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An Assessment of New Product Development Process: Development and Use of Wind As An Alternative Source Of Energy In Kenya.

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Abstract
The purpose of this article is to examine the new product development (NPD) process in the development and use of wind as alternative source of energy in Kenya, using the Kenya Electricity Generating Company (KenGen) as an illustrative case study. The objectives of the research were: to ascertain first whether the NPD process is in existence in the energy sector; secondly, what has necessitated the adoption of the NPD process in the energy sector and third, to assess the NPD approach and challenges facing KenGen to generate alternative source of energy. The total population under scrutiny was 112 members of staff in KenGen that were divided into three categories; support, technical and management staff. The study used a survey and interview design to assess the NPD process at KenGen. In the study, the researchers employed both primary and secondary sources of data to be able to gather constructive data used to illustrate the findings. A well structured questionnaire was administered to a sample of the total population under scrutiny to collect primary data. The secondary data source was mainly from research books, internet, reports and strategic plans from the institution and other energy bodies such as the MoE, Energy Regulatory Commission (ERC), Independent Power Producers (IPPs), Kenya Power and Lighting Company (KPLC) among others. A sample was established using a combination of cluster and simple random sampling techniques. Out of this procedure the sample size was made of 112 elements of which 50 were successful in completing the questionnaire sent out. The Microsoft Excel Package was used to code the data collected from the field after it had been collated and verified. Analysis was done using descriptive and inferential statistical methods to make conclusions about the NPD process at KenGen. The findings enabled the study to reach the conclusion that NPD process approach is not fully adopted at KenGen in the development of wind energy, thus some of the process steps are skipped. The study also reached the conclusion that KenGen lacks sufficient funding among others slowing down the development of wind energy. The aspect of funds is also viewed as a key impediment to NPD process and thus limiting its expected outcomes.
Key words: New product development, wind energy; renewable energy

1.0 Introduction

New products continue to be of critical importance to all organisations globally. Intense global competition, short product and technology lifecycles, unpredictable consumer buying patterns and possible market stagnation makes NPD process a critical activity in most businesses. New products provide organisations with growth opportunities that allow them to strengthen their market position (Kotler *et al.* 1994).

Strategic planning identifies opportunities for NPD and sets new product planning guidelines. Creating the right organisational culture that can encourage innovation is one of the primary tasks for top management, developing successful new products requires systematic planning and integration of various organisational cross-functional activities. Without a clear direction from top management it is difficult to select the right innovation strategy. Senior Management's involvement in the NPD planning process is directly responsible for a new product's success rate in the market (Kotler *et al*. 1994).

There are three factors that drive new product performance: i)The quality of the firm's new NPD process; ii) The resource commitments made to NPD; and, iii) The new product strategy. The determinants of new products' success include strategic factors, such as product advantage, marketing synergy, technical synergy, developmental process factors and market knowledge (Hutt and Speh, 2004).

Kotler *et al*. (1994) argues that new products are original products, product improvements, product modifications and new brands that business develops through its own research and development efforts. Strategic planning sets

important guidelines for NPD. Some organisations are very successful in creating an innovative culture that promotes new product ideas and reward staff for their contribution towards NPD. Craven (2000) suggests that successful innovation requires the creation of innovative culture, selecting the right innovation strategy, development and implementation of effective new product processes, making resource commitments and leveraging capabilities.

Successful organisations in the NPD are those that develop new products as part of the overall corporate strategy in order to create a competitive advantage for their business in the market. They determine the organisation's internal strengths, financial objectives and strategic roles for the new products and constantly evaluate the external environment in order to understand potential consumer needs. All new products should play a strategic role in the organisation's business strategy (Hutt and Speh, 2004).

In the energy sector, developing new products is also seen as one of the fundamental processes that is driving renewal and competitive advantage. In the recent past the fluctuation of oil prices occasioned by rising global energy consumption and a few powerful suppliers such as the Organisation of Petroleum Exporting Countries (OPEC), oil commodity market speculations, coupled with heightened lack of rainfall has driven energy producing companies like KenGen in Kenya to seek sustainable alternative sources of renewable energy to meet the market demand (Bharat Book Bureau, 2008). Hence qualifying the need recognition for alternative sources of energy in the NPD process.

According to Kaygusuz (2004) one of the products that have been touted as a viable alternative to conventional fossil fuel-based energy sources has been wind energy. As witnessed over the years the use of wind energy has been growing in the developed world and among the emerging economies. Generating electricity from wind makes economic as well as environmental sense. Wind energy is already competitive with coal or nuclear power across most of Europe, especially when the cost of pollution is taken into account. What is more, the cost of wind energy is falling, whilst other energy technologies such as geothermal are becoming more expensive. Wind is clean renewable source of energy.

The business of generating electricity from wind is growing fast and is set to expand as Europe and the rest of the world looks for an economic, cleaner and more sustainable ways to generate electricity. For example in German and other developed nations the use of wind energy is vibrant and enjoys government support in form of friendly policy framework that enables quick rate of commercialization and tax incentives in comparison to the conventional oil industry. The energy firms in this country realise that globalisation of markets has created a highly competitive arena where, in order to survive, they have to develop successful new products on a continuous basis.

According to Hills (1994) globally wind has been recognized as a value addition in the production of energy. Table 1.0 below indicates that the European Union (EU) is a world leader in installed wind capacity, with two thirds of the capacity world-wide. The leading wind energy countries in the EU are Germany, Denmark and Spain.

Table 1.0: Operational wind power capacity worldwide

Region	Installed Capacity (MW)					
	1996	1997	1998	1999	2000	2001
Europe	3216	4766	6470	9307	12972	16362
North America	1681	1611	2010	2619	2695	4440
South & Central America	32	38	52	87	103	103
Asia & Pacific	897	1149	1257	1403	1677	2162
Middle-East & Africa	13	24	26	39	141	203
Total worldwide	5839	7588	9814	13455	17706	23270

Source: (Windpower, 2002)

Despite the constraints in the development of a vibrant wind energy sector, the benefits it presents to developing countries in terms of energy reliance and compliance to global protocols on climate change are enormous and therefore the sector cannot just be rejected based on short term market viability (Kaygusuz, 2004).

Today, the lessons learned from more than a decade of operating wind power plants, along with continuing Research and Development (R & D), have made wind-generated electricity very close in cost to the power from conventional utility generation in some locations. Wind energy is the world's fastest-growing energy source and will power industry, businesses and homes with clean, renewable electricity for many years to come. It is currently viewed as one of the most promising renewable energy sources. For example, the United States government has spent millions of dollars researching and developing wind turbines for electricity generation. In California, numerous wind farms are already in operation (Mirza *et. al.* 2006).

In Kenya while there are a few wind energy farms set up by production companies such as KenGen and IPPs, tangible development of the use of wind energy is yet to be experienced. The country is a net importer of petroleum products which accounts for 7.4% to 10% of the Gross Domestic Product (GDP). For example in the 2005 / 2006 financial year oil imports were worth Kshs. 95.2 billion which was 25% of the national foreign exchange earnings. Of total oil-based fuels consumed in the country, diesel products accounted for 65% (Kenya Bureau of Statistics, 2008). There is no doubt of the potential market available for wind energy in Kenya if the figures shown here are anything to go by.

At the moment, KenGen's major energy supply sources are petroleum, hydro power, geothermal and to a limited extent, wind. The country has no commercially exploitable oil and coal deposits and has to depend on imports to meet its commercial energy requirements. Kenya currently has an installed energy capacity of about 1,300 MW against a demand of about 1,100 MW with more than 60 percent or 737. 3 MW of energy generated coming from hydro. There is therefore an urgent need to address the looming energy shortages and crisis that will continue to cost the country. In 2000 when Kenya faced a prolonged drought coupled with power outages, the country lost an estimated $20 million a month for the duration of the crisis. Such a crisis needs to be avoided in any future hence synergies are necessary. Given the importance of energy to the nation's economy and current the lifestyle choices, it is generally recognized that a secure, affordable, and reliable energy supply is needed (www.kengen.co.ke, 2009). Following is a brief review of KenGen's current products and their contributions to the national grid independent of importation of fossil fuel.

1.1. Hydro-Power

According to Renewable Energy Department (2009) Kenya's energy mix is currently among the most sustainable in the world with 70 per cent coming from hydroelectric dams of the country's many rivers. This important source of power now contributes a low 230 megawatts to the national grid due to the prolonged drought. The major advantage of hydroelectric systems is the minimisation of cost of fuel and low operating costs. This makes the hydroelectric power far less expensive than electricity generated from fossil fuels (Aldrich, 1979).

1.2 Geothermal Power

According to the Renewable Energy Department, (2009) Kenya is endowed with geothermal resources mainly located in the Rift Valley. It is estimated that the Kenya Rift has a potential of greater than 2000 MW of Geothermal Power. Two wells drilled (Olkaria I and II) operated by KenGen are generating a total of 115 MW and an IPP is producing 12 MW at Olkaria III. KenGen and the IPP produce a total of 129 MW of geothermal energy and this is expected to increase to 576 MW within the next 20 years.

The overall potential for geothermal energy in Kenya is enormous; it has been evaluated up to 2,000 MW and the funding procedure for the source is ongoing. The Government has created a special purpose geothermal development company (GDC), with the mandate to explore and sell geothermal energy for electricity generation and other uses.

However, the major drawback of geothermal energy is the size of the initial investment, which has tended to scare away governments and investors. A megawatt of geothermal-produced electricity costs around three million dollars, 30 percent more than what coal-powered plants can offer (Kenya: Integrated assessment of the Energy Policy, 2006).

1.3 Wind Energy

According to a survey by the Institute of Development Studies, University of Nairobi wind energy is contributing a total of 35 megawatts to the national grid. The site which has been set up making this contribution is the Ngong Wind Farm. According to www.kengen.co.ke (2009) wind power potential in Kenya is enormous but its exploitation has been minimal. The government through the Ministry of Energy intends to establish a number of incentives to attract investors, including the feed-in-tariffs policy (that is the signing of advance sale agreements with power producers).

The above sources contribute a total of about 1,200 megawatts to the national grid leaving a shortfall of 3,000 megawatts. The increase in consumption and projected economic growth is expected to peak power demand from 1,188 MW to 1,838 MW by 2012.

2.0 Literature review

In developing countries, Kenya included, sustainable development is associated with energy supplies. World over main energy sources include oil, hydropower, renewable (solar, wind, geothermal and biomass) and nuclear. Hydropower is diminishing due to climate change globally. Renewable energy plays a remarkable role in this respect, whereas geothermal, solar and wind are the most famous renewable energy resources available in developing countries (Rashed, 2008).

The NPD process application in the energy sector is considered necessary to ensure a systematic planned approach to develop energy through defined phases including design, testing, launch, and commercialization (Ulrich and Eppinger, 2000). The process will support market research to better understand consumer behaviour and preference, local supply, marketing and distribution channels (Mirza *at. el*, 2007).

The process is envisaged addressing the following in the energy sector: Setting up concerned national institutional framework; Bilateral and international co-operation; Securing funds for the projects (national resources, grants and soft loans); Building the national capacity in the field; and, Conducting studies for resource assessment.

2.1 NPD Process

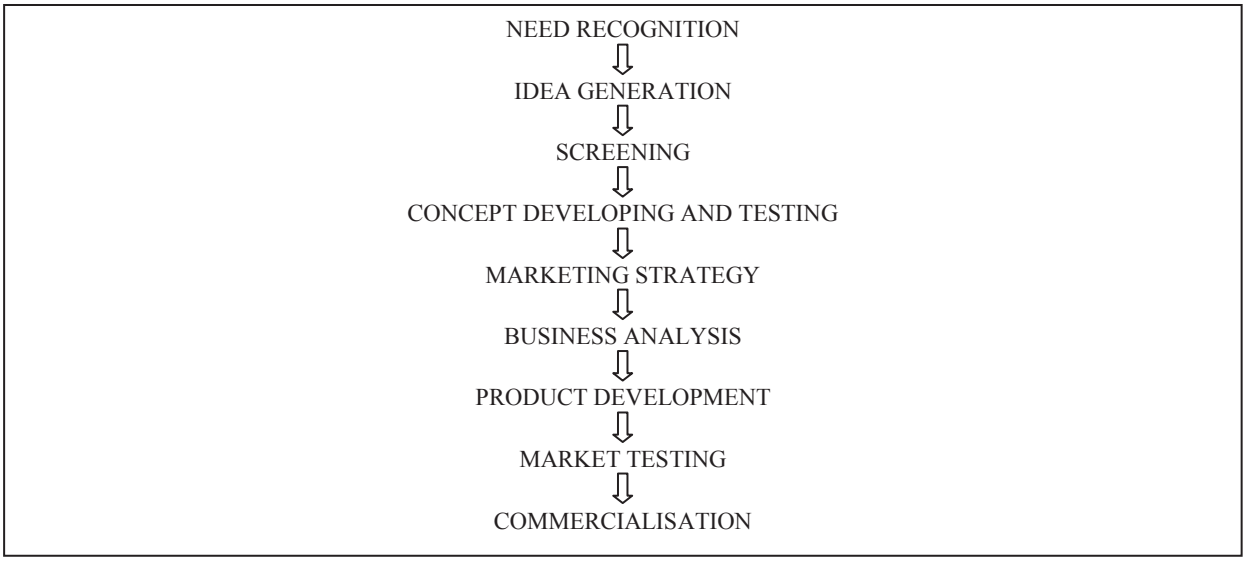
NPD is basically a grand strategy with substantial modification of existing or creation of new related products that can be marketed to current customers through established channels. It is very important to companies, economies and consumers. Indeed, NPD and innovation are the activities that shape the future of any business and hence the lifeblood of any organisation. Growth and profits suffer without aggressive NPD and service to the market. The development of a successful product is the outcome of many strategic decisions that include resource allocation to build core competencies, matching resources to market opportunities and coordinating activities across functions which normally determine success or failure of the products (CIM Manual, 2006).

According to Dibb et al. (2006) organisations need to find out what their existing or potential customers want in order to meet gaps in the market. Top managements' skills and vision in addressing various issues in product development process are vital to business success. This will facilitate the creation of an innovative culture within an organisation, so new product ideas can be generated from various organisational levels. Therefore, key to successful market research for NPD is to understand customer values and fast delivery.

The NPD research is not always about looking at the product in isolation but also the packaging, the advertising and the pricing strategy as integral parts of the research. Any new product launch is inherently risky as it is a venture into the unknown. It is well known that a well planned research can accurately pinpoint the richest areas of opportunity and therefore prioritize the most promising areas of NPD (Dibb et. al. (2006).

Research has shown that innovation is key to economic success. New products change consumer behaviour and therefore NPD process is very important as it has the potential to change peoples' lifestyle. Industry leaders see NPD as an ongoing process (referred to as continuous development) in which the entire organization always looks for opportunities. The most important part of the NPD process is to understand the target market's needs

and create value for the customers by delivering benefits (Kotler and Keller, 2006). According to Kotler (2003) there are nine main stages in the NPD process as outlined below:



With increased pressure on companies to get products to the market quicker and achieve returns on their investment, there are temptations for organisations to bypass some of the steps in the process or run them in parallel resulting to little customer involvement and lack of knowledge management to address some of the problems and reduce time-to-market (CIM Manual, 2006).

2.2 The Existence of NPD Process in the Energy Sector

According to Gunasekara and Lloria-Arambura (2002) successful organisations strictly apply NPD process treating it as a competitive strategy in a global market environment. Organisations essentially improve the NPD process with the objective of reducing the product development cycle time and hence reach the market quickly. Product innovation is the commercialization of a technologically distinct product, including new products whose design characteristics change to improve the service to users.

Organisations therefore tend to differentiate new products as follows:

1. Products which are completely new to the world which create a new market.
2. Products new to the organisation or addition to the existing ones.
3. Improvements / minor modifications, upgrades, replacements to existing products.
4. Repositioned products that allow the organisation to target new markets.

In the energy sector, Dismukes, Miller and Bers (2009) argue that development, demonstration and commercialisation period for wind power in particular takes longer than many well known technological innovations. Thus governments have patiently explored the avenues available such as capacity building, installation of data loggers, sourcing for funds among others to enable private sector participation in the development of wind energy.

According to Klaasen *et, al* (2005) the Germany government ensures production of wind energy is progressed through the NPD program requirements on technical quality guaranteed by test, research centres and investment subsidies. As regards the research and development (R&D) in support for wind energy, there are various projects concentrating on pre-feasibility study, site identification and or feasibility study, Environmental Impact Assessment (EIA), product assessment, financial plans and training of resources enabling development of small and large wind turbines. The stages of execution, operationalization and decommissioning of the project follow thereafter. In later years some of the prototypes were launched in modified form in line with NPD process. It is

noticeable that the first R&D programs to develop large scale wind turbines were regarded as failed due to the huge expenditures that were involved.

2.3 The Rationale to NPD Process

The researchers intend to base their rationale on the factors that have necessitated the adoption of the NPD process in the energy sector which will be addressed by models such as the Porters 5 Forces and the Product Life Cycle (PLC). According to Dibb *et al*. (2006) these models are tools that are used by organisations to analyse the dynamics of the environment through which they can create value and competitive advantage. The models allow a systematic and structured way of doing an industrial analysis or micro environmental analysis. These models or techniques are widely used for analyzing an organization's industry structure strategy especially; competitive and normally based on the understanding of industry structures and the way they change. They also enable firms to match their capabilities and resources to the competitive environment in which it operates and are instrumental in strategy formulation and selection and facilitates identification of the firm's strengths and weaknesses.

2.4 The NPD Approach and Challenges by KenGen to develop and use Wind Energy

2.4.1 KenGen's NPD Approach to Develop Wind Energy

KenGen is charged with the responsibility of all public power generation facilities in the country, generating about 80% of the country's total power output and selling it to KPLC for distribution (www.kengen.co.ke, 2009).

Under the Vision 2030 National Development Plan, need recognition for electric power provision has been highlighted as a major pillar (a key enabler) in the realization of national development. Development projects recommended under Vision 2030 will increase demand on Kenya's energy supply. The country must, therefore, generate more energy and increase efficiency in its consumption (Ministry of Energy, Vision 2030 Strategic Plan, 2009).

Currently, demand for power supersedes supply and this has resulted in the Government of Kenya putting stop-gap measures to prevent load-shedding by inviting emergency power supply. The economy currently services 150 MW of emergency power to fill the supply gap. This measure is expensive but necessary at this point in time. However, it is in the country's best interest to make use of emergency power as temporary as possible. KenGen must therefore accelerate its investment programme to bridge the gap as well as meet the growing demand (Renewable Energy Department, 2008).

KenGen plans to increase its energy capacity by over 500 MW by 2013 and over 2,000 MW by 2020. The expansion capacity estimate of 500 MW is an investment of over US$ 1 billion and the 2,000 MW will attract an investment of over US$ 7 billion. KenGen has therefore embarked on a financing plan whose first phase of expansion will be rolled out of a Kshs. 15 billion Bond, listed on the Nairobi Stock Exchange. The funds will be utilized in part-financing of the first horizon of the expansion programme (www.kengen.co.ke 2009).

The MoE's efforts to promote investment in wind energy generation recently completed preparation of the broad National Wind Atlas highlighting potential areas of sustainable winds in terms of speed to run the turbines consistently (Renewable Energy Department, 2009). Through the National Power Development Plan, ERC determines how the economy will grow and hence identifying energy demand for the year. A feasibility study is carried out on the sites identified (site resource assessment) followed by an Environmental Impact Assessment (EIA) and a license issued. On approval of the project, KenGen will embark on the development to deliver the project as required by the Least Cost Least Carbon Power Development Plan. The development stage will include sourcing for finances, reviewing detailed designs, preparation or establishing specifications, tendering procedures, drafting the contract and signing off the project. Finally executing, testing and commissioning of the project. Approvals are mandatory at each stage to ensure compliance (MoE, Least Cost Power Development Plan, 2010).

Under the government least cost development plan, 1,395 megawatts generation capacity is anticipated by 2015 for the country to bridge the power gap in the short run. Currently, KenGen owns two wind generating plants in

Ngong with a total capacity of 5.45 MW. Other proposed sites for wind energy generation projects of a total capacity of 625 MW in the medium term are as shown below (www.erc.co.ke, 2009):

Table 2.0: Potential Wind Projects

Plant	Capacity (MW)
Lake Turkana Wind	300
Aeolous Kinangop	60
Aeolous Ngong Wind	100
Osiwo Ngong Wind	60
Aperture Green Ngong	60
Daewoo Ngong Wind	30
KenGen Wind	15
Total	**625**

Source: (Ministry of Energy – Kenya Least Cost Power Development Plan, 2010)

The idea generation and concept development by KenGen is intended to efficiently generate competitively priced electric energy using state of the art technology, skilled and motivated human resource to ensure financial success. Subsequently achieve market leadership by undertaking least cost and environmentally friendly capacity expansion. Consistent with their corporate culture, the company's core values shall be adhered to in all its operations and be a market leader in the provision of reliable, safe, quality and competitively priced electric energy in the Eastern Africa region (www.kengen.co.ke, 2009).

NPD involves stakeholders such as the MoE and various organisations such as the University of Nairobi in collaboration with organisations like the German Aerospace Center (DLR), Riso National Laboratory and the National Renewable Energy Laboratory (NREL) in the assessment of wind energy production for Kenya. The assessment products under development include a 5 kilometre wind map which is a geospatial (GsT) toolkit that will integrate wind data with Geographic Information Systems (GIS) data to support overall wind energy resource assessment. GsT is a stand-alone interactive application used for decision-making and policy analysis in addition to planning for future renewable energy projects. It utilizes GIS technology to evaluate potential locations for solar and wind energy development. This tool relates renewable resource data with other relevant information, such as energy and transportation infrastructure, population centers, protected areas among others (Renewable Energy Department, 2009).

2.4.2 Challenges of NPD process at KenGen to develop Wind Energy

Like any other developing countries, Kenya has considerable wind resources that are still untapped. Kenya's key barrier is its lack of expertise, pertaining to site selection and technical aspects of wind power. In addition wind energy data collection among other aspects should meet the relevant international quality standards by the International Electrotechnical Commission (IES). The IES organisation prepares and publishes the international standards for all electrical, electronic and related technologies (swera.unep.net, 2002). According to www.swera.unep.net, (2002) some of the major challenges include:

1. Most potential sites lack accurate wind resource data required for long term correction prediction. The government in liaison with United Nations and Environment Programme (UNEP) and Solar and Wind Resource Assessment (SWERA) developed two wind atlases in 2004 and 2008 that cannot be used to provide a long term objective of ascertaining the wind energy potential in Kenya.
2. The projects require international aid since only limited regional support exists caused by lack of a financial mechanism to enable timely funding. The elaborate and bureaucratic process of the International Financing Agents also contributes to delays in accessing the funds coupled with the reluctance of governments issuing guarantees to the financiers.
3. Lack of energy market within the prospective region as lighting alone is insignificant since large scale enterprises are not well established in the country coupled with local commercial banks high interest rates on loans discouraging big power plants from establishing themselves in these regions.

4. Land policy barriers make acquisition expensive and subsequently attracting tariffs that make energy unaffordable.
5. Understanding of appropriate equipment specification such as the turbines requirements lacks.

3.0 Methodology

The study used a survey and interview design to assess the NPD process at KenGen. In the study, the researchers employed both primary and secondary sources of data to be able to gather constructive data used to illustrate the findings. A well structured questionnaire was administered to a sample of the total population. The secondary data source was mainly from research books, internet, reports and strategic plans from the institution and other energy bodies such as the MoE, Energy Regulatory Commission (ERC), Independent Power Producers (IPPs), Kenya Power and Lighting Company (KPLC) among others. A sample was established using a combination of cluster and simple random sampling techniques. Out of this procedure the sample size was made of 112 elements of which 50 were successful in completing in the questionnaire sent out. The Microsoft Excel Package was used to code the data collected from the field after it had been collated and verified. Analysis was done using descriptive and inferential statistical methods to make conclusions about the NPD process at KenGen.

4.0 Discussion

4.1 What are some of the obstacles encountered during the Wind Energy NPD process at KenGen?

The respondents were asked to state some of the obstacles that are encountered at KenGen during wind energy NPD process. Their responses were summarised in Table 3.0 below where the views were put into various categories as indentified by the researchers.

Table 3.0: What are some of the obstacles encountered during the Wind Energy NPD process at KenGen?

Obstacles met during NPD process at KenGen	**Staff Category at KenGen (N=34)**			
	Managers	**Technical Staff**	**Support Staff**	**Total**
	Count	**Count**	**Count**	**Count**
Lack of appropriate long term wind resource data to enable identify best sites in terms of wind speeds	3	6	1	**10**
Lack of appropriate financing mechanism (difficulties in accessing financial resources required for development)	6	3	3	**12**
Political interference or lack political goodwill ; social issues and conflict of interest	1	3	4	**8**
Lack of accurate wind resource assessment facility for aiding initial feasibility study not developed	1	6	2	**9**
Lack technological research facilities for development of wind equipment	2	2	7	**11**
Lack of local capacity and appropriate expertise in the development process; operational and maintenance spares	4	3	2	**9**
Land acquisition barriers to set up the wind farms (land policy within the region not conducive to investors)	3	3	2	**8**
Lack of a market for energy within the region	3	0	0	**3**

Table 3.0 shows that 12 respondents viewed lack of financial mechanisms as a critical issue to the NPD process in wind energy development; 11 respondents indicated that lack of technological research facilities as a major challenge to NPD process at KenGen. 10 respondents viewed lack of appropriate long term wind resource data as a basis to identifying best sites in terms of wind speeds as a challenge, while 9 respondents were of the opinion that wind resource assessment facility for aiding initial feasibility study lacked. 9 respondents also felt that lack of local capacity and appropriate expertise in the development process is an impediment to NPD in the wind energy development. While 8 respondents observed that politics has weighed down development in terms

of social issues such as demands for heft compensation on land acquisition and conflict of interests and lack of ethics whereby some of the politicians feature as direct beneficiaries in the acquisition process. The same number of respondents (8) also indicated that land acquisition barriers to set up the wind farms in selected sites have also affected the NPD progress. Three (3) respondents cited lack of market for energy within the region. This is due to lack of big commercial enterprises that consume large amounts of power. Kengen sells power to KPLC who in turn distributes to a large number of small consumers constituting of residents and small enterprises.

Group 1 of the IDIs participants felt that it is lack of accurate wind resource data required for long term correction and prediction whereby one member stated that the required expertise and equipment are unavailable, while Group 2 highlighted the difficulties in accessing financial resources required for development of wind energy as a manager strongly blamed the local banks for the high interest rates and foreign governments attaching stringent conditions on their loans. Group 4 cited the lack of a market for energy within the regions of production associating this situation to poverty levels and lack of large commercial enterprises.

4.2 What are some of the expected outcomes that led to wind energy selection in KenGen's NPD Process?

The respondents were asked to state some of the expected outcomes that led to wind energy selection in KenGen's NPD Process. Their responses were as summarised in Table 4.8 below where the views were put into various categories as indentified by the researcher.

Table 4.0: Some of the expected outcomes that led to wind energy selection in KenGen's NPD process

Expected outcomes that led to wind selection in KenGen's NPD process	**Staff Category at KenGen**			
	Managers	**Technical Staff**	**Support Staff**	**Total**
Stability of energy pricing, infinitely sustainable form of energy and cost effective as opposed to fossil fuel energy	5	4	2	**11**
Promote energy efficiency and conservation as well as prudent environmental, health, and safety practices	3	4	2	**9**
Economically viable alternative product that is sustainable to replace the conventional fossil fuel-based and hydro power sources	1	3	1	**5**
Lack of data collection instruments to identify wind potential sites and monitoring	2	5	0	**7**
Improve business portfolio balance between hydro, geothermal, wind and solar power (renewable energy resources)	2	3	0	**5**
Large wind resource – there is huge potential for various projects all over the country	1	1	0	**2**
Lack of expertise in terms of wind technology, monitoring and equipment	3	4	2	**9**

Table 4.0 shows 11 respondents view the cost of energy as one of the major outcomes that led to the NPD process at KenGen. 9 respondents indicated the promotion of energy efficiency in terms of production processes and supporting a clean environment also led to NPD process at KenGen. The same number of respondents (9) also indicated lack of expertise in terms of technology; monitoring and equipment led to the selection of NPD process in the organisation. 7 respondents felt that lack of data collection instruments to identify the wind potential sites and monitoring. 5 respondents' views showed that there was need for an economically viable alternative product that is sustainable to replace the conventional fossil fuel-based and hydro power sources and the same number of 5 respondents indicated the improvement of business portfolio balance between hydro, geothermal, wind and solar power (renewable energy resources).

4.3 What is the approach to NPD Process at KenGen?

Respondents were asked to further state the approach to NPD process at KenGen. Their views were analysed and grouped into various categories as depicted on the table below.

Table 5.0 : What is the approach to NPD Process?

What is the approach to NPD Process at KenGen	**Staff Category at KenGen** Table shows percentage (%) of total [N= 34]				
	Managers	**Technical Staff**	**Support Staff**	**Total**	
	Count	**Count**	**Count**	**Count**	**%**
Idea Generation stage: • High priority and urgency in improving energy supply in Kenya towards Vision 2030	1	2	1	**4**	**11.8**
Screening stage: • Concept leading pre-feasibility study, then feasibility study to determine the viability of the process, approval and finally project implementation	4	2	2	**8**	**85.3**
• Wind data collection to determine viability of the site and also ensure data collected meets relevant international standards of quality	6	4	4	**14**	
• The need for new product is first assessed in terms of viability and environmentally friendliness and then approved by the government. KenGen will subsequently embark on the development to deliver the project as required by the Least Cost Carbon Power Development Plan.	4	2	1	**7**	
Total				**29**	
Concept Development stage: • The process of development includes a lot of controls to ensure delivery on time, budget and to standards of quality	2	3	3	**8**	**26.5%**
• Execution of wind energy projects: include site resource assessment, wind farm design, preparation of specifications, contractor selection, review of detailed designs and construction supervision	1	0	0	**1**	
Total				**9**	
Test Marketing stage: • Testing after supervision and completion of various construction works	6	0	0	**6**	**17.6**
Commercialisation stage: • Capacity building in terms of training, conferences and seminars (skills transfer and equipment) through partnership initiatives with firms such as Daewoo	4	3	1	**8**	**38.2**
• Commissioning and management of	3	1	1	**5**	

defects in accordance with the contract					
Total				13	
Missing Questions / not Answered	1	0	0	**1**	**3**
TOTAL	**10**	**18**	**6**	**34**	**100**

Table 5.0 above shows that the NPD process approach is at its screening stage as indicated by the majority of 29 (85.3%) respondents. While 13 (38.2%) of respondents indicated commercialisation. However, 9 (26.5%) respondents are of the opinion that the process is at the concept development stage while 6 (17.6%) and 4 (11.8%) respondents indicated the NPD process approach is at the test marketing and idea generation stages respectively. One (3%) manager did not respond.

5.0 Conclusion and Recommendations

5.1 Conclusion

The quest to have stability in energy prices, infinite sustainable form of energy and cost effective as supported by 11 respondents can be concluded as key outcomes that led to selection of wind energy at KenGen's NPD process. The other outcomes include promoting energy efficiency and conservation as well prudent environmental, health and safety practices as indicated by 9 respondents. The lack of technological expertise and lack of wind data collection instruments also led to wind energy selection at KenGen's NPD process. This is supported by the response of 9 and 7 respondents respectively.

5.2 Recommendations

In the local scene, banks are not keen on funding green energy projects, such as wind thus holding back investment in the emerging sector. The government should urge and prevail upon the local banks to revise their lending criteria to develop this opportunity. In addition the government should revise the green energy policies and fast track licensing of projects and harmonise policies that are in conflict. This will ensure organisations such as KenGen do not commence their new products too late and as a result, miss out on many business opportunities. To avoid new product failure, KenGen should systematically follow all the NPD process steps and define what is wanted and expected from the NPD to ensure that the investment is worthwhile. In addition clear objectives and targets are essential when implementing new product projects to ensure the cost effective and timely commercialisation of new products into the market.

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