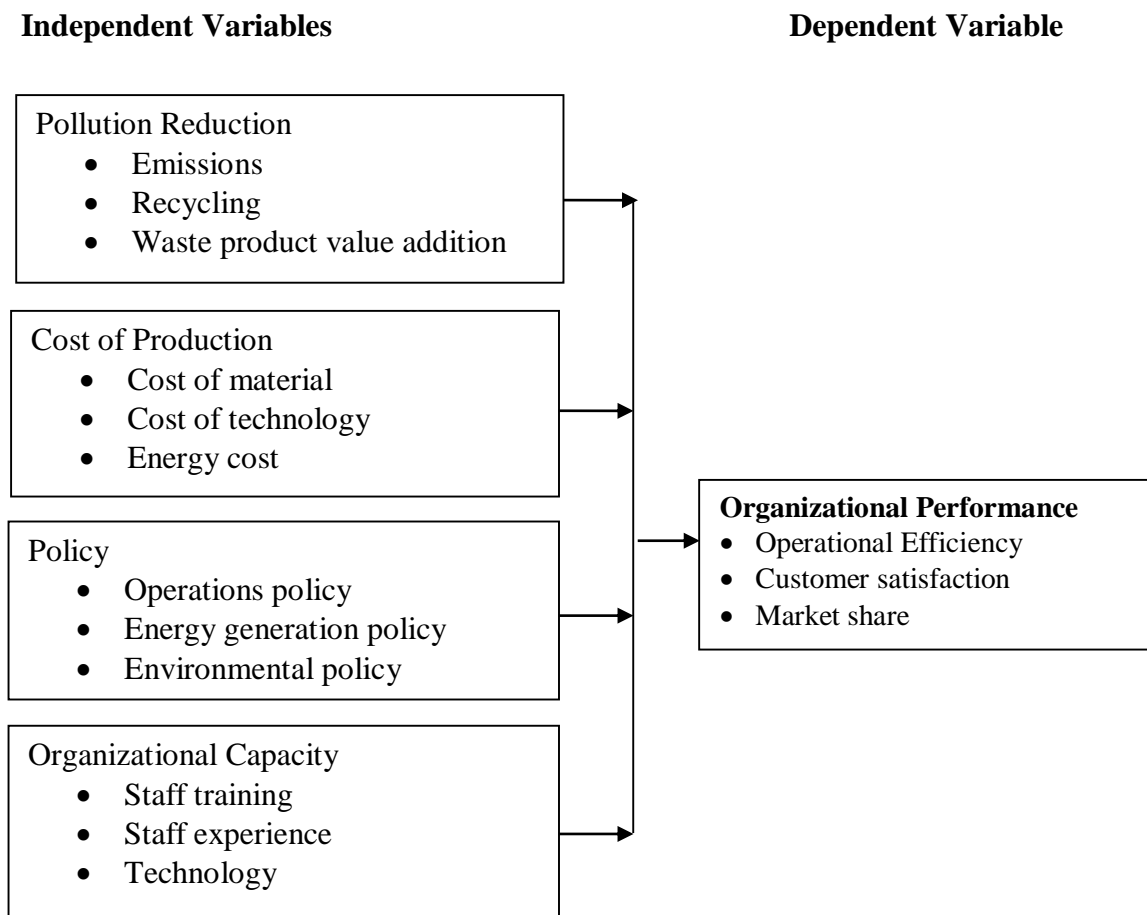


Figure 2.1: Conceptual Framework

Source: Researcher, 2019

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter presents a systematic flow of various steps that were used in the study. The steps focuses on the research design, target population, sample size and sampling technique, research instruments, pilot study, data collection procedures and data analysis techniques. Finally, the ethical considerations taken into account during the study are outlined.

3.2 Research Design

This study adopted descriptive survey design that primarily targeted the green energy project at the Butali Sugar Factory and how it has affected its performance. This method is very important in the quest of determining the answers to who, what, where and how questions (Mugenda & Mugenda 2003). The design also captures all important aspect of the study while employing a unit and investigations.

3.3 Population

Mugenda and Mugenda (2009) define the target population as all the members of real or hypothetical set of people, events, or objects from which the study wants to generalize the results of the research. The target population was 204 respondents. They consisted of top managers and heads of departments connected to the Butali Sugar Mills Limited bagasse adoption (Butali Sugar Mills Limited's HRM report, 2019).

Table 3.1 Target Population

Categories	Population
Top management (CEO, Directors, Managers)	18
Supervisors and heads of departments	37
Human Resource department	15
Project management department	79
Operations department	21
Engineering department	26

Accounts department	8
Total	204

Butali Sugar Mills Limited's HRM report (2019).

3.4 Sample Procedure and Sample Size

Lavrakas (2015) defines sampling size as the selected number of observations from the general population which could be equal to the population if census is conducted or smaller than the population with the use of other types of sampling procedures. The study conducted an estimator using the Yamane's formula to identify the sample size for the study. In regards to this formula (error = 0.05 or 5%), the sample size was 134 as described in Table 3.2.

Table 3.2 Sample Size

Categories	Population	Calculation
Top management (CEO, Directors, Managers)	18	12
Supervisors and heads of departments	37	24
Human Resource department	15	10
Project management department	79	52
Operations department	21	14
Engineering department	26	17
Accounts department	8	5
Total	204	134

Source: Researcher, 2019

3.5 Data Collection Instruments

The primary data that was collected in this study was both quantitative and qualitative data. The data was collected using structural questionnaires that were administered to the respondents. This questionnaire had both closed and open-ended questionnaire that captured all the variables. Open ended questions permitted the free response from the respondents without any suggestion of answers. Closed ended questions enabled the researcher to arrange data into started alternatives. Questionnaire is used because it allows the researcher to collect a larger amount of data within limited area (Orodho, 2003). These questionnaires were self-administered, dropped and picked later.

3.6 Data Collection Procedures

The researcher sought for approval from the University for data collection which was used to seek for permit from NACOSTI. Authority was also sought from the Butali Sugar Company and project management team before data collection. The questionnaires were dropped at the respondents working place and the respondent was given one week to fill them and then the researcher collected the filled questionnaires. The researcher preferred the ‘drop and pick’ method so as to give the respondents as enough time as possible to the respondents to fill the questionnaires.

3.7 Validity and Reliability of Research Instruments

3.7.1 Reliability of the Research Instruments

Orodho (2008) notes that reliability of research instruments concerns with the degree to which a particular measuring procedure gives similar results of a number of repeated trials. Reliability is a measure of how consistent the results from a test are Kombo and Tromp (2006). According to Mugenda and Mugenda (2009), the reliability of an instrument is the measure of the degree to which a research instrument yields consistent results or data after repeated trials. The study conducted a pilot study to test weaknesses in design and instrumentation to provide proxy data for selection of a sample. The pilot study was conducted as provided in this study. However, the findings from the pilot test were not included in the final results. The study employed the Cronbach Alpha Coefficient to measure the internal consistency of the questionnaire. As a general rule, a value of $\alpha > 0.7$ was deemed reliable enough for each of the data sets where α is the item being tested for reliability.

3.7.2 Validity of Research Instruments

According to Halton (2014), validity is the quality attributed to proposition or measures to the degree to which they conform to establish knowledge or truth. Validity refers to the extent to which a research instrument can measure what it ought to measure with regard to the study

topic. To ensure content validity of the tools of data collection, the student consulted the supervisor and discussed the data collecting instruments with the research experts and staff in the company.

3.8 Data Analysis and Presentation

After data collection, data was edited, referenced coded to facilitate statistical analysis. Data collected was analyzed using both qualitative and quantitative methods. Data was analyzed using Statistical Package for Social Sciences (SPSS version 21). After data cleaning which entails checking for errors in entry, investigate differences between and among groups and frequencies were estimated for all variables and information presented in form of frequency and tables. For quantitative techniques, inferential statistics were applied and drawing conclusions with predictions about the properties of a population based on information obtained from a sample. Correlation coefficient was used to measure the strength and direction of a linear relationship between two variables. A P-value of <0.05 was significant, and the opposite insignificant. Multiple regression analysis involved finding the best straight-line relationship to explain how the variation in an outcome (or dependent) variable, Y, depends on the variation in a predictor (or independent or explanatory) variable, X. Once the relationship was estimated, it was possible to use the equation: $Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \dots + \epsilon$ Where;

Y= Performance of Butali Sugar Company

α = Constant

β_0 = Coefficients

$\beta_1, \beta_2,$ and β_3 = Coefficients of the independent variable

X_1 = Pollution reduction

X_2 = cost reduction

X_3 = organizational Policy

X_4 = organizational capacity

ε = Standard error term

3.9 Ethical Consideration

The study used primary data to collect data in the field. Introductory letter from the University was attached to and permission to carry out the research was obtained from NACOSTI. This enabled the researcher to carry out the research. The respondents were assured of confidentiality and that the data was only used for academic purpose. The researcher also held a brief interview with the respondent to iron out any misleading information's. This basically encouraged the level of honesty of the respondents and increased validity of the data

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the findings of the study on the relationship between green energy adoption and performance of Butali Sugar Mills Limited. The green energy adoption mechanisms selected were pollution reduction, cost of production, policy and organizational capacity. The study respondents included top managers and heads of departments connected to the Butali Sugar Mills bagasse project. The data was analyzed using both descriptive and inferential statistics with the aid of SPSS. The findings are as presented in the following sections.

4.1.1 Response Rate

Out of the 134 respondents sampled for the study, 125 of them completed the questionnaires and presented them for analysis. This represents a response rate of 93.28%. This rate is statistically significant and representative according to Mugenda and Mugenda (2003) who indicated that the response rate of half is sufficient for investigations and revealing, a 60% rate is by and large great while a 70% rate of response is magnificent. This is presented in the table below;

Table 4.1: Response Rate

Response rate	Frequency	Percentage
Response	125	93.28
Non-Response	9	6.72
Total	134	100

Source: Field data, 2019

4.1.2 Reliability Test

The study conducted a pilot study which was used to test reliability of the study instruments by assessing the consistency of data arising from the use of the study research method. A Cronbach Alpha was used to measure reliability of the research questionnaires. The Cronbach findings were as shown in Table 4.2.

Table 4.1: Reliability Test

Variable	Number of Coefficient	Cronbach Alpha
Pollution reduction	5	0.837
Cost of Production	5	0.722
Organization Policy	5	0.801
Organizational Capacity	5	0.826
Average		0.7965

Source: Field data, 2019

The study indicated that pollution reduction as one of the ideas behind green energy adoption at the sugar miller had a Cronbach Alpha of 0.837, cost of production had a coefficient of 0.722, and organizational policy had a coefficient of 0.801 while for organizational capacity it was 0.826. Since the individual and average Cronbach alpha coefficients were all more than 0.7 the data collection instruments were deemed statistically reliable to collect data for the study. This is also indicated by Cronbach (1957) that a coefficient of more than 0.7 indicates that the data collection instruments are significantly reliable.

4.2 Demographic Data

The study assessed the demographic background of the respondents at the Butali Sugar Mills Limited, bagasse project focusing on gender, age, working experience and level of education. The findings were as presented below;

4.2.1 Gender of Respondents

The gender distribution of the respondents who were mainly project managers and heads of departments at the Butali Sugar Mills Ltd was analyzed. The study established that 68% of top managers and heads of departments at the Butali Sugar Mills Limited bagasse project were male while 32% of them were female. This shows that most of the management staffs at the sugar factory were male.

4.2.2 Age of Respondents

Respondents' age was also assessed based on the established age brackets. The findings were as tabulated below;

Table 4.3: Age of Respondents

Age bracket	Frequency	Percentage
Under 30 years	27	21.60
31-40 years	47	37.60
41-50 years	39	31.20
Over 50 years	12	09.60
Total	125	100

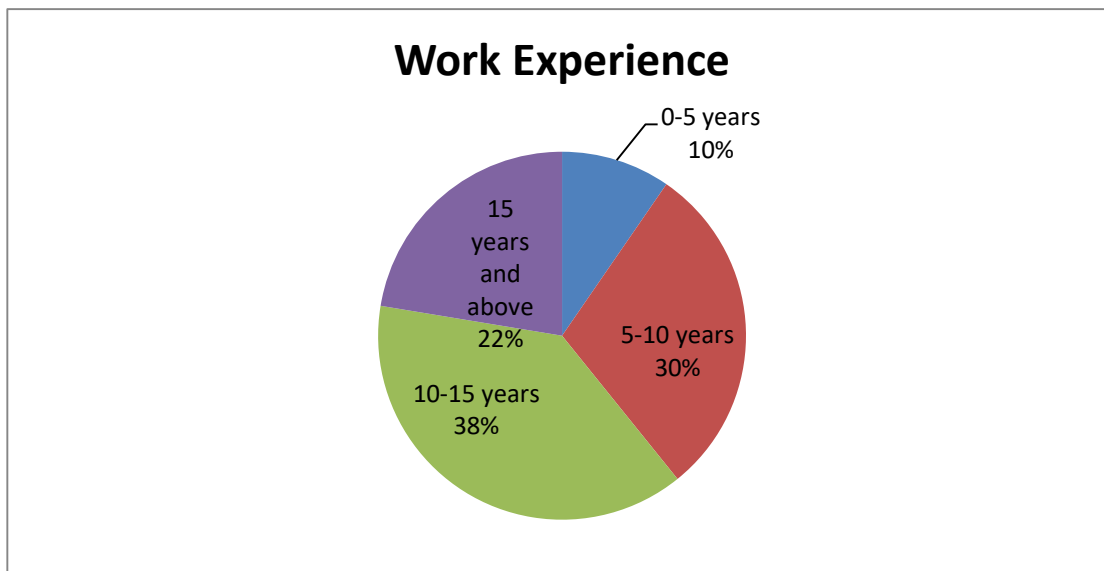
Source: Field data, 2019

The study established that 21.6% of the management employees at the Butali Sugar Mills Limited were less than 30 years of age, 37.6% were aged between 31 and 40 years, 31.2% were aged between 41 and 50 years while 9.6% were over 50 years of age. This indicates that majority of the staff were between 31 and 40 years. This shows that the workforce at the firm was below 50 years implying an energetic, dedicated, vibrant, knowledgeable and creative human resource at the firm to drive its agenda and projects effectively and efficiently.

4.2.3 Working Experience

The study further analyzed the work experience among the top managers and heads of department in the green energy project at Butali Sugar Mills. The findings were as presented below;

Figure 4.1: Respondents' work experience



Source; Field data, 2019

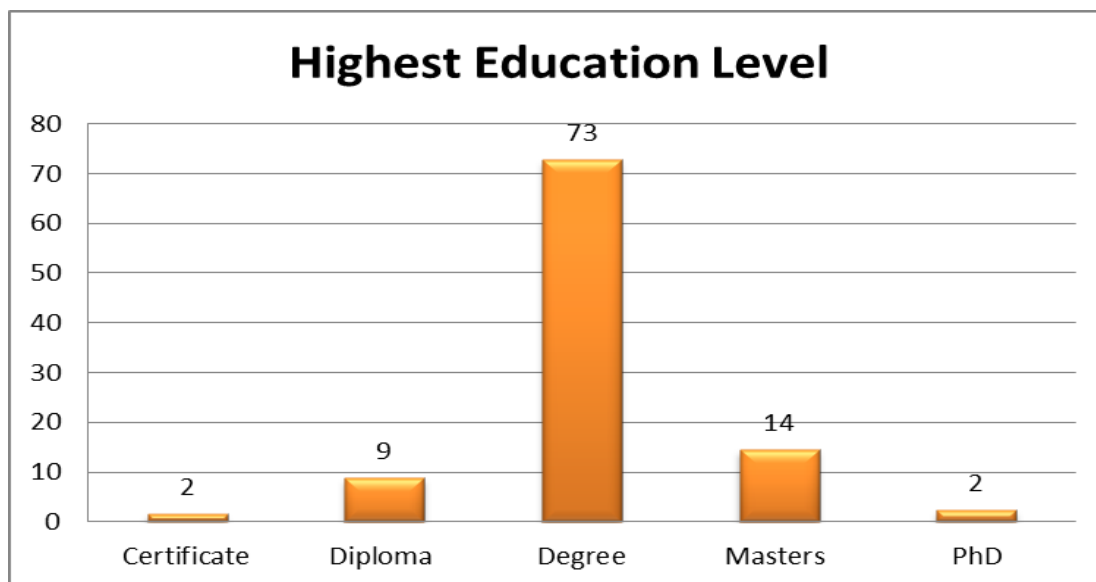
As presented in figure 4.2, 10% of the respondents had an experience of between 0 and 5 years, 30% of them had an experience of between 5 and 10 years, 38% had a working

experience of between 10 and 15 years while 22% had an experience of more than 15 years. This indicates that most of the respondents had a working experience of between 10 and 15 years. This shows that the respondents had a significantly long period of working experience to deliver on their mandate in planning, initiating, implementing and sustaining the green energy project.

4.2.4 Highest Education Level

The study assessed the highest academic achievement among the respondents. This was aimed at establishing the capacity of the respondents to perform their duties, read and interpret the data collection instruments and give credible feedback. The findings were as presented below;

Figure 4.3: Respondents' highest academic level



Source: Field data, 2019

It was established that 2% of the top management and heads of department at the Butali Sugar Mills Limited had a certificate qualification as the highest academic achievement, 9% were diploma holders, 73% were undergraduate degree holders, 14% were masters degree graduates while 2% had a PhD degree. This indicates that most of the respondents were degree holders. This indicates a significantly qualified, knowledgeable and skilled work force at the firm.

4.3 Descriptive Statistical Findings

4.3.1 Pollution Reduction and Performance

One of main goals of green energy adoption is to reduce pollution. The study respondents were therefore asked to indicate to what extent they agreed with the following statements regarding the effect of pollution reduction on the performance of Butali Sugar Company in Kakamega County, Kenya using a scale of 1-5 where 5: Strongly Agree, 4: Agree, 3: Undecided; 2: Disagree; 1: Strongly Disagree. The findings were as presented below;

Table 4.4: Pollution Reduction

Statement	Mean	Std.Dev
The firm has minimal emissions to the atmosphere	3.51	0.619
The company has a recycling plant for factory wastes	2.87	0.784
The firm collaborates with other firms that make use of factory wastes	2.56	0.719
The company stores waste products safely and disposes them well	2.67	0.805
The factory uses renewable sources to reduce environmental degradation	3.62	0.849
The firm has embarked on environmental conservation in close environs	3.79	0.856

Source: Field data, 2019

The study respondents significantly agreed that Butali Sugar Mills Limited has minimal emissions to the atmosphere, the factory uses renewable sources to reduce environmental degradation and the firm has embarked on environmental conservation in close environs as indicated by a mean of 3.51, 3.62 and 3.79 respectively. The respondents were neutral on whether the company has a recycling plant for factory wastes, the firm collaborates with other firms that make use of factory wastes and also that the company stores waste products safely and disposes them well due to adoption of green energy as indicated by a mean of 2.87, 2.56 and 2.67 respectively. This indicates that the firm had significantly reduced emissions to the atmosphere by adopting green energy, enhanced use of renewable energy, improved environmental conservation, recycles wastes, embraces environmental friendly waste disposal and collaborates with other firms on waste management. This reduces pollution and contributes to efficient firm performance. This is in agreed with a study by Manrique& Carmen-Pilar (2017) on the effect of corporate environmental performance on corporate financial performance in developed and developing countries established that implementation of

environmental practices such as waste management and reduction of pollution could have an important effect on the financial performance of firm.

4.3.2 Cost of Production and Performance

To establish the extent to which cost of production had been reduced through green energy adoption by Butali Sugar Company and the effect it has on firm performance, the respondents were asked to indicate the extent to which they agreed with the following statements regarding how cost of production through adoption of green energy has affected performance of Butali Sugar Company in Kakamega County, Kenya using a scale of 1-5 where 5: Strongly Agree, 4: Agree, 3: Undecided; 2: Disagree; 1: Strongly Disagree. Table 4.5 below presents the findings;

Table 4.5: Cost of Production and Firm Performance

Statement	Mean	Std. Dev
The company has reduced energy costs through green energy adoption	4.06	0.814
Cost of running factory machines and equipment is affordable	3.79	0.901
The company has scaled down on equipment and machine wear and tear due to green energy use	3.54	0.827
There are adequate finances for the projects personnel	2.89	1.355
The cost of transportation is reasonable	3.05	1.246
The price of license to produce power is fair	2.55	0.791

Source: Field data, 2019

The study established that the respondents were in agreement that the company has reduced energy costs through green energy adoption, the cost of running factory machines and equipment is affordable and that the company has scaled down on equipment and machine wear and tear due to green energy use as indicated by a mean of 4.06, 3.79 and 3.54 respectively. The respondents however indicated that to a moderate extent there are adequate finances for the projects personnel, the cost of transportable is reasonable and the price of license to produce power is fair as indicated by a mean of 2.89, 3.05 and 2.55 respectively. This indicates that green energy adoption had significantly reduced the cost of production in the firm despite their being inadequate finances for the project, cost of transportation being slightly higher and the price of license to produce power being moderately higher. Similarly Green *et al* (2012) in their study on the relationship between use of renewable energy and

cost performance of firms in the UK indicated that there is a direct relationship between environmental protection and cost performance among firms.

4.3.3 Organizational Policy

Organizational policy gives the guidelines and regulations to a project or strategy and stipulates the necessary steps towards its realization. The study respondents were therefore asked to indicate the extent to which they agreed with the following statements regarding the effect of organizational policy on green energy on the performance of Butali Sugar Company in Kakamega County, Kenya on a five point likert scale where; 5: Strongly Agree, 4: Agree, 3: Undecided; 2: Disagree; 1: Strongly Disagree. The findings were as presented below;

Table 4.6: Organizational Policy and Firm Performance

Statement	Mean	Std. Dev
The company has the license for production of green energy	4.22	0.759
The company has a policy for green energy use and environmental conservation	3.67	0.688
The organization operates on standard regulations that permit its production and supply of green energy	3.55	0.903
There is a safety policy for employees working on the project	3.76	0.749
The company has permit to generate the green energy	3.59	0.829
The company coordinates with other organizations that permit its program of green energy	3.11	0.884

Source: Field data, 2019

The respondents agreed that Butali Sugar Millers Limited has the license for production of green energy, the company has a policy for green energy use and environmental conservation, the organization operates on standard regulations that permit its production and supply of green energy, there is a safety policy for employees working on the project and that the company has permit to generate the green energy as indicated by a mean of 4.22, 3.67, 3.55, 3.76 and 3.59 respectively. The respondents were neutral on whether the company coordinates with other organizations that permit its program of green energy as indicated by a mean of 3.11 and standard deviation of 0.884. This generally indicates that firm has a clear policy guideline on green energy adoption, complies with government policy and regulations governing the project. This has made project implementation smooth and compliant. Ngniatedema and Li (2014) in their study on the relationship between green operations and

organizational performance in top 500 publicly traded companies in the USA indicated that green operations and organizational policy on green energy have a more significant and positive effect on performance of firms.

4.3.4 Organizational Capacity

The last objective of the study was to establish the organizational capacity to implement the green energy adoption project and how it has affected the performance of Butali Sugar Millers Limited. The respondents indicated the extent to which they agreed with the following statements regarding the effect of organizational capacity for the adoption of green energy on the performance of Butali Sugar Company in Kakamega County on a scale of 1-5 where; 5: Strongly Agree, 4: Agree, 3: Undecided; 2: Disagree; 1: Strongly Disagree. The findings were as tabulated below;

Table 4.7: Organizational Capacity and Firm Performance

Statement	Mean	Std. Dev
Personnel have adequate education	3.66	0.801
The staff is well trained	3.75	1.443
There is enough skilled personnel for technology control	3.85	0.820
The employees in this project have many years of working experience	2.88	0.739
Management is supportive in provision of guidance	3.33	0.864
There are adequate stakeholders supporting the project	2.79	0.842
There is adequate bagasse for green energy generation	3.18	0.678
The company has adequate facility to produce energy	3.22	0.772
The storage capacity for bagasse is large enough	3.08	1.408
The company is able to store a lot of green energy	3.16	1.225
The facility has adequate space for the process	3.41	0.619
There exists required technology for the adoption process	2.77	0.822

Source: Field data, 2019

The study respondents significantly agreed that the project personnel have adequate education, they are well trained and that there is enough skilled personnel for technology control as indicated by a mean of 3.66, 3.75 and 3.85 respectively. The respondents were neutral or averagely agreed that the employee in the project have many years of working experience, the management is supportive in provision of guidance, there are adequate

stakeholders supporting the project, there is adequate bagasse for green energy generation, the company has adequate facility to produce energy, the storage capacity for bagasse is large enough the company is able to store a lot of green energy, the facility has adequate space for the process and there exists required technology for the adoption process as indicated by a mean of 2.88, 3.33, 2.79, 3.18, 3.22, 3.08, 3.16, 3.41 and 2.77 respectively. This indicates that the company to a moderate extent had the necessary human resource capacity, technology, storage, stakeholders, raw material and management support to execute the green energy adoption process. The study contradicts the findings by Menzel et al (2010) in their study on the trend and effect of environmentally friendly manufacturing on the financial performance of companies where they indicated that there is no significant relationship between greener manufacturing and corporate performance.

4.3.5 Performance of Butali Sugar Company

The study sought to find out the effect of green energy adoption on the performance of Butali Sugar Millers Limited. The respondents were therefore asked to rate the following statements regarding performance of the factory on a scale of 1-5 where 5: Strongly Agree, 4: Agree, 3: Undecided; 2: Disagree; 1: Strongly Disagree. The findings were as presented below;

Table 4.8: Performance of Butali Sugar Millers Limited

Statement	Mean	Std. Dev
The firm revenue has improved with adoption of green energy	3.61	0.811
The firm market share has improved significantly	3.59	1.348
Use of green energy has promote high operational efficiency	4.11	1.442
The amount of energy generated is adequate	3.72	0.699
Conservation of environment has improved stakeholder and customer satisfaction	3.55	0.728
There is surplus of energy that the company sells to KPLC generate additional revenue	2.51	0.883

Source: Field data, 2019

The study respondents agreed that the firm revenue has improved with adoption of green energy, the firm market share has improved significantly, use of green energy has promoted high operational efficiency, the amount of energy generated is adequate and conservation of environment has improved stakeholder and customer satisfaction as indicated by a mean of 3.61, 3.59, 4.11, 3.72 and 3.55 respectively. The respondents were however neutral on

whether there is surplus of energy that the company sells to KPLC generate additional revenue as indicated by a mean of 2.51 and standard deviation of 0.883. This indicates that green energy adoption had significantly contributed to positive performance of Butali Sugar Company through improved revenue, market share, operational efficiency, and stakeholder and customer satisfaction. The study however established that the energy generated had not risen to economically viable levels to generate additional revenue.

4.4 Inferential Statistics

The study used a multiple regression analysis to establish the relationship between the variables of the study. The findings of Model Summary, ANOVA and Coefficient of Regression were as indicated in the following sections.

4.4.1 Model Summary

The findings of coefficient of correlation and coefficient of determination are as shown in Table 4.9.

Table 4.9: Model summary

Model	R	R square	Adjusted r square	Std. Error of the estimate
1	.869 ^a	.856	.851	1.24416

a. Predictors: (constant), pollution reduction, cost of production, organizational policy and organizational capacity

Source: Field data, 2019

The study shows that coefficient of correlation R of 0.869 an indication of strong of correlation between the variables. The adjusted R² was 0.851 which implies that 85.1% of the variation in firm performance was accounted for by the four independent variables which include: pollution reduction, cost of production, organizational policy and organizational capacity. The residual of 14.9% can be explained by other variables not incorporated in the current study.

4.4.2 ANOVA

An ANOVA was conducted at 95% level of significance. The findings of F_{Calculated} and F_{Critical} are as shown in Table 4.10.

Table 4.10: ANOVA

Model	Sum of squares	Df	Mean square	F	Sig.
Regression	836.211	15	55.7474	28.6325	.000 ^b

Residual	214.134	110	1.947
Total	1050.345	125	

a. Dependent variable: Firm performance

b. Predictors: (constant), pollution reduction, cost of production, organizational policy and organizational capacity

Source: Field data, 2019

It was established that the study had $F_{\text{Calculated}}$ of 55.7474 and F_{Critical} was 7.51224, this show that of $F_{\text{Calculated}} > F_{\text{Critical}}$ an indication that the overall regression model was significant for the study. The p value was $0.00 < 0.05$ an indication that at least one independent variable significantly influenced the performance of Butali Sugar Millers Limited, Kenya.

4.4.3 Regression Coefficient

The study used a regression coefficient to establish the effect of individual variables of green energy adoption on performance of Butali Sugar Company bagasse project. The findings are indicated in Table 4.11.

Table 4.11: Regression Coefficient

Model	Unstandardized coefficients		Standardized coefficients	T	Sig.
	B	Std. Error	Beta		
(constant)	5.987	1.05		2.316	.000
Pollution reduction	0.855	.033	.471	2.104	.000
Cost of production	0.847	.024	.125	3.628	.000
Organizational policy	0.828	.052	.404	2.531	.000
Organizational capacity	0.811	.020	.463	2.361	.000

a. Dependent variable: Firm Performance

Source: Field data, 2019

$$Y = 5.987 + 0.855X_1 + 0.847X_2 + 0.828X_3 + 0.811X_4$$

Whereby: Y = Performance of Butali Sugar Company Limited

X_1 = Pollution reduction

X_2 = Cost of production

X_3 = Organizational Policy

X_4 = Organizational Capacity

Table 4.11 indicates that all variables held constant, firm performance would be at 5.194 this indicates that performance of the factory can still take place without the influence of the

stated variables. The variable coefficients indicate that the relationship between green energy adoption and firm performance was positive and significant. These findings are similar to those by Aimable, Shukla and Oduor (2015) who on their study on effects of risk management methods on project performance in Rwandan Construction industry. The researchers indicated that detailed that risk management practices have a significant and positive effect on project performance.

The p values of all the independent variables which include project planning, monitoring and evaluation, communication and stakeholder participation were $0.000 < 0.05$ an indication that the variables significantly influenced performance of projects in Nairobi City County. This is supported Ngniatendema & Li (2014) who in their study on the relationship between green energy operations and organizational performance concluded that green energy adoption enhances organizational performance by reducing cost of operation, reducing pollution and promoting generally environmental conservation. The study indicated that green energy operations ranging from having a relevant and favorable organizational policy, capacity, reduced pollution and cost of production have significant and positive effect on manufacturing firms' performance.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings of the study as presented and discussed in the previous chapter. The study conclusions and recommendations are enumerated based on the findings; suggestions for further studies are also provided.

5.2 Summary of the Findings

The study sought to establish the effect of green energy adoption on the performance of Butali Sugar Company. The study sought to establish the effect of pollution reduction, cost of production, organizational policy and organizational capacity as aspects of green energy adoption on firm performance. The target population was 204 management staff where Yamane's formula was used to develop a sample of 134 respondents. The response rate was 93.28% with 125 questionnaires sufficiently completed and submitted and hence used for analysis. Both descriptive and inferential statistics were used to analyze and present data.

5.2.1 Pollution Reduction and Firm Performance

The study established that pollution reduction as a means and an end to green energy adoption positively and significantly influenced performance of Butali Sugar Company Limited. The study established that Butali Sugar Mills Limited has minimal emissions to the atmosphere, the factory uses renewable sources to reduce environmental degradation and the firm has embarked on environmental conservation in close environs. The respondents were neutral on whether the company has a recycling plant for factory wastes, the firm collaborates with other firms that make use of factory wastes and also that the company stores waste products safely and disposes them well due to adoption of green energy. This indicates that the firm had significantly reduced emissions to the atmosphere by adopting green energy, enhanced use of renewable energy, improved environmental conservation, recycles wastes, embraces environmental friendly waste disposal and collaborates with other firms on waste management. This reduces pollution and contributes to efficient firm performance.

5.2.2 Cost of Production and Firm Performance

The study found out that cost of production reduction due to green energy adoption significantly influenced performance of Butali Sugar factory. The study established that to a significant extent the company has reduced energy costs through green energy adoption, the cost of running factory machines and equipment is affordable and that the company has scaled down on equipment and machine wear and tear due to green energy use. The

respondents however indicated that to a moderate extent there are adequate finances for the projects personnel, the cost of transportable is reasonable and the price of license to produce power is fair. This indicates that green energy adoption had significantly reduced the cost of production in the firm despite their being inadequate finances for the project, cost of transportation being slightly higher and the price of license to produce power being moderately higher

5.2.3 Organizational Policy and Firm Performance

The study established that availability of relevant organizational policy on green energy adoption positively influenced performance Butali Sugar Company. The study established that Butali Sugar Millers Limited has the license for production of green energy, the company has a policy for green energy use and environmental conservation, the organization operates on standard regulations that permit its production and supply of green energy, there is a safety policy for employees working on the project and that the company has permit to generate the green energy. The respondents were neutral on whether the company coordinates with other organizations that permit its program of green energy. This generally indicates that firm has a clear policy guideline on green energy adoption, complies with government policy and regulations governing the project.

5.2.4 Organizational Capacity and Firm Performance

The study established that organizational capacity to implement green energy project significantly influenced performance of the factory. The study established that the project personnel have adequate education, they are well trained and that there is enough skilled personnel for technology control. The respondents were neutral or averagely agreed that the employee in the project have many years of working experience, the management is supportive in provision of guidance, there are adequate stakeholders supporting the project, there is adequate bagasse for green energy generation, the company has adequate facility to produce energy, the storage capacity for bagasse is large enough the company is able to store a lot of green energy, the facility has adequate space for the process and there exists required technology for the adoption process. This indicates that the company to a moderate extent had the necessary human resource capacity, technology, storage, stakeholders, raw material and management support to execute the green energy adoption process.

5.3 Conclusion

The study concluded that green energy adoption had a positive and significant effect on the performance of Butali Sugar Company.

The study sought to establish whether the research questions were answered;

(i) What is the effect of pollution reduction on performance of Butali Sugar Company, Kenya?

It was concluded that the firm had significantly reduced emissions to the atmosphere by adopting green energy, enhanced use of renewable energy, improved environmental conservation, recycles wastes, embraces environmental friendly waste disposal and collaborates with other firms on waste management

(ii) How does the cost of production affect performance Butali Sugar Company, Kenya?

It was further concluded that green energy adoption had significantly reduced the cost of production in the firm despite their being inadequate finances for the project, cost of transportation being slightly higher and the price of license to produce power being moderately higher

(iii) To what extent does organizational policy influence the performance of Butali Sugar Company, Kenya?

The study concluded that the firm has a clear policy guideline on green energy adoption, complies with government policy and regulations governing the project.

(iv) What is the effect of organisational capacity on performance of Butali Sugar Company, Kenya?

The study lastly concluded that the company to a moderate extent had the necessary human resource capacity, technology, storage, stakeholders, raw material and management support to execute the green energy adoption process

5.4 Recommendations

The following recommendations are given based on the findings of the study per objective:

5.4.1 To assess the effect of pollution reduction on performance of Butali Sugar Company, Kenya.

Butali Sugar Company should embrace the implementation of environmental practices such as waste management and reduction of pollution could have an important effect on the financial performance of a firm, because the profitability could be decreased by high production costs linked to environmental innovation according to neoclassical economic theory. However, from a natural-resource-based view and instrumental stakeholder theory, the adoption of environmental practices by core business strategy allows firms to save production costs by reducing environmental risks, while enhancing their relationship with the key stakeholders, which contributes to achieving competitive advantages and thus improves their corporate financial performance in the long term.

5.4.2 To determine effect of the cost of production on performance of Butali Sugar Company, Kenya

There is a direct link between environmental efforts and financial performance but strong support for a link between environmental performance and leaner performance. Studies have highlighted that improving environmental performance may be the key to improving cost and financial outcomes. The current study takes a step further by seeking to identify the relationship between pollution prevention through green energy adoption and cost performance.

There is need for capital to set up new cogeneration plants and to expand on the existing ones. The current sugar plants require conversion to accommodate condensing turbines and this requires significant capital injection. The success of the project also depends on a viable unit price for the sale of electricity generated from cogeneration. The cost of electricity from cogeneration will be more expensive than that from conventional fossil fuels

5.4.3 To establish the effect of organizational policy on performance of Butali Sugar Company, Kenya

Based on metrics for environmental impact and green reputation, manufacturing companies scored lower on the environmental impact metric and higher on the green reputation metric than companies in the service industries. The overall impact of green operations was found to be different between the manufacturing and service firms studied. For manufacturing firm's environmental impact score and green policies and performance score were found to have an impact on organizational performance; while green reputation plays a more important role in impacting the organizational performance of service firms.

A barrier arising from the fact that still the government does not have a comprehensive policy on price that KPLC is to pay on power from cogeneration sources and this has made it difficult to have strict and precise projection on sales revenue and profits, this fact can also deter investors and financiers. The pricing aspect has made cogeneration projects not to be pursued by most sugar companies in the country.

5.4.4 To examine the effect of organizational capacity on performance of Butali Sugar Company, Kenya

The Findings were mixed, but studies where a positive impact of environment on financial performance is obtained were predominant. In addition, the findings show that the set of firms, industries and countries are varied. Some studies use environmental management variables and other works employ environmental performance variables. The study offers interesting implications for managers, pointing out that a real commitment to green management may result in a positive influence on financial performance. The study however does not consider studies that analyze the influence of environmental management on environmental performance thus further studies should be carried out to analyze the influence of environmental management on environmental performance

5.5 Suggestions for Further Studies

The study recommends a similar study to be carried out by use of secondary data. The current study had a coefficient of adjusted R^2 of 0.851 and a residual of 14.9% which can be explained by other variables beyond the scope of the current study that future scholars should focus on. The main objective of the study was to establish the effect of green energy adoption and performance of Butali Sugar Company, future scholars should carry out similar study in other sectors or entities.

REFERENCES

- Ahmed, S. (2016). Cogeneration through bagasse: a renewable strategy to meet the future energy needs. *Renew. Sust.Energ. Rev.* 54, 732–737.
- Araújo, K. (2017). *Low carbon energy transitions: Turning points in national policy and innovation*. Oxford University Press: New York.

- Balachandra, P. (2009). Sustainable bioenergy for India: Technical, economic and policy analysis. *Energy* 34, 1003–1013.
- Balasubramanian, R. (2014). Preparation and characterization of fuel bagasse energy from woody biomass, agro-residues and their corresponding hydrochars. *Appl. Energ.* 113, 1315–1322.
- Barney, J. B., Ketchen & D. J., Wright, M. (2011). The Future of Resource-Based Theory: Revitalization or Decline? *Journal of Management*, 2011, Vol.37(5), pp.1299-1315
- Baruah, D.C. (2012). GIS based assessment of rice (*Oryza sativa*) straw biomass as an alternative fuel for tea (*Camellia sinensis* L.) drying in Sonitpur district of Assam, India. *Biomass Bioenerg.* 44, 160–204.
- Baruah, D.C. (2014). Bioenergy potential from crop residue biomass in India. *Renew. Sust.Energ. Rev.* 32, 504–512. IBEF, 2016.
<http://www.ibef.org/industry/power-sector-india.aspx> (accessed December 2016).
- Belward, A., Bisselink, B., Bódis, K., Brink, A., Dallemand, J.-F., de Roo, A., Huld, T., Kayitakire, F., Mayaux, P., Moner-Girona, M., Ossenbrink, H., Pinedo, I., Sint, H., Thielen, J., Szabó, S., Tromboni, U., & Willemen, L. (2011). Renewable energies in Africa. *JRC scientific and Technical Reports*
- Chaudhury, R. (2015). Scope and sustainability of hybrid solar–biomass power plant with cooling, desalination in polygeneration process in India. *Renew. Sust.Energ. Rev.* 51, 304–316.
- Davies, P.A. (2012). The feasibility of hybrid solar-biomass power plants in India. *Energy* 46, 541–554.
- Deepchand, K. (2000). Cogeneration of Bagasse Energy in Mauritius. *Energy for Sustainable Development*, V(I): 15 – 22.
- Deepchand, K. (2016). Economics of Electricity Production from Sugar Cane Tops and Leaves, a preliminary study. *Int. Sug. Jnl* 88 (1055):210-216.
- Dimand, R. W. (2004) Echoes of Veblen's theory of business enterprise in the later development of macroeconomics: Fisher's debt-deflation theory of great depressions and the financial instability theories of minsky and tobin, *International Review of Sociology*, 14:3, 461-470.
- FAO (2017). *Bioenergy for sustainable development*. Geneva, UN

- Garcia-Perez, M., Shen, J., Wang, X.S. and Li, Chun-Zhu.(2010). “Production and fuel properties of fast pyrolysis oil/bio-diesel blends.”*Fuel Process Technology*, 91: 296-305
- Geldermann, J. (2015). Efficient co-generation and district heating systems in bioenergy villages: an optimization approach. *J. Clean. Prod.* 104, 305–314.
- Graham, S., &McAdam, R. (2016).The effects of pollution prevention on performance.*International Journal of Operations & Production Management*, 36(10), 1333-1358. <https://doi.org/10.1108/IJOPM-05-2015-0289>
- Habbershon, T. & Williams, M. (1999).A Resource-Based Framework for Assessing the Strategic Advantages of Family Firms. *Family Business Review*, 1999, Vol.12(1), pp.1-25
- Helfat, C.; Peteraf, M. (2003). The dynamic resource-based view: capability lifecycles. *Strategic Management Journal*, 2003, Vol.24, pp.997- 1010
- Killen, C. ,Jugdev, K. , Drouin, N. & Petit, Y. (2012). Advancing project and portfolio management research: Applying strategic management theories. *International Journal of Project Management*, 2012, Vol.30(5), pp.525-538
- Kimuyu, P., Mutua, J., &Wainaina, J. (2012).Role of renewable energy in promoting inclusive and sustainable development in Kenya.*European Report on Development*.
- Koskela, L. & Howell, G. A. (2002).*The underlying theory of project management is obsolete. Paper presented at PMI® Research Conference 2002: Frontiers of Project Management Research and Applications*, Seattle, Washington. Newtown Square, PA: Project Management Institute.
- KPLC.(2016). *Kenya Power Annual Report and Financial Statements*.KPLC.
- Kraaijenbrink, Spender, J. &Aard J. (2010). The Resource-Based View: A Review and Assessment of Its Critiques. *Journal of Management* 2010 36: 349
- Lay, J., Ondraczek, J., Stoeber, J. (2012). Renewables in the energy transition: Evidence on solar home systems and lighting-fuel choice in Kenya. GIGA Working Papers, No. 198.
- Lichts, F.O. (2014). *World Sugar Statistics*.65thEdn.
- Malins, C. (2015). A reassessment of global bioenergy potential in 2050. *GCB Bioenergy* 7, 328–336.
- Michaelowa, A. (2007). CDM potential of bagasse co-generation in India.*Energy Policy* 35, 4779–4798.

- Ministry of Energy. (2012). Scaling up Renewable Energy Program - Investment plan for Kenya.
- Moomaw, W. (2017). To curb climate change we need to protect and expand US forests, Conversation, May 8, 2017. <https://theconversation.com/to-curb-climate-change-weneed-to-protect-and-expand-us-forests-76380>.
- Okoh, O. (2016). Pre-processing of sugarcane bagasse for gasification in a downdraft biomass gasifier system: A comprehensive review. *Renew. Sust.Energ. Rev.* 66, 775–801.
- Pablo, A. ,Reay, T., Dewald, J. &Casebeer, A. (2007). Identifying, enabling and managing dynamic capabilities in the public sector*. *Journal of Management Studies*, 44(5), 687-708.
- Prodhon, C. (2016). Models for optimization and performance evaluation of biomass supply chains: An operations research perspective. *Renew. Energ.*87, 977– 989.
- Rodes, C.E. (2016). Biogas stoves reduce firewood use, household air pollution, and hospital visits in Odisha, India. *Environ. Sci. Technol.* 51, 560–569.
- Saunders, M. , Lewis, P. &Thornhill, A. (2000) *Research Methods for Business Students*.
- Saxena, M. (2015). Multi-pronged approach required to re-ignite growth in the sector. *Bio-power* 1, 22–24.
- Sergio Manrique& Carmen-Pilar Martin-Ballester (2017); analyzing the effect of corporate environmental performance on corporate financial performance in developed and developing countries.*Sustainability*, MDPI, 2017
- Silva, M. (2017). Global biofuels at the crossroads: An overview of technical, policy, and investment complexities in the sustainability of biofuel development. *Agriculture* 7, 32, 1–22.
- Singh, J. (2016). A roadmap for production of sustainable, consistent and reliable electric power from agricultural biomass-An Indian perspective. *Energy Policy* 92, 246–254.
- Singh, J. (2017). Management of the agricultural biomass on decentralized basis for producing sustainable power in India.*J. Clean. Prod.* 142, 3985–4000.
- Thakur I.S. (2017). Emerging role of Geographical Information System (GIS), Life Cycle Assessment (LCA) and spatial LCA (GIS-LCA) in sustainable bioenergy planning.*Bioresour. Technol.* 242, 218–226.
- Tri Vi Dang, Youan Wang &Zigan Wang (2018); The effects of mandatory pollution abatement on corporate investment and performance: Theory and evidence

from a U.S. Regulation. *JEL Classifications*, G32, G38, Q 58. Columbia University, USA

Urpelainen, J. (2015). *Access to clean cooking energy and electricity*. CEEW Report. September 2015.

Veblen, T. (1904). *The Theory of the Business Enterprise*. New Brunswick, New Jersey: Transaction Books. p. 62.

Vinterbäck, J., 2009. Global potential of sustainable biomass for energy. Swedish University of Agricultural Sciences Report Number 013, ISSN 1654–9406.

Wang, F. (2017). Regional optimization of new straw power plants with greenhouse gas emissions reduction goals: a comparison of different logistics modes. *J. Clean. Prod.* 161, 871–880.

Wang, F., (2008). Using spatial information technologies to select sites for biomass power plants: A case study in Guangdong Province, China. *Biomass Bioenerg.* 32, 35–43.

Wanjiru, H., & Ochieng, F. X. (2013). Underpinning factors for the development of a commercialization strategy for small wind. 904–910.

APPENDICES

APPENDIX I: INTRODUCTORY LETTER

This questionnaire is administered for collection of data that will be used for academic purposes only and your response will be treated in confidential.

Dear Respondent,

I am a post graduate student. For partial fulfillment of the requirements for the award of a Masters of Business Administration in Project Management in the school of business; I am carrying out a research on **Adoption of Green Energy and Performance of Butali Sugar Company Limited, Kenya.**

Please, fill this attached questionnaire by ticking [√] on the response that best suits your understanding of each statement.

Your cooperation is highly appreciated.

Yours sincerely,

ISHMAEL MAINA MAKANGA

APPENDIX II: QUESTIONNAIRE FOR PARENTS

Instructions

Please give answers in the spaces provided and tick (✓) in the box that matches your responses to the questions where applicable.

PART A: Demographic and Respondents profile.

Gender (Tick as applicable)

Male

Female

What is your age bracket?(Tick as applicable)

Under 30years

31-40 years

41-50 years

Over 50 years

What is your working experience?

0-5 years

5-10 years

10-15 years

15 and above

6. What is your highest educational level attained?

Certificate

Diploma

Degree

Masters

PHD

Others.....

PART B: POLLUTION REDUCTION AND PERFORMANCE

To what extent do you agree with the following statements regarding the effect of pollution reduction on the performance of Butali Sugar Company in Kakamega County, Kenya? Use a scale of 1-5 where 5: Strongly Agree, 4: Agree, 3: Undecided; 2: Disagree; 1: Strongly Disagree

Statement	1	2	3	4	5
The firm has minimal emissions to the atmosphere					
The company has a recycling plant for factory wastes					
The firm collaborates with other firms that make use of factory wastes					
The company stores waste products safely and disposes them well					
The factory uses renewable sources to reduce environmental degradation					
The firm has embarked on environmental conservation in close environs					

PART C: COST OF PRODUCTION AND PERFORMANCE

To what extent do you agree with the following statements regarding how cost of production through adoption of green energy has affected performance of Butali Sugar Company in Kakamega County, Kenya? Use a scale of 1-5 where 5: Strongly Agree, 4: Agree, 3: Undecided; 2: Disagree; 1: Strongly Disagree

Statement	1	2	3	4	5
The company has reduced energy costs through green energy adoption					
Cost of running factory machines and equipment is affordable					
The company has scaled down on equipment and machine wear and					

tear due to green energy use					
There are adequate finances for the projects personnel					
The cost of transportation is reasonable					
The price of license to produce power is fair					

PART D: ORGANIZATIONAL POLICY

To what extend do you agree with the following statements regarding the effect of organizational policy on green energy on the performance of Butali Sugar Company in Kakamega County, Kenya? Key 5: Strongly Agree, 4: Agree, 3: Undecided; 2: Disagree; 1: Strongly Disagree

Statement	1	2	3	4	5
The company has the license for production of green energy					
The company has a policy for green energy use and environmental conservation					
The organization operates on standard regulations that permit its production and supply of green energy					
There is a safety policy for employees working on the project					
The company has permit to generate the green energy					
The company coordinates with other organizations that permit its program of green energy					

PARD E: ORGANIZATIONAL CAPACITY

To what extent do you agree with the following statements regarding the effect of organizational capacity for the adoption of green energy on the performance of Butali Sugar Company in Kakamega County, Kenya? Key 5: Strongly Agree, 4: Agree, 3: Undecided; 2: Disagree; 1: Strongly Disagree

Statement	1	2	3	4	5
Personnel have adequate education					
The staff is well trained					
There is enough skilled personnel for technology control					
The employees in this project have many years of working experience					
Management is supportive in provision of guidance					
There are adequate stakeholders supporting the project					
There is adequate bagasse for green energy generation					
The company has adequate facility to produce energy					
The storage capacity for bagasse is large enough					
The company is able to store a lot of green energy					
The facility has adequate space for the process					
There exists required technology for the adoption process					

PERFORMANCE OF BUTALI SUGAR COMPANY

To what extent do you agree with the following statements regarding performance of your factory Key 5: Strongly Agree, 4: Agree, 3: Undecided; 2: Disagree; 1: Strongly Disagree

Statement	1	2	3	4	5
The firm revenue has improved with adoption of green energy					
The firm market share has improved significantly					
Use of green energy has promote high operational efficiency					
The amount of energy generated is adequate					
Conservation of environment has improved stakeholder and customer satisfaction					
There is surplus of energy that the company sells to KPLC generate additional revenue					