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ADOPTION OF BIO-BASED ECONOMIES IN RURAL KENYA FOR IMPROVED LIVELIHOODS

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ABSTRACT

Good livelihoods are a key component to providing adequate health, sustainable energy and satisfactory education within communities. One approach to providing a means for an efficient system for rural communities in Kenya is the uptake of bio-based economies. The research is a social change research guided by the transition theory. Anticipated transitions of the transition theory are applied to understand the relationship of different social contexts within communities and impacts of various roles. The qualitative study aims to map community member's perceptions of available resources and how resources could be used to improve livelihoods. Kenya's rural areas are vastly distributed hence rural communities in Murang'a County represent a viable sample with which to test a bio-based economy approach. The study will contribute not only an understanding of hierarchies in roles within the process network, but also provide socio-economic development hypothesis towards the successful adoption of bio-based economies.

Key words: Bio-based economy, Good livelihoods, Rural communities, Transition theory.

1. INTRODUCTION

According to Bugge et al., (2016) a bio-based economy is centred on reduction of fossil fuel. The global focus on sustainability has increasingly been on various ways to reduce the use of fossil fuels among other environmentally friendly practices. The bio-based economy also focuses on material cycles that are efficient and sustainable, through using waste from one process as a raw material for another. The distributed bio-based economy emphasizes the production of and/or use of raw materials produced close to their point of use. The European Commission (2012) argues that the term “bio-economy” is still a matter of discussion and there has not being one standard meaning of the same. The commission goes on to argue that research by various forestry, agriculture and fisheries researchers, show bio-based economies as the process of using bio-based products as an alternative to fossil fuels. Bio-resources are produced from a variety of sustainable sources which include but are not limited to biomass, crop residue, dedicated crops and crop processing by-product.

Rural economies are gaining a wider and more complex relation with other sectors as well as industries. If well nurtured these relationships could lead to improved livelihoods within rural communities. Large portions of land in the Kenyan rural settings are used for agriculture. There are however other economic activities that take part in these communities that are directly or indirectly linked to the core agricultural activity. The integrated development of rural areas is based on a coherent and well-established network of the primary, secondary and tertiary economic and social practices within these communities. Inclusion of community members in establishing these relationships between the various practices would be more beneficial as community members are able to provide solution that they can own and be more involved in (Henry & Trigo, 2010).

One of the challenges faced by Sub-Saharan Africa is embracing the 2015 development agenda laid down in the United Nations’ SDGs. The main challenge is how the countries in this region could build economies that are more inclusive, sustainable and respond to the emerging needs such as environmental preservation, empowerment of livelihoods and community development. This will require governments to consider long term development goals and adoption of economies that ensure food security, improve livelihoods by diversifying economies and conserving the environment. Eastern Africa’s policy makers, researchers and corporate decision-makers have in the past decade had their focus on the bio-based economies particularly in the social and biological sciences. In Kenya the focus is on the implementation of these economies within the rural settings as a way of achieving the president’s big for agenda that encompass; enhancing manufacturing, food security and nutrition, universal health coverage and affordable housing (GoK, 2007).

The main research objective was to investigate to what extent (if any) bio-based economies have been adopted in Murang’a county (sample representing rural Kenya). The researcher’s other objective was to investigate the hindrances towards the adoption of bio-based economies in Murang’a county. Through the research the researcher sought to answer the question of whether the bio-based economies have been adopted and if not why by highlighting the benefits of the same.

2. TOWARDS A BIO-BASED ECONOMY

Developing countries stand to achieve global society’s stated objectives on hunger and poverty through focusing mainly on rural development. Despite increasing urbanization in these counties extreme poverty continues to be a rural phenomenon. Out of the world’s 1.2 billion extremely poor people, an estimated 75% live in rural areas and mostly depend on agriculture, forestry, fisheries and related activities for their livelihoods. Adopting sustainable bio-economies in rural areas has the potential to increase employment opportunities, reduce income disparities, increase security and reduce poverty at its very source in turn leading to improved livelihoods in these rural areas (Henry & Trigo, 2010).

Adopting bio-based economies in rural areas is one of the key contributors to improved livelihoods through improved environmental and economic practices. Bio-based economies can completely change a community and in Kenya could be a key factor in improving livelihoods within rural communities. This type of economy provides for establishment of industries that give opportunity for further growth of a community in a sustainable way. Activities within rural communities like agriculture, forestry and fishing have a great potential to be central to this bio-based economy providing the much needed raw materials for production of key bio-products like fuels, gases and raw materials for various industries. The public-good benefit of adopting these economies within rural settings include but are not limited to job creation through growth of industries, infrastructure development, improved health and security, and environmental conservation (Staffas et al., 2013).

2.1. Agriculture and the bio-based economy

Approximately 85% of the communities living in rural Kenya practice agriculture as their main economic activity. Agricultural activities involve a lot of human manipulation of the land and biosphere which in turn impacts the environment. Much of the environmental harm is associated with the use of fossil fuels either in the inputs like farm fertilizers and transportation of farm goods from one place to another. Agriculture is looked upon as one of the main providers of raw materials for various industries. This needs to be practiced sustainably ensuring that enough raw materials are provided for industries but at the same time natural resources are not impoverished (CARC, 2003).

One of the areas which can be sustainably improved is the proper management of farm waste and residue. Crop residues are available in very large quantities and can be used either as animal feeds, farm manure (hence avoiding industrial fertilizers), and in the production of bio-fuels that would help in reduced fossil fuel use. Crop residues also can be used to protect the soil from erosion and maintain the soil organic matter in the most natural way possible. The choice of crop in a farm is also an important consideration within these farms that should be taken into account. Farmers should be sensitized on crops for each season and on crops that maintain the soil fertility at all time (Bugge et al.,2016).

Government policies are important in ensuring a smooth transition to these bio-based economies. Policies on training and sensitization on the advantages of the bio-based economies need to be implemented as most people living in rural areas simply do not understand the benefits of these economies mainly due to lack of training. Policies on funding for various sectors in rural areas especially agriculture, fisheries and forestry should be integrated to include coordination of the various arms of the bio-based economies. This includes but not limited renewable feedstock supplies, seed supplies, sustainable fertilizers, water resources, energy security and trade. A major point of connection between agriculture and the bio-economy is in the field of public policy and institutional arrangements that regulate innovation, production processes and the allocation of intellectual property rights. Rural governance plays a key role in the effective implementation of the bio-based economies. With the devolution of various arms and bodies of the government most functions are now available closer to the people through local leaders. Rural governance enables training on bio-based practices through public gatherings. Through rural governance security is better provided within these rural areas, and infrastructure development is easily achieved like the improvement of roads enabling successfully implementation of bio-based practices (CARC, 2003).

The debate on the key components of bio-economy cannot be complete without drawing attention to the issue of societal coordination. Through societal coordination decisions are easily reached, thus bringing together different roles within society like the farmers, transport coordinators, those running industries, consumers and waste managers. This is simply narrowed down to communication and a need to adopt inclusive communication practices. There is however a need for a stronger focus on the interface between sociology, psychology and economics of a people to effectively understand how different arms respond to external drivers of the structure (Henry &Trigo, 2010).

2.2.Common benefits of a bio-based economy

Bio-based economies if properly implemented and adopted can provide important economic, social and environmental benefits. One of the best practices towards successfully adopting this economy is to clearly define the desired outcome then develop structures and policies that make those outcomes a reality. Transition towards a bio-based economy has far greater benefits to rural economies in terms of rural development, economic growth, reduces fossil fuel use (OECD, 2001).

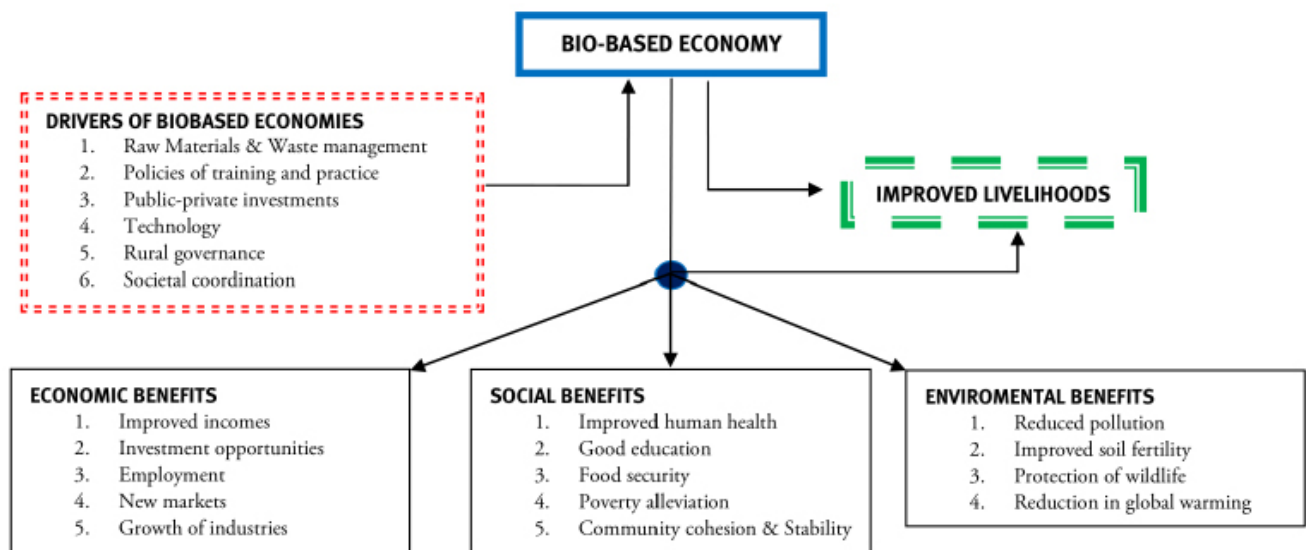


Figure 1; Benefits of a bio-based economy in rural areas/ communities

2.3.Theoretical framework

The research adopted the transition theory which argues that the systems upon which a society depends on must transition towards a more sustainable future. These systems include political, technological, economic and social systems. Transition theory proposes that for anyone to act as an agent of change they must apply planned course of actions with outlined expected outcomes by understanding the community systems within where the changes are expected. An anticipated transition was the main guide for the study. This dictates that adoption of bio-based practices within rural communities would yield various social, economic and environmental outcomes (benefits) towards sustainable rural communities and improved livelihoods (Retolaza, 2011).

3. RESEARCH METHODS

The research applied a qualitative approach assisted by a survey research approach. A transition research theory guided the research basing it on anticipated transitions brought about by various inputs which for the purpose of the research were discussed as drivers of a bio-based economy. The predictability of various economic and social benefits as outcomes of adopting bio-based economies was also discussed in this research (Yin, 2013).

The study's population is rural areas in Kenya but since they are vastly distributed geographically a case research design was applied Murang'a County being selected as the case study for the research. Samples were selected from Kangema constituency within Murang'a County using both purposive sampling and convenient sampling methods based on the samples's accessibility. The sample comprised of twelve (12) homesteads (distributed across the three wards in Kangema constituency) from where the objective was to investigate the bio-based practices applied and if none the hindrances towards the same and two (2) administrative officers from whom the objective was to investigate the government intervention towards the adoption of bio-based economies. The research applied both primary and secondary methods of data collection. The data collected was analyzed using both thematic method of data analysis and narrative data analysis method. Ethical considerations were put in place eg; the subjects were uncomfortable with photographs of their spaces so the researcher respected their request to maintain confidentiality (Yin, 2013).

Table 4.1 Research methods applied

COLLECTION METHOD	COLLECTION TOOL	TECHNIQUE	SIGNIFICANCE
Primary	Observation (Applied within the twelve (12) homesteads, and the environment within and around the community)	Observation involved the use of the naked eye to capture behavior and practices within the various homesteads. As the subjects requested nor to have photographs taken notes were taken instead (using a notebook) on the various bio-based practices observed and those not observed.	Through observation the study captured information that would otherwise not be captured by other means. Eg; It was easier to observe the use of animal and food waste.
Secondary	a. Interviews; Informal (Conducted in all the 12 homesteads)	The research applied twelve (12) interview guides with both open and closed questions. These informal interviews were used to gather data that would otherwise not be made available.	Informal interviews allowed an opportunity of asking follow-up questions. The interview mode created for a more involving data collection mode with the respondents.
	Questionnaire (Sent to the 2 administrative offices)	A list of questions was prepared prior to meeting the research subjects with the aim of answering the research questions. Three (3) questionnaires were sent to each of the two administrative offices a total of 6 questionnaires used.	The questionnaires were cost efficient and upheld the anonymity of the respondents. Through the questionnaires the study was able to cover all aspects of the research in a speedy manner.
	Publications Earlier research	Publications and earlier research on bio-based for the study were also used in data collection. This was mainly through desktop research and visiting various libraries.	Through publications and earlier research, comparative studies on the various aspects of the research were conducted allowing for a better understanding of the bio-based economies. These research methods allowed the generation of new insights for the study in a timely and cost effective way.
	Mass media	Online based research like paper articles and journals were also applied for the research. Most of the mass media research focused on finding data to answer the research questions through case study research.	Mass media research provided various successful case studies of adoption of bio-based economics in rural areas in various parts of the world. This was used as a basis to discuss the benefits of adopting the same within rural Kenya.

4. FINDINGS

Kangema constituency is an electoral constituency in Murang'a County, situated within central Kenya and is one of the forty seven (47) counties in Kenya. The constituency has a population of approximately 76,990 people and its total area is approximately 320 square kilometers. It is the 104th constituency in Kenya. The constituency is comprised of three (3) wards namely; Kanyenya-ini ward, Rwathia Ward and Muguru ward.

Approximately 87% of the area covered by the constituency comprises of rural areas. The main economic activity in Kangema constituency's rural areas is agriculture. Farmers keep various types of livestock and pets kept in 90% of these homesteads are dogs and cats. There's very little knowledge on bio-based practices or the advantages of the same within this rural community. This is mostly due to lack of training and support by both the rural government and the national government. Poor infrastructure like roads results to destruction of raw materials due to the time taken to transport to various trade centers. A lack of a well established public-private relationship has results to lack of adequate investments like industries to take up the raw materials produced also leading to wastage especially with overproduction as industries are far away. This has also led to insecurity (youth result to crime due to unemployment) and rural-urban migration.

There's very little wastage of crop and animal residue as the same are used for manure and feed for animals. The residues are also used for production of bio-gas within the few homesteads practicing the same. Most people only know of bio-gas production from seeing a small minority practice in the village. They also had knowledge of solar as a renewable source of energy as most used solar energy before the implementation of rural electrification program by the Government of Kenya which saw them switch to hydro-power as the main source of energy. Housing is mainly comprised of semi-permanent structured constructed using timber. The timber is sourced from cutting down trees within the area. Other building materials like iron sheets and masonry stones are transported from shops four kilometers away. Most of the community members' income comes from agricultural activities, mainly farming. The subjects would love an opportunity for sustainable practices that could improve their everyday living. Most houses are owned by the families and therefore no rent is paid and most are semi-permanent structures.

Table 5.1; Research findings from Kangema Constituency

Driver	Data Collection Tool	General Findings	Rio-Based Practise	Community Practices	Average Costs
Societal coordination	Interviews Observation Publications	Average land size is 2 ha per homestead. Farming is the main income source, earning each household approximately \$200 per month. Each homestead comprised of 3 households with 5 family members each; Total 15 people per homestead.	Labour on farms from within the community; employment. Farming usually planned around rainy seasons avoiding use of water to irrigate.	Lack of employments leading to rural-urban migration.	Average income per homestead is \$600 per month
Raw Materials & Waste management	Interviews (12 homesteads)	Raw materials sourced from farm produce. (Crops and animals).	Crop residues used as animal feed. Animal waste used as manure & for bio-gas production Food waste used as animal feed.	Raw materials transported to industries situated further away. Use of industrial fertilizers	Average cost of farm maintenance per month is \$150 per homestead.
Trainings & Policies. Rural governance.	Interviews (12 homesteads) Questionnaires (2 offices)	CDF office in charge of constituency development. Rural leaders lack open communication channels and an understanding of community needs like infrastructure.	Lack of training on bio-based practices. Lack of policies on bio-based practices & funding. Government bio-based initiatives for the community lacking.	Self-training on bio-gas production by observing neighbours.	
Public-Private Investments	Questionnaires (2 offices) Mass media	Investments are mainly on education (building schools), Using unsustainable materials.	A milk processing plant located five kilometres away. Churches occasionally offer seedlings to farmers.	Youth desperate due to lack of employment result to crime.	
Technology	Questionnaires (2 offices) Interviews (12 homesteads) Publications Earlier Research	Lack of basic understanding/training on technological advancements in bio-based practices.	Use of bio-gas for heating. Hydro-electric power; used for lighting and charging electronic devices.	Firewood and charcoal; used for Cooking and heating. Kerosene; used for lighting during power outages.	Average cost of energy used per month; \$20 per household.

Driver	Data Collection Tool	General Findings	Rio-Based Practise	Community Practices	Average Costs
Infrastructure	Questionnaires (2 offices) Interviews (12 homesteads) Publications Earlier Research	Main transport means is by road. The road network mostly dirt roads, with few gravel roads and a tarmac road to main town. Most houses are semi permanent.	People mostly walk to various destinations within the community. Few semi permanent houses constructed using mud brick and thatched.	Motorbikes & vehicles are alternate transport means Timber houses. cutting trees. Corrugated iron sheets & masonry stone sourced elsewhere.	Average cost of transport per month; \$15 per month per household.

5.CONCLUSION

Kangema constituency is one of the constituencies in Kenya that directly impact the national economy through provision or raw materials for its industries. It is evident that these economies are not sustainable and more often than not are forgotten in the national government's development agendas. There's no documentation indicating that the county leaders have adopted bio-based practices within these rural economies. Kangema people and leadership are either ignoring or not aware that bio-based economies can work or can be replicated within their rural areas. Although bio-based economies have been adopted in various parts of the world, there are little or no interventions that have been done to improve the same practices within rural areas in Kangema constituency. The adoption of bio-based economies is yet to gain enough sensitization and awareness partly due to very little research and/ or documentation existing to highlight these practices in other area. It is through highlighting these bio-based practices and the success stories in various parts of the world's rural economies that we can improve the uptake of the same within the Kenyan rural setting.

From the research conducted, Kangema constituency's rural areas have very little or no bio-based practices within their economies. This is unsustainable when natural resources, environment and the sustainability of the communities are taken into consideration. As people seek to improve their livelihoods within the community settings they find themselves in, it is becoming evident that the rural economies need to shift their practices towards more sustainable ones as they also greatly affect the urban economies. The push to improve on the adoption of bio-based economies in rural areas in Kenya is further fuelled by the president's big four agenda (enhancing manufacturing, food security and nutrition, universal health coverage and affordable housing). The agendas are seen as strong drivers of bio-based economies and would lead to improved livelihoods.

Improvement of people's livelihoods is more than just improving their income. It is about making their way of life sustainable for their everyday living, improving the environment in which this everyday living is and ensuring continuity and prosperity of the communities. A bio-based economy can contribute to a more sustainable society, not only due to its positive impact on the environment through production of industrial raw materials, reducing dependency on fossil fuels and generating less waste but also due to the general growth it impacts on the society. With proper frameworks in place to facilitate adoption of bio-based economies the research findings can be used to ensure communities can have a positive impact on the environment and their surrounding communities within the research area and can replicated in other rural areas in Kenya.

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