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INTELLECTUAL PROPERTY RIGHTS

IN

THE IDENTIFICATION OF QUALITY FIREWOOD AMONG THE LUO:

A CASE OF SEME MIDAT

BY

OTIENO OYUCHO TIMON

G62/69659/2013

A Project Report Submitted in Partial Fulfillment of the Requirements for the Master of Laws Degree, (LL.M),

School of Law

University of Nairobi

SUPERVISOR: MR. STEPHEN KIPTINNESS

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Contents

TABLE OF FIGURES

LIST OF TABLES

ACRONYMS

1. AO: Appellation of Origin.
2. ARIPO: African Regional Intellectual Property Organization.
3. BEST: Bio-Energy Strategy.
4. BTU: British Thermal Unit.
5. CEC: California Energy Commission.
6. CFA: Community Forest Association.
7. EMCA: Environment Management and Coordination Act 1999.
8. ERC: Energy Regulatory Commission.
9. ESPA: Ecosystems Services for Poverty Alleviation.
10. FAO: Food and Agriculture Organization.
11. GDP: Gross Domestic Product.
12. GI: Geographical Indication.
13. GoK: Government of Kenya.
14. HEDON: Household Energy Network.
15. HHV: High Heating Value.
16. ICRAF: International Center for Research in Agro-Forestry.
17. IEA: International Energy Agency.
18. IG-GRTKF: Inter Governmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore.
19. IIED: International Institute for Environment and Development.
20. IP: Intellectual Property.
21. IPR: Intellectual Property Right.
22. ITT: Institute for Technology and Research Management in the Tropics and Sub-Tropics.
23. KBS: Kenya Bureau of Standards.
24. KSF: Kenya Forestry Service.
25. MENR: Ministry of Environment and Natural Resources.
26. NASA: National Aeronautics and Space Administration.
27. OAPI: Organization of African Intellectual Property.
28. TK: Traditional Knowledge.
29. TRIPS: Trade Aspects of Intellectual Property.
30. TVU: Thames Valley University.
31. UNCBD: United Nations Convention on Bio-Diversity.
32. UNEP: United Nations Environmental Programme.
33. USA: United States of America.
34. WGIP: Working Group on Indigenous Populations.
35. WHO: World Health Organization.
36. WIPO: World Intellectual Property Organization.
37. WTO: World Trade Organization.

CHAPTER ONE

INTRODUCTION

This study focused on traditional knowledge (TK)[1] of local communities in the identification of high energy yielding firewood. The resulting intellectual (IP) property right was examined. A case study of *Seme*[2] clan's identification of *Midat* tree[3] as a high energy yielding firewood was undertaken. The study sought to protect *Seme Midat* as a Geographic Indication (GI) peculiar only to *Seme*. In this regard, *Seme* clan, as the holders of traditional knowledge in the identification of *Midat* as a high energy firewood are vested with the creation, origination, development and practice of this useful knowledge. *Seme* clan ought, therefore, to be the beneficiaries of the resulting intellectual property right (IPR).

The wider aim was to address the energy deficit in Kenya. The focus of the study therefore was to explore the viability of industrial processing of traditional firewood, and in particular *Seme Midat* for purposes of value addition to the firewood. Value addition to firewood in developed democracies has contributed to the enhancement of the market value of firewood.

Thus, the study envisaged that value addition to traditional firewood would significantly contribute to the firewood attracting a wider market. The end result would be employment creation and protection of intellectual property rights (IPRs) of indigenous communities in the identification of high energy quality firewood. The study was hence regarded as a beginning for protection, support, promotion and enhancement of the IPRs of the people of Kenya in the identification of indigenous firewood variety.

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[1] Traditional Knowledge (TK) has also been referred to as Indigenous Knowledge (IK), Traditional Ecological Knowledge (TEK) or Local Knowledge (LK) by various scholars. TK may be viewed as a subset of the broader concept of heritage of indigenous people. IK being the traditional knowledge of indigenous people is a subset of TK; World Intellectual Property Organization (WIPO): Intellectual Property Needs and Expectations of Traditional Knowledge Holders: *WIPO Report on Fact-Finding Missions on Intellectual Property and Traditional Knowledge (1998-1999)* at page 27*:* The term "traditional knowledge" includes all tradition-based innovations and creations resulting from intellectual activity in the industrial, scientific, literary or artistic fields. Categories of traditional knowledge include: agricultural knowledge; scientific knowledge; technical knowledge; ecological knowledge; medicinal knowledge, including related medicines and remedies; biodiversity-related knowledge; and geographical indications. "Tradition-based" refers to knowledge systems, creations, innovations and cultural expressions which have generally been transmitted from generation to generation; are generally regarded as pertaining to a particular people or its territory; and, are constantly evolving in response to a changing environment.

[2] *Seme* clan (now forms *Seme* constituency) is located in the North-Central shores of Lake Victoria. The region is hilly and experiences a tropical climate.

[3] *Midat* is a type of hard wood known for its good energy qualities. It is also used for agro-farming.

The study encompassed the following definite areas in arriving at the findings: the background to the problem; statement of the problem; the theoretical framework, conceptual framework and literature review; objectives of the research; broad argument layout, assumptions or hypotheses; research questions; and methodology.

1.0 BACKGROUND TO THE PROBLEM

The research was conducted within the context of IP as a branch of Property Law. The study recognized TK of indigenous communities in identification of the high energy quality firewood. As GI, high energy quality traditional wood fuels peculiar to specific regions in Kenya might find protected and profitable commercial regimes aimed at improving the economic status of the rural communities.

Ever since, man has used energy to create and ensure comfortable habitation of his environment. At the present time, as was in the pre-historic era, the extent and intensity of energy use dictate the level of civilization. Early man used fuel in form of animal fat, bones, and biomass.[4] Biomass, however, provided the greatest source of fuel.[5] Wood is the oldest and most important among biomass sources of energy for mankind.[6] In spite of cultural evolution a central feature of man's life has been the use of firewood as a critical source of energy. Whereas wood fuel is mostly used in developing countries accounting for 80% of energy demand, joint Wood Energy Enquiry in Europe in 2007 established that wood energy remains significant and accounts for 50% of the renewable energy used world over.[7]

Kenya's rural communities rely heavily on firewood (87.7%) as compared to the urban population (10%). Nationally, 68.3% of households use firewood.[8] The type of firewood preferred varies from community to community. Among the Luo[9], choice of firewood is dictated

[4] Biomass consists of products from various trees, shrubs and plants; and dung from various domesticated animals. The Energy Act, No. 12 of 2006, s 2: "biomass" means non-fossilized and biodegradable organic material originating from plants, animals and micro-organism and includes bio-ethanol, bio-diesel, biogas, charcoal, fuelwood and agro-waste.

[5] Grubler A and Nakicenovic N, 'The Dynamic Evolution of Methane Technologies' in Lee TH, Lindel HR, Dreyfus DA, and Vasko T. (eds), *The Methane Age (*Kluwer Academic Publishers 1988).

[6] FAO, 'Forests and Energy in Developing Countries' (2007) FAO, Rome; Massachusetts Sustainable Bio-energy Initiative, 'Woody Biomass: Local Renewable Fuel for Commercial, Institutions and Industrial Facilities' USA (2008).

[7] FAO, 'Forest Products Annual Market Review 2008-2009' (2009) Geneva.

[8] Kenya National Bureau of Statistics, 'Integrated Household Budget Survey' (2007) GoK.

[9] A Kenyan populous tribe living around Lake Victoria, within the former Nyanza Province.

by the prevailing climatic conditions in various geographical locations. *Seme* clan has perfected its knowledge of indigenous flora with superior energy qualities over the centuries. This has led them in identifying the *Midat* tree from traditional agro-forest, as their main firewood.

The community need not necessarily be in a position to scientifically, and by use of modern equipments and apparatus, calculate and determine the actual energy qualities inherent in the *Midat* tree firewood. The IPR in their identification of *Midat* tree as high energy firewood should, however, be protected. The rationale behind this line of argument was adopted by Lord Hoffmann of the British House of Lords in a 1995 patent appeal case in which he posed:[10]

> "There is an infinite variety of descriptions under which the same thing may be known. Things may be described according to what they look like, how they are made, what they do, and in many other ways. Under what description must it be known in order to justify the statement that one knows that it exists?"

The bottom line here is that *Seme* community need not present scientific empirical data on the actual energy qualities inherent in *Midat* tree as a high energy quality firewood to back their IPR in the identification of the tree thus. From many centuries of sampling various tree species as firewood, the community's conclusion that *Midat* tree is the best firewood suffices. Indeed, *Midat* tree has served the community as the best firewood over centuries.

In summarizing this fact, Lord Hoffman[11] used the example of quinine with regard to the TK of the Amazon Indians in cinchona bark as medicine for malaria and fevers:

> "The Amazon Indians have known for centuries that cinchona bark can be used to treat malaria and other fevers. They used it in the form of powdered bark in 1820. French scientists discovered that the active ingredient, an alkaloid called Quinine, could be extracted and used more effectively in the form of Sulphate of Quinine. In 1944, the structure of the alkaloid molecule [$C_{20}H_{24}N_2O_2$] was discovered… Does the Indian know about Quinine? …under the description of a quality of the bark which makes it useful for treating fevers, he obviously does. …he knows that the bark has quality which makes it

[10] Leonard Hoffmann, Baron Hoffmann, PC (born 8 May 1934), in ***Biogen -v- Medeva,*** [1995] FSR 4; [1995] RPC 25.
[11] ibid.

good for fever[12] and that is one description of Quinine. On the other hand, the Amazon Indian …if shown pills of Quinine Sulphate, he would not associate them with cinchona bark. He does not know Quinine under the description of a substance in the form of pills. And he would certainly not know about the artificially synthesized alkaloid."

The IPR of the people of *Seme* in the identification of the traditional *Midat* tree as firewood needs to be protected as a GI. This protection may take any one or a combination of the following systems. First, it may be protected as a *sui generis* right subject to specific and exclusive rules. Secondly, it may be protected under trade mark law regime either as a collective mark[13] or a certification mark.[14] Lastly, it may be protected under other trade related laws dealing with advertisements, unfair competition or passing off generally. These protection systems are in line with the aspirations of Articles 40(5) and 69(1)(c) of the Constitution of Kenya 2010 (the Constitution)[15] providing for "recognition, enhancement, support, promotion and protection" of subsisting IPRs in indigenous knowledge as a matter of fundamental rights and freedoms. Industrially processed *Midat* firewood may thus be packaged and marketed for sale in a wider market to improve the welfare of *Seme* community.

1.1 STATEMENT OF THE PROBLEM

In the developed world, calorific value of wood enables customers to choose appropriate firewood.[16] In Africa, such technology is found in South African and Egypt. High energy quality firewood is industrially processed and marketed under trade mark through various store outlets. This improves the accessibility of a wide range of high quality firewood. In addition, it becomes easy to determine firewood's contribution to Gross Domestic Product (GDP).

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[12] Emphasis mine; to import the raw high quality energy value inherent in *Midat* tree which makes it fit for firewood in the world view of Seme community.

[13] Trade Marks Act, Cap. 506, Laws of Kenya, section 40A (5); The Paris Convention for the Protection of Industrial Property 1883, Article 7^{bis}. Generally, a collective mark is registered in the name of a collective entity, such as an association of traders, producers or manufacturers. Membership of the association, which is dictated by compliance with conditions, gives the right to use the collective mark.

[14] The Trade Marks Act, Cap. 506, Laws of Kenya, section 40: Certification marks are generally owned by a public entity which undertakes to certify that the goods or services on which the mark is used comply with certain standards of production and quality. The owner of the mark may not regularly use the mark but he may license others to use the mark while observing the strict standards and quality.

[15] The Constitution of Kenya 2010: (1). Article 40 (5): 'The State shall support, promote and protect the intellectual property rights of the people of Kenya; (2). Article 69 (1) (c): 'The State shall protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities.'

[16] <http://www.energy.ca.gov/> (2009) accessed on 4th April, 2014.

In Kenya, like in other sub-Sahara African countries, energy consumption of households[17] has preponderance over the total demand of all other sectors put together and relies overwhelmingly on traditional fuels, mainly firewood.[18] However, firewood is not industrially processed nor is it, regulated by Energy Regulatory Commission. Its marketing is haphazard and its contribution to the GDP uncertain. This leads to loss of revenue. The insight into the magnitude of the loss of revenue from firewood may be gained by considering the percentage dominance of wood fuel in the energy sector *vis-a-vis* its contribution to the GDP.

The total energy consumption in Kenya is dominated by three main sources namely; Wood Fuel (67.65%), Petroleum (28.57%), Electricity (3.11%). The energy sector contributes 9.49% to the GDP of which Wood Fuel contributes 0.4%; Petroleum contributes 8.4%; and Electricity contributes 0.6%.[19] Comparing the contributions of Wood Fuel to those of Electricity and Petroleum to the GDP, a simple mathematical relation would reveal that if Wood Fuel is well harnessed then: its contribution to the GDP would range between 13.05%[20] and 19.89%.[21] This would raise the energy sector contribution to the GDP to between 22.05%[22] and 28.89%.[23] Thus, Wood Fuel has the potential of contributing between 33 to 50 times its current contribution to the GDP. This would give a corresponding increase of the energy sector's contribution to the GDP to between over 2 to 3 times its current contribution. The result would be unprecedented growth of Kenya's economy.

The existing low performance of Wood Fuel energy sub-sector as a revenue source needs to be reversed. Through an IP platform, various traditional firewood peculiar to different geographical locations may be routed for value addition to attract a wider market and lead to a reversal of the current low economic performance.

[17] A household may be defined as a group of individuals with or without family ties, taking their meals together, pooling their financial resources, acting under the same authority.
[18] Youba Sokona, Rio + 5 Report: *Energy in sub-Saharan Africa* at page 9 (Source: African Development Bank: *Household Energy Consumption Patterns in Africa, 1996 1).*
[19] Kenya Economic Survey (2009).
[20] Assuming a direct proportionality relationship between wood fuel and electricity as energy sources.
[21] Assuming a direct proportionality relationship between wood fuel and petroleum as energy sources.
[22] The sum of the contributions of petroleum, electricity and wood fuel [with respect to direct proportionality with electricity] to the GDP.
[23] The sum of the contributions of petroleum, electricity and wood fuel [with respect to direct proportionality with petroleum] to the GDP.

This study ascertained the energy qualities of *Seme Midat* tree with a view to assigning the people of *Seme* a GI in it as firewood of superior energy qualities. World over, IPRs have hitherto not been bestowed in any community for the community's genius identification of high energy yielding firewood. In Kenya, the Government has a constitutional mandate to recognize, enhance and protected the IPR in the people of *Seme* as well as among other communities.[24] As a GI, *Seme Midat* firewood would join the class of Idaho Potatoes[25] as a product of merchandise. Through this study, the firewood energy sub-sector stands to contribute significantly to the country's GDP.

1.2 THEORETICAL FRAMEWORK

1.2.1 Introduction

The development of IP world over has given forth to a new era of property ownership which focuses on capturing value from intellectual capital and knowledge-based assets as opposed to the traditional property theory where assets were seen in terms of land and chattels. Thus, battles have shifted from the control of raw materials produced from land to the control on intellectual property as the most dynamic strategic asset occurring in the form of productive knowledge. Accordingly, institutions have been established to help persons (both natural and juristic) to protect, manage and administer their IPRs.

IPRs are the rights given to persons over the creations of their minds. Through IPR regimes, the creator is given an exclusive right over the use of his creation for a certain period of time. IPRs have not only become an increasingly important practice for persons, but are also explicit agenda for many a Government.

The belief is that increased privatisation and recognition of a person's intellectual capital and knowledge-based assets will enable him to better capture the value from his productive knowledge assets. The World Trade Organization (WTO) is convinced, through the Trade Related Aspects of Intellectual Property Rights (TRIPS),[26] that this is the way to go. Thus, ownership of property confers on an owner indefeasible title in the property.

[24] The Constitution of Kenya 2010, Articles 40(5) and 69(1)(c).

[25] Potatoes whose peculiar high starch nutritive value is attributable to their place of growth: the Idaho State of the United States of America.

[26] TRIPS came into came into force in 1995 as a part of the Uruguay Round Trade Negotiations to enforce intellectual property worldwide.

Article 260 of the Constitution[27] interprets '*property'* to include IP. Property acquisition and ownership are fundamental human rights under Article 40. An individual or a group of individuals have a right to acquire and own property of any description in Kenya. The State has a mandate to 'support, promote and protect the IP rights of the people of Kenya.' The State is further mandated in matters of environment and natural resources under Article 69 to 'protect and enhance IP in, and indigenous knowledge of, biodiversity and the genetic resources of the communities' of Kenya.

In context, the IPRs of indigenous communities, upon recognition and registration as GIs, may additionally be exercisable in trade mark law either as certification or collective marks. Therefore, it may be necessary that the energy qualities of traditional firewood peculiar to communities be determined through laboratory experimentation. The enjoyment of the rights would thus be protected as GIs as communities' IPRs get enhanced to encourage their exploitation for economic good.

1.2.2 The Private/Personality Property Rights Theory

Although various property rights theories such as the natural rights theory; moral rights theory; and the utilitarian theory find application in this study, the main jurisprudential basis is the private or personality right property theory. The private property right theory is derived from Hegel's[28] philosophy of right. According to this theory, private property rights are crucial to the satisfaction of some fundamental human needs. The basis of individual rights lies in property. Property is not merely material acquisition; it is central to an individual's assertion of identity and personality. Property is an expression of self and the locus of an individual's claim to rights, since it is through property that one can say "this is mine," a claim that others respect. According to Hegel, property is the "embodiment of personality."

The system of private property establishes individuality and personality through contract and exchange. Governments should thus strive to create and allocate entitlements to resources in the manner that best enables people to fulfill those needs. On this basis, IP rights may be justified

[27] The Interpretation Article.

[28] Georg Wilhelm Friedrich Hegel (August 27, 1770 – November 14, 1831) was a German Philosopher, who authored *The Elements of Philosophy of Rights* in 1820. A major figure in German Idealism, he combined history and idealism to account for reality. [Information accessed at <http://en.wikipedia.org/wiki/Georg_Wilhelm_Hegel> accessed on 29th March, 2014].

either on the ground that they protect infringement of proprietary rights; or on the ground that they create social and economic conditions conducive to creative intellectual activity, which in turn is important to human flourishing.[29]

Thus, private property theory alludes to two important guidelines concerning the proper shape of an IP system. First, Governments should be willing to accord legal protection to the fruits of highly expressive intellectual activities, such as the identification of high energy quality traditional firewood by an indigenous community. Second, a community's TK is its '*persona'* - its public image, including its physical features, mannerisms, and history. TK is therefore an important receptacle for personality, and as such, it deserves generous legal protection.[30] With regard to this study, vesting of IPR in the *Seme* clan for the identification of *Seme Midat* as quality firewood would enhance the persona or identity of the Seme community worldwide. This would enhance both the stature and the economic prospects of the clan.

1.2.3 Other Property Rights Theories

The natural rights property theory, based on the works of Jon Locke,[31] postulates that a person who labours upon resources that are God given or 'held in common' to create property has a natural property right to the fruits of his efforts. After the acquisition, though, "there" should be "enough and as good left in common for others."[32] Evidently, the natural rights property theory ties an individual to his society. This theory finds application in this study to the extent that *Seme Midat* firewood is a God given resource "held in common" by the *Seme* community. The IPR in the identification of *Seme Midat* as quality firewood forms the part of labour important to its value.[33] The vesting of IPR in *Seme* clan for the identification of *Seme Midat* as quality firewood would facilitate other communities' access to *Seme Midat* as firewood. The discovery of *Seme*

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[29] Margaret Jane Radin, *Reinterpreting Property* (Chicago: University of Chicago Press, 1993); Jeremy Waldron, *The Right to Private Property* (Oxford: Clarendon, 1988).

[30] Hughes, 'Philosophy of Intellectual Property,' at 330-350.

[31] In Chapter V of his *Second Treatise*, John Lock (29 August 1632 – 28 October 1704), uses the word *property* in both broad and narrow senses. In a broad sense, it covers a wide range of human interests and aspirations; more narrowly, it refers to material goods. He argues that property is a natural right and it is derived from labour; that the individual ownership of goods and property is justified by the labour exerted to produce those goods or utilise property to produce goods beneficial to human society; that nature on its own provides little of value to society; and that the labour expended in the creation of goods gives them their value.

[32] John Locke, *Two Treatises of Government* (P. Laslett, ed., Cambridge: Cambridge University Press, 1970), *Second Treatise*, Sec. 27.

[33] Justin Hughes, 'The Philosophy of Intellectual Property,' *Georgetown Law Journal*, 77 (1988): 287, at 299-330.

Midat as quality firewood would not have existed at all without the intellectual efforts of the *Seme* community.

The moral rights theory introduces an ethical view into property rights. Attributed to utilitarian philosopher Jeremy Bentham [1748-1832], the moral rights theory acts in opposition to the natural rights theory by stipulating that it is the moral duty of the society to not only protect the inventor, but also to secure the inventor a fair share of the reward when exploiting the inventor's knowledge and ideas. It is the State's responsibility to identify and enforce ethical principles in property rights. In context, the identification of *Midat* as quality firewood by *Seme* clan easily avails Midat for use by all. Due to this societal benefit, society has a moral obligation to confer IPR in to *Seme* clan. Consequently, *Seme* clan has a moral right to the IPR.

Utilitarian theory posits that a morally right action is that which will maximize utility (happiness, welfare, and well-being). Applied to property theory, the rationale is that IPR in one's creation is necessary as a means to further development; which development is beneficial to the society as a whole. Where such IPRs guarantee happiness to the entire society, the onus is on Governments to enact laws that guarantee this happiness. In regard to this study, the primary economic benefits of IPR protection are: First, it will be useful to consumers since it will reduce their 'search costs' for quality firewood. The consumer will easily pick the *Midat* firewood at the exclusion of other firewood on the basis of reliance of the IPR protection. Secondly, the IPR protection will create an incentive for businesses to *Seme* clan to engage in agro-forestry involving *Midat* for its energy quality.[34]

1.3 CONCEPTUAL FRAMEWORK

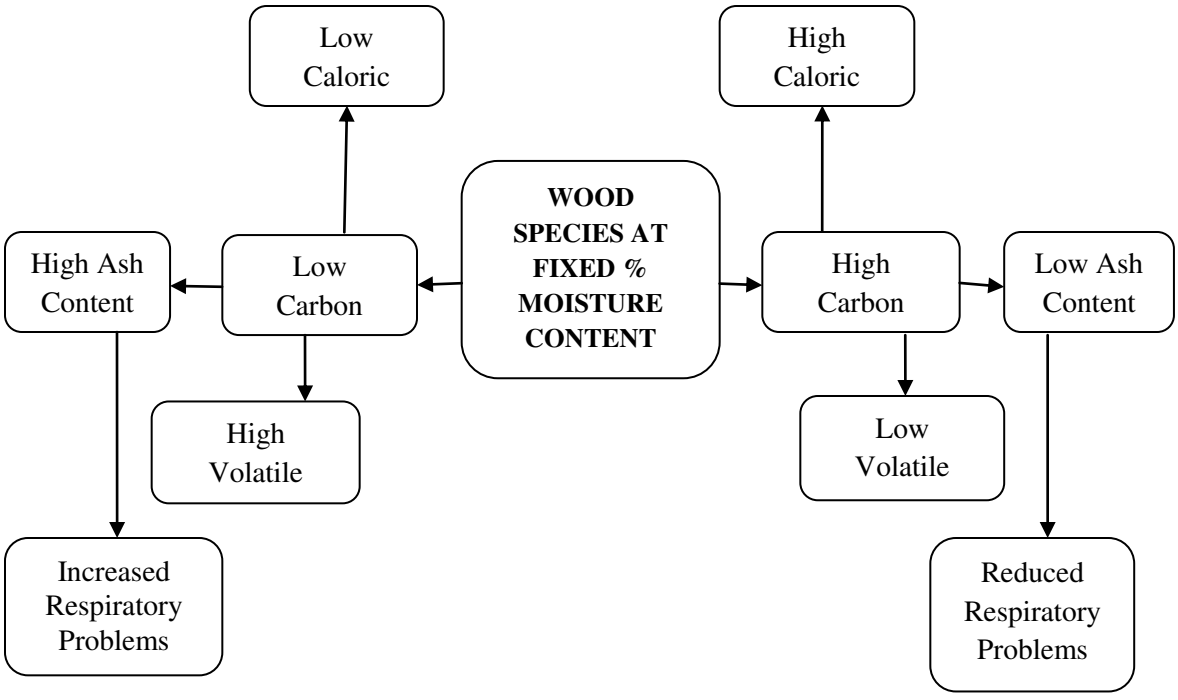
The concepts that run throughout this study are: wood species, which refers to the type of wood as it may be known in a native language or in botanical terminology; energy qualities of firewood: moisture content, volatile matter, ash content, fixed carbon content, lignin content and calorific value which have their respective scientific definitions in **Appendix A.**

These concepts are in three categories. The independent variable is wood species; the dependent variables are: fixed carbon content, calorific value, ash content, volatile matter, lignin content

[34] William Landes and Richard Posner, 'Trademark Law: An Economic Perspective,' *Journal of Law and Economics*, 30 (1987): 265; Nicholas Economides, 'The Economics of Trademarks,' *Trademark Reporter*, 78 (1988): 523-39 and Daniel McClure, 'Trademarks and Competition: The Recent History,' *Law and Contemporary Problems*, 59 (1996): 13-43.

and amount of smoke released. Moisture content and heat loss during combustion are constants. The hall mark of the inter-relations between these concepts is that quality firewood has high energy content, high level of lignin, burns evenly with a blue flame without emitting sparks, produces minimal ash residue and emits minimal and none toxic smoke.[35] In other words, fixed carbon content, calorific value, ash content, volatile matter, lignin content and the amount and toxic level of smoke released are directly dependent on wood type. The calorific value is directly dependent on the fixed carbon content and lignin content; and inversely dependent on mass of both residue ash and volatile matter. Thus, *Seme Midat* would be regarded quality firewood if it can be demonstrated through this study that when dry, it possesses these energy qualities. The inter-relations among these variables are illustrated in Figure 1 below.

Figure 1: Conceptual Framework: The Schematic Diagram



In the determination of the inter-relations among the variables, this research borrows heavily from Physics, where Einstein's theory is employed. According to Einstein's theory, energy (calorific value) released by matter (original mass of the wood) is in direct proportion to the

[35] Oduor and Githiomi, (n 42).

accompanying mass defect (carbon content).[36] The linear relationship is: ***E = mc²,*** where ***E*** is the energy released (Joules) by a mass defect, ***m,*** (kilograms); and ***c*** is the velocity of light constant of ***3.0 x 10⁸ m/s.*** When firewood burns, the difference in its original mass and mass of residue ash by and large represents the amount of energy released. Accordingly, firewood which leaves less residue ash after combustion releases more energy and is therefore a high energy yielder.

1.4 LITERATURE REVIEW

1.4.1 INTRODUCTION

This chapter outlines the literature with regard to the protection of traditional regard knowledge of indigenous communities. It is conceptualized under the objectives of the African Model Law for the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resources; the Provisions of the Nagoya Protocol on Access to Genetic Resources and the Fair Sharing of Benefits Arising from their Utilization; and Part II of the TRIPS Agreement. All in all, it remains our view that the underlying IP rights of the people of *Seme* in the identification of *Midat* tree quality firewood is worth recognizing, protecting, promoting and enhancing as a GI for viable economic gain. Further, it is our view that a streamlined firewood energy sub-sector is capable of contributing immensely to the county's GDP.

1.4.2 COMMUNITY INTELLECTUAL PROPERTY RIGHTS IN BIO-DIVERSITY

In the past two decades or so, traditional knowledge systems have witnessed a belated renaissance, both in policy instruments of some international intellectual property organizations;[37] in some global international law agreements;[38] and at attempts to design regional legal regimes suitable for its exploitation.[39] Its arrival at the core of international consciousness,

[36] Classical mechanics defines mass as the quantity of matter in a substance; and that matter can neither be created nor destroyed but can be converted from one form to another. One form of matter is energy. Thus matter may take the form of energy. Quantum mechanics views mass as the quantity of energy in a substance. A change in mass of a substance does not therefore lead to destruction of matter, but to production or absorption of energy. A mass defect therefore leads to release of energy into space or absorption of energy from space.

[37] See for example, *Draft Report of the World Intellectual Property Organization (WIPO) Fact-Finding Missions on Intellectual Property and Traditional Knowledge* (1998-1999) Geneva, Switzerland, p. 28.

[38] See for example, *Convention on Biological Diversity*, done at Rio de Janeiro on 5 June 1992, and which entered into force 29 December 1993.

[39] See for example, African Model Legislation for the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resources (2000) Algiers, Algeria.

however, has been riddled with controversies regarding the question of its relationship with the dominant intellectual property rights systems.

Traditional Knowledge systems traverse a wide range of the life patterns of indigenous communities. These include the communities' cultural experiences, epistemologies and empiricisms of thousands of cultures. TKs are implicated in ecology, agronomy, agriculture, medicine, animal husbandry, music, story-telling, cloth-weaving, et cetera, across several thousands of different cultures and peoples. Unfortunately, these have often been lumped together as if TKs were a simple monolith.[40] Consequently, given the multitudinous nature and diversity of TKs, it becomes intellectually risky for such monolithic lumping.

Realizing the significant potential of TK in rural development, African States have modeled legislation for the protection of the rights of local communities, farmers and breeders, and for the regulation of access to biological resources (herein after referred to as the Model Law).[41]

The Model Law espouses strong commitment to protect "the rights of local communities over their biological resources, knowledge and technologies that represent the very nature of their livelihood systems and that have evolved over generations of human history," which for the reason that they "are of a collective nature …, are *a priori* rights which take precedence over rights based on private interests."[42] The Model Law recognizes the need to not only "protect and encourage cultural diversity," but also to give "due value to the knowledge, technologies, innovations and practices of local communities with respect to the conservation, management and use of biological resources."[43] In respect, the State ought to provide "adequate mechanisms for guaranteeing the just, equitable and effective participation of its citizens in the protection of their collective and individual rights and in making decisions which affect its biological and intellectual resources as well as the activities and benefits derived from their utilization."[44]

Thus, the Model Law stands out, worldwide, among regional instruments on its special treatment of community rights at Part IV.[45] Like any other s*ui generis,* the Model Law is not designed to be

[40] Mgbeoji, I. 2006. *Global Bio-Piracy: Patents, Plants, and Indigenous Peoples*. (University of British Columbia Press). p.77

[41] ibid (n 84).

[42] The African Model Legislation for the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resources (2000) Algiers, Algeria, preamble.

[43] ibid.

[44] ibid.

[45] The African Model Legislation for the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resources (2000) Algiers, Algeria: Part IV has (1). Article 16:

implemented "as is" at the level of national legislation. Every Member State needs to develop its own *sui generis* on the basis of the nature of TKs existing within its jurisdiction. However, despite being heavily community-centered, the Model Law is silent about the actual mechanisms through which local communities can ensure that collectors of TK associated with genetic resources will respect the rights and customary rules of communities. In this regard, the Nagoya Protocol improves on the Model Law in relation to TK associated with genetic resources.[46] Accordingly, the Nagoya Protocol proposes the development of community protocols and calls on parties to endeavor to support their development by indigenous and local communities.[47]

The development of legislation for the protection of TK entails various legal elements that need to be addressed. These include: the subject matter of protection; the criteria for protection; who the beneficiaries are; the scope of protection; the exceptions and limitations; how the rights will be managed; the term of protection; the formalities for protection; how the rights will be enforced; the legal proceedings for taking actions, including remedies and penalties; the processes to be used for dispute resolution; the relationship with IP protection; the relationship with the regulation of access to genetic resources and the fair and equitable sharing of benefits arising out of their utilisation (commonly referred to as 'ABS'); and how the international and regional protection will be addressed.[48]

The process of TK legislation development, however, needs to conform to national guidelines developed by experts specially to assist policy-makers in the process.[49] The experts need to seek prior clarification from a cross section of the stakeholders on the areas which require to be

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Recognition of the Rights of Local and Indigenous Communities; (2). Article 17: Application of the Law on Community Rights; (3). Article 18: Prior Informed Consent of Local Communities; and (4). Article 23: Recognition of Community Intellectual Rights <http://www.wipo.int/edocs/lexdocs/laws/en/oau/oau001en.pdf> accessed 4th December, 2014.

[46] Munyi P., Tonye M.M., du Plessis P., Ekpere J., Kabir B., (2012). "A Gap Analysis Report on the African Model Law on the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resources," (Department of Human Resources, African Union, Addis Ababa, Ethiopia) pp. 51-57. <http://www.abs-initiative.info/upload/media/GAP_Analysis_and_Revision_African_Model_Law_FINAL_2902.pdf > accessed 4th December 2014.

[47] Nagoya Protocol on Access to Genetic Resources and the Fair Sharing of Benefits Arising from their Utilization, Article 12.

[48] The Pacific Islands Forum Secretariat, (2010). "Guidelines for Developing Legislation for the Protection of Traditional Biological Knowledge, Innovations and Practices Based on the Traditional Biological Knowledge, Innovations and Practices Model Law." (Suva, Fiji). pp. 22. <http://www.spc.int/hdp/index2php?option=com_docman&task=doc_view&gid=256&Intemid=4> accessed 4th December, 2014.

[49] ibid, p. 6.

addressed by the policy makers. It would equally be expected that prior to commencing policy development, the policy makers on their part may wish to consider whether it would be useful to develop process principles to guide the process.[50] The significance of process principles is twofold. First, they are useful means of ensuring policy-makers exhibit a specified level of behaviour. Secondly, they also serve as a benchmark for all decisions taken by policy-makers during the policy development process.

This careful and all inclusive approach is core to the success of the resulting TK law as the process principles are a major link between the policy-makers and the TK holders. Accordingly, the process principles need to draw on the following points that are commonly emphasised: recognising that the broad and active participation of traditional communities throughout the process is critical in order to ensure that their rights as TK holders are fully and effectively protected; acknowledging that policy development should be guided by the aspirations and expectations expressed directly by traditional communities as well as the nature, specific characteristics and forms of traditional cultures, expression and creativity; and respect for the rights of traditional communities, including indigenous peoples, under national and international law.[51]

It is worth noting that protection of ideas and practices exists without the requirement of a positive act such as registration.[52] Similarly, prior publication of TK does not preclude the local community from exercising the intellectual right.[53] An issue to consider is whether these collectively owned and exercised rights are compatible with the TRIPS Agreement. Although the preamble of TRIPS specifically provides that 'intellectual property rights are private rights,' it is worth noting that IP rights have become more collective in nature: as a result of corporate or institutional research and development activities, IP rights such as patents are increasingly being treated as collective endeavours.[54] Furthermore, the notion of establishing a *sui generis* right is derived from the vacuum that exists within the realm of IP to cover those areas that do not fit under traditional conceptions of IP. A *sui generis* right, therefore, would not have to be tailored

[50] ibid p. 13.
[51] ibid p. 14.
[52] Loretta Feris, (2004) 4 African Human Rights Law Journal: "Protecting Traditional Knowledge in Africa: Considering African Approaches." (University of Pretoria, South Africa). p. 252. <http://www.corteidh.or.cr/tablesR21556.pdf> accessed 4th December, 2014.
[53] ibid (n 90), Article 23(3) and (4).
[54] Dutfield G., (2001) 33 *Case Western Reserve Journal of International Law* 233 240: 'TRIPS-related aspects of traditional knowledge.'

as a *traditional* IP right. As such, the 'private right' provision of TRIPS would not apply to a *sui generis* right.

In conclusion, the issue of protection of TK requires proper handling. It involves a myriad of TKs held by diverse communities ranging from quite traditional to more integrated ones. All in all, studies have revealed the following. One, TK may be in the decline in many communities with the younger generation having little interest in learning it and in observing customary laws. For instance loss of ancestral land and sacred sites, such as the *kaya* forests among the *Mijikenda*, has been a key factor.[55] Two, erosion of cultural values and customary laws due to the spread of western culture, markets and governments to rural areas, are also key factors.[56] This has mainly left some customary values and cultural preferences with the community elders. This state of affairs should not, however, be a hindrance to the recognition, protection and enhancement of TK among the indigenous communities.

On its part, Kenya has made a progressive step by providing for the support, promotion, protection, and enhancement of IPRs of its people's in biodiversity and genetic resources and the resulting TKs.[57] However, in spite of its variety of TKs, there is no known protection of any. This has left various communities precariously exposed to the bio-piracy activities of the West. This study, therefore, proposes a GI protection of Seme Midat as quality firewood for the purpose of addressing energy deficit in the country. This should form only but a beginning to taking TKs seriously among Kenya's various communities.

1.5 MAIN OBJECTIVE

The Main objective of this research was to sensitize the Government to support, promote, protect and enhance the IP rights of indigenous communities in Kenya in their knowledge and identification of high energy firewood.

1.6 SPECIFIC OBJECTIVES

The specific objectives of the study were:

[55] Mutta, D. and Munyi, P., (2010) in Shemdoe SS., Mhando L. (2012) Research Paper No. 17: "National Policies and Legal Frameworks Governing Traditional Knowledge and Effective Intellectual Property Systems in Southern and Eastern Africa: The Case of Traditional Healers in Tanzania." (African Technology Policy Studies Network, Nairobi, Kenya). p. 15.
[56] ibid.
[57] The Constitution of Kenya 2010, Articles 40(5) and 69(1)(c).

a) To ascertain the energy qualities in *Seme Midat* firewood.
b) To ascertain if Seme *Midat* firewood is protectable as a GI.
c) To propose ways in which the processing, packaging and marketing of *Seme Midat* firewood can be translated to a viable economic activity.

1.7 BROAD ARGUMENT LAYOUT

The broad argument layout in this study is that with the intervention of intellectual property rights of the traditional knowledge among local communities in the identification of high energy quality firewood, the national primary energy deficit in Kenya can be bridged. Intellectual property rights protection has the magic of enhancing value addition in the product so protected. Thus, the protection of the IPR in the identification of high quality firewood has the potential of reversing the low contribution of the biomass energy sub-sector to the economic growth of the country. The argument therefore is that when the right laws are enacted and applied to the firewood sub-sector, the country's economy will be enhanced. In addition, over reliance on petroleum and electricity as primary energy sources for domestic use will be significantly minimized.

The gist of this argument is that in rural Africa firewood, which is the major primary source of energy, is used in its traditional round or split form.[58] In developed world, firewood is used as chips (green or dry), pellets, briquettes, gas and liquid referred to as '*modern fuelwood.*'[59] *Modern firewood* is not only an indication that wood has gained a lot of importance as energy resource, but has also introduced wood into competition with fossil fuel.[60] This may be attributed to economic, environmental and social reasons.[61]

It is in Africa's best interest to embrace modernization of its firewood sector to satisfy its energy needs instead of over reliance on imported oil. According to World Energy Outlook, an increase in oil price by US $ 10 can reduce the GDP of an African county by 3%.[62] Due to the raw manner in which firewood is utilized in Africa, its market is weak despite its growing scarcity.

[58] Seidel A, 'Charcoal in Africa Importance, Problems and Possible Solution Strategies' GTZ, Eschborn (2008).
[59] Massachusetts (n 5); Richter D deB Jr., 'Wood Energy in America' (2009) <www.scienemag.org> accessed 2nd November, 2013; FAO, 'Industrial Charcoal Making: FAO Forestry paper 63' (1985) <http://www.fao.org/docrep/x5555e/x5555e00.htm#Contents> accessed 2nd November, 2013; FAO, 'Sustainable Wood Energy' (2010) FAO, Rome.
[60] FAO, 'Forests and Energy Key Issues: FAO Forestry Paper No. 154' (2008a) FAO, Rome.
[61] FAO (n 6).
[62] IEA, 'World Energy Outlook 2004' (2004) Paris, France.

Forest managers and tree farmers are discouraged by its under-pricing. This often leads to firewood crisis and translates to its inefficient production and consumption.[63] The result is increased distance to the wood sources which increases its cost.[64]

In addition, the sub-sector suffers from a poor marketing strategy due to the absence of group associations to strengthen it. According to studies,[65] firewood collection and marketing is mainly an occupation of the poor. They are isolated individuals and family members.[66] This reduces the bargaining power and job security for the weaker links in the supply chain.

In spite of these problems, for every 62 terajoules[67] of energy equivalent, firewood energy sub-sector creates employment for 100 to 700 unskilled manpower. This is between 5 to 35 times more than the requirement in kerosene energy sector.[68]

The firewood value chain in Kenya is largely informal and poorly developed. In the year 2000, 64% of firewood was sourced from agro-forestry while 36% were from trust land, gazetted forests and sources the consumers could not explain.[69] Consumers who rely on large scale firewood buy live trees from farmers, harvest them and contract transporters to deliver it to the site. The traders sell firewood in small bundles in makeshift structures to minimize operation expenses.

The price of firewood varies with the buyer, the intended market and the bargaining powers of the parties. It is riddled with corruption, limited capital base and lack of vibrant market.[70] A vendor in the major towns in Kenya makes a profit of about KSh. 11,600 monthly while for the same duration, a farmer makes KSh. 6,400 and a transporter, KSh. 3,600.[71]

Studies reveal gaps in the production, transportation, marketing and consumption of firewood. The value chain may be simplified as: production, harvesting, transporting, retailing and

[63] Sepp S, 'Analysis of Charcoal Value Chain: General Considerations' (2009) GTZ, Germany.
[64] Kituyi E, 'Towards Sustainable Charcoal Production and Use: A Systems Approach' (2001) African Centre for Technology Studies, Nairobi, Kenya; IEA, 'Renewables in Global Energy Supply: An IEA Fact Sheet' (2007) Paris, France; KIPPRA, 'A Comprehensive Study and Analysis of Energy Consumption Patterns in Kenya' (2010) Nairobi, Kenya.
[65] Kitui 2001 (n 142).
[66] ibid.
[67] A terajoules is equivalent to 1.0 x 10^{12} Joules or 1,000,000,000,000 Joules.
[68] Trossero MA, 'Socio-economic Aspects of Wood Energy Systems in Developing' (2002).
[69] GoK, 'Study on Kenya's Energy Demand, Supply and Policy Strategy for Households, Small Scale Industries and Service Establishments' (2002) Kamfor Ltd., Kenya.
[70] ibid 87.
[71] ibid.

consumption.[72] The entire value chain is not certain of the firewood energy qualities in the market. The Government has not focused on the potential in firewood as an energy source.

1.8 ASSUMPTIONS/HYPOTHESES

The following assumptions/hypotheses were made in the study:

i. There exists an IP right in the choice of *Seme Midat* firewood among the *Seme* community.
ii. *Seme Midat* firewood is protectable as a GI.
iii. The IP right of *Seme* community in the identification of *Midat* tree as firewood can be translated to a viable economic activity.

1.9 RESEARCH QUESTIONS

This study sought to address the following questions:

i. Is there an IP right in the choice of *Seme Midat* firewood among the *Seme* community?
ii. Is *Seme Midat* firewood protectable as a GI?
iii. How can the IP right of *Seme* community in the identification of *Seme Midat* firewood be translated to a viable economic activity?

1.10 METHODOLOGY

1.10.1 RESEARCH DESIGN

The research was conducted through a case study. A case study is a research design which uses a small sample for an intensive and holistic analysis of an entity in order to gain insight into the larger cases.[73] The research design was descriptive and explanatory. The research entailed collection of quantifiable and qualifiable data from respondents. Interview schedules were used to ascertain ways in which *Seme* community identifies high energy yielding firewood. Library resources as well as internet research were also conducted.

1.10.2 POPULATION AND SAMPLING

1.10.2.1 Target Population

[72] ibid.
[73] Oso WY and Onen D, *A General Guide to Writing research Proposal and Report (*Jomo Kenyatta Foundation rev edn, 2011) 77.

The target population was *Seme* clan in Kisumu County. This is a rural population that depends on firewood for its domestic use.

1.10.2.2 The Sample

The sample consisted of 4 women of 60 years and above chosen from 8 sub-locations in Seme. The total sample was 32. The gender was biased towards women. Traditionally, firewood identification, collection and cooking are women affairs. Women aged 60 years and above were the target group for their institutional memory in firewood identification and collection in the olden times.

1.10.2.3 The Sampling Technique

The study employed simple random sampling and purposive sampling techniques in sample selection. Simple random sampling ensured that each member of the target population had an equal and independent chance of being included in the sample. This enhanced the validity of the data. Purposive sampling was used to select the respondents on age and sex bases to give the required sample. It served the purpose of enhancing data reliability.

1.10.3 DATA COLLECTION

1.10.3.1 Instrumentation

Focus group interview schedules were used. Focus group discussions were considered convenient because of the low literacy level among the respondents. The respondents' difficulties in reading were therefore eliminated. The discussions were also found to be convenient due to the small sample size. The interview technique was useful in understanding the underlying reasons and motivations for people's attitudes, preferences or behavior.[74]

1.10.3.2 Research Procedure

1.10.3.2.1 Primary Data

The researcher engaged the respondents on guided one-on-one discussions. Semi-structured interview schedules were used for the purpose. This set an open ground for respondents to

[74] Thames Valley University, 'Dissertation Guide' (2010) <http://brent.tvu.ac.ac.uk/dissguide/hm1u0/hm1u0fra.htm> accessed 12th November, 2013.

express themselves freely.[75] Interviews enabled the researcher to delve deeply into questions. The respondents also had a chance to pose questions on what they did not understand. The researcher assigned each research assistant a respondent as he assigned himself one too for purposes of recording the responses.

1.10.3.2.2 Secondary Data

Secondary data sources included publications; research institutes' and Government agencies' data bases; and web resources of organizations. The secondary data was cheap to access and was found to be less time consuming. Because the sources were credible, this data was reliable.[76]

1.10.4 DATA ANALYSIS

Frequency tables, pie charts and bar graphs were employed in analyzing the data. Energy qualities of *Seme Midat* were deduced from these analysis techniques.

1.10.5 LIMITATIONS

Limitations which were encountered included: limited time for exhaustive collection of primary data hence more reliance on secondary data; inadequacy and/or lack of up to date data on energy qualities of firewood in Kenya; and unwillingness of some data custodians and respondents to give some crucial data.

1.11 CHAPTER BREAKDOWN

The chapter breakdown lays out the sequence in which the chapters in the project report is represented. The study was encapsulated in five distinct chapters briefly outlined below.

1.11.1 CHAPTER ONE

Chapter One entails the justification of the study. It outlines the problem under study in the backdrop of existing energy crises in the country despite the availability of solutions as relates to firewood identification and production among indigenous societies in Kenya. The Chapter, basing on the literature review, demonstrates that despite a huge bank of knowledge acquired through various researches, energy crisis remains a serious concern in Kenya because of over reliance in imported petroleum products. The nexus is that all research works on firewood have not identified the potential of the traditional knowledge in firewood as an IP right that should be

[75] Montello von DR and Sutton PC, *An Introduction to Scientific Research Methods in Geography* (Sage Publications Inc. USA 2006).

[76] SDSU, 'Marketing 470: Marketing Research Notes' (2010) <http://www-rohan.sdsu.edu/> accessed 12th November, 2013.

exploited for a faster economic growth. This Chapter draws our attention to the interdisciplinary approach which combines Physics, Environmental Law, Energy Law, Intellectual Property and Economics to arrive at a solution to the energy crisis in Kenya.

1.11.2 CHAPTER TWO

This Chapter outlines some key developments that are illustrative of the issue under study. It introduces a scientific consideration of energy qualities of firewood before it lays emphasis on the energy situation in Kenya as well as other developing economies *vis-a-vis* the legal frame work. With special emphasis on the steps that Kenya has taken to alleviate energy crisis in the rural areas, the Chapter proposes the participatory approach to finding lasting solutions to the energy crisis in the domestic domain. It highlights the marketing of firewood as a commodity and proposes that the current sorry state of firewood supply chain may be improved through value addition of firewood by use of IPR of the TK in the identification of quality firewood among the local communities.

1.11.3 CHAPTER THREE

This Chapter brings to sharp focus the legal status of firewood energy sub-sector in Kenyan; and uses this as a spring board in proposing meaningful development through recognition, development, enhancement, protection and enforcement of IP rights of the local communities in the identification of high energy quality traditional firewood. The recognition, development protection and enforcement of the IPR of *Seme* clan in the identification of *Seme Midat* lingers in the hindsight. The Chapter further highlights the various challenges encountered at every stage in dealing with community IP rights. It gives an insight into the local solutions to the national energy crisis, especially in the domestic sector, by proposing a shift in attention from importation of petroleum products to development of traditional firewood energy sub-sector.

1.11.4 CHAPTER FOUR

This Chapter presents analysed data in woodfuel industry. It lays the foundation for general and specific inferences of the study which may inform future Government policies on firewood energy sub-sector with special emphasis on assignment of trademark to TK as a means to an end of the domestic energy crisis in Kenya.

1.11.5 CHAPTER FIVE

This Chapter concludes and presents the research findings. It forms the quick reference for energy solutions as relates firewood energy sub-sector. It also outlines the recommendations with regard to policy, statute, commercial and processing methods of traditional firewood for value addition necessary for meaningful economic growth.

CHAPTER TWO

KEY DEVELOPMENTS IN FIREWOOD ENERGY SUB-SECTOR

INTRODUCTION

This Chapter outlines some key developments that are illustrative of the issue under study. It introduces a scientific consideration of energy qualities of firewood before it lays emphasis on

the energy situation in Kenya as well as other developing economies *vis-a-vis* the legal frame work. With special emphasis on the steps that Kenya has taken to alleviate energy crisis in the rural areas, the Chapter proposes the participatory approach to finding lasting solutions to the energy crisis in the domestic domain. It highlights the marketing of firewood as a commodity and proposes that the current sorry state of firewood supply chain may be improved through value addition of firewood by use of IPR of the TK in the identification of quality firewood among the local communities.

2.0 ENERGY QUALITIES OF FIREWOOD

2.0.1 Carbon Content of Wood

Wood species are categorized as either hard wood or soft wood. Energy content of wood depends on its species; and also on whether the wood is resinous or non resinous. Previously, carbon content in wood was assumed to 50% of tree biomass; however, recent studies indicate that this assumption is not accurate, with substantial variation in Carbon content among tree species as well as among tissue types. Overally, the carbon content of softwood species is 47-50% and that of hardwood species 50-53%. This is due to the varying lignin and extractives content.[77]

Analyses of tissue-specific wood carbon values indicate that stem wood carbon provides a direct approximation for carbon content in other tissues of a tree, such as branches and coarse roots. This result suggests that in spite of tissue-specific functional demands, there are important constraints on genetic determination of the key chemical traits of woody tissues, such as lignin-cellulose ratio and non-structural carbohydrate content that determine carbon content.[78]

Good firewood has superior energy qualities. Energy content of wood is measured in the calorific value. Statistics held by California Energy Commission (CEC) show that based on 80 cubic feet per cord,[79] calorific value of wood ranges between 8,000-8,500 British Thermal Unit

[77] Ragland, K.W., Aerts, A.J., and Baker, A.J. (1991). Properties of Wood for Combustion Analysis. *Bioresource Technology* 37 (1991) 161-168. (Madison, Wilkinsin 53705, USA). P. 164. Accessed at <http://www.bioresource.com > on 20th July, 2014.

[78] Sean, C. T. and Adam, R.M. (2004). Carbon Content of Tree Tissues: A Synthesis. (Faculty of Forestry, University of Toronto, ISSSN 1999-4907). p. 343. Accessed at <http://wwwmdpi.com/journal/forestss> ISSN 1999-4907 on 20th July, 2014.

[79] A "cord" of wood is defined as a stack 4 feet high, 4 feet thick and 8 feet long. It has about 85 cubic feet of wood and not 128 (the product of 4 by 4 by 8) because of the air spaces between the pieces of wood. This information was accessed at <http://mb-soft.com/juca/print/311.thml> on 4th April, 2014.

(BTU) for non resinous woods and from 8,600-9,700 BTU for resinous woods.[80] These statistics corroborate with those held at the United States Forest Products Laboratories, which are based on seasoned wood at 20% moisture content, and 85 cubic feet of wood per cord.[81]

Calorific value is an important energy quality of firewood. It has linear relationship with the wood's carbon content. Wood's carbon content is directly proportional its density. Thus, firewood's calorific value is directly proportional to the firewood's density.[82] Studies have shown that the densities of high energy yielding woods range from 634 kgm^{-3} to 891 kgm^{-3} whereas the respective calorific values range from 3.5 kilo calories to 5.0 kilo calories.[83] Correlation of carbon content to calorific value of wood fuel depicts similar patterns for both raw wood and carbonized wood (charcoal). According to Oduor and Githiomi, woods that have high carbon content yield more heat energy upon combustion.[84]

2.0.2 Moisture Content in Wood

Moisture content may be defined as the weight of moisture contained in a piece of wood expressed as a percentage of its oven dry weight.[85] The advantages of defining moisture as a percentage of oven dry weight are twofold. First, dry weight of wood is a constant value that may easily be determined at any time. Second, moisture content is readily envisaged as the amount of water contained in the wood as parts by weight to 100 parts of wood substance.[86]

In its natural state, wood contains cell wall substance, imbibed and free water, internal voids and extraneous materials including extractives. Wood's internal void accounts for its porosity.

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[80] <http://www.energy.ca.gov/> (2012) accessed on 4th April, 2014. The conversion table of BTU per pound to Mega Joules per kilogram being: $1MJkg^{-1}$ is equivalent to 429.923 $BTUlb^{-1}$ and 429.923 $BTUlb^{-1}$ is equivalent to 238.846 kilocalories per kilogram ($kcalkg^{-1}$).

[81] <http://mb-soft.com/juca/print/311.html> (2009) accessed on 4th April, 2014.

[82] Mugo F and Ong C (2006). 'Lessons of Eastern Africa's Unsustainable Charcoal Trade: ICRAF Working Paper No. 20' World Agro-forestry Centre, Nairobi, Kenya.

[83] National Biomass Study, 'National Biomass Study Phase III Project Document: Kampala, Uganda' (2006); Oduor N and Githiomi J, (2004). 'Utilization Potential of Prosopis Juliflora grown in Kenya Dryland Areas' in Choge S.K and Chikamai B,N. (eds), *Proceedings of Workshop on Integrated Management of Prosopis species in Kenya: Workshop held at Soi Safari Club, Lake Baringo, 1-2 October 2003* (Regal Press Kenya Ltd 2004. KEFRI, Nairobi, Kenya. ISBN: 9966-9660-6-4. pp. 41-51); Kenya Forestry Research Institute, 'A study on Charcoaling *Acacia Xanthophloea* species using Half Orange Kiln in Madiany Division, Bondo District, Kenya' (2008).

[84] Oduor N and Githiomi J, (2004). 'Utilization Potential of Prosopis Juliflora grown in Kenya Dryland Areas' in Choge S.K and Chikamai B,N. (eds), *Proceedings of Workshop on Integrated Management of Prosopis species in Kenya: Workshop held at Soi Safari Club, Lake Baringo, 1-2 October 2003* (Regal Press Kenya Ltd 2004. KEFRI, Nairobi, Kenya. ISBN: 9966-9660-6-4). p. 2480.

[85] MaClean, J.D (1952). Preservative Treatment of Wood by Pressure Methods: Agriculture Handbook No. 40. (US Department of Agriculture, Washington DC). P 160; Stamm, A.J. (1964). Wood and Cellulose Science. (Ronald Press Company, New York). p. 549.

[86] Eckelman, A.C. (2011). Forestry and Natural Resources: Wood Moisture Calculations. (Purdue University, Department of Forestry and Natural Resources, USA). pp. 1-2.

Studies have shown that up to 62% of the volume of oven dry wood consists of internal void.[87] Thus, green wood may have more than 62% of water by volume contained in the void spaces and cell cavities. The relative and absolute amounts of wood substance, free and imbibed water, and void space present in wood have a direct bearing on the physical and mechanical properties of the wood.

Although good firewood burns well even when green, high moisture content requires more energy to evaporate the water in the wood before it can burn.[88] Studies by the United States Forest Products Laboratory reveal that freshly cut wood is at least 60% water.[89] Some of this water must be removed before the wood can burn. When the water content is above 25%, the wood is referred to a green wood and burns poorly and gives less heat.

Moisture content in wood leads to a lower heating value, also referred to as net calorific value or lower calorific value. Lower heating value is determined by subtracting the latent heat of vaporization of the water from the heat generated. As such, the energy required to vaporize the water in the wood is not recoverable as useful energy, but lost to the environment.[90]

Dry wood on the other hand leads to a higher heating value, also referred to as gross energy or upper heating value or gross calorific value or higher calorific value. The higher heating value takes into account the latent heat of vaporization of water in the wood.[91] This is possible because dry oven wood has minimal water to be vaporized during combustion. Studies have shown that wood with low moisture content has a higher calorific value than green wood. The same results have been obtained with carbonized wood.[92] Therefore, dry wood[93] is more desirable for firewood as it delivers more energy for heating than green wood[94] of the same species.

2.0.3 Presence of Lignin in Wood

[87] ibid.
[88] Tewari JC, Harris PJC, Harsh LN, Cadoret K, Pasiecznik NM (2000). 'Managing *Prosopis Juliflora*, (Vilayeti Babul) A Technical Manual CAZRI, Jodhpur, India and HDRA Coventry, UK. P. 96; Oduor and Githiomi, 'Fuel-wood Energy Properties of *Prosopis Juliflora* and *Prosopis Pallida* grown in Baringo, Kenya' (2013).
[89] Information accessed at <http://mb-soft.com/juca/print/311.thml> on 4th April, 2014.
[90] ibid 46.
[91] ibid.
[92] Oduor N and Githiomi J, (2004). 'Utilization Potential of Prosopis Juliflora grown in Kenya Dryland Areas' in Choge S.K and Chikamai B,N. (eds), *Proceedings of Workshop on Integrated Management of Prosopis species in Kenya: Workshop held at Soi Safari Club, Lake Baringo, 1-2 October 2003* (Regal Press Kenya Ltd 2004. KEFRI, Nairobi, Kenya. ISBN: 9966-9660-6-4). p. 2480.
[93] A typically, seasoned (dry) wood has 20% to 25% moisture content.
[94] Unseasoned (green) wood moisture content varies by the species; green wood may weigh 70 to 100 percent more than seasoned wood due to water content.

According to studies, lignins have been found to be complex polymers of aromatic alcohols known as monolignols.[95] They are made up of *p-hydroxyphenyl, guaiacyl*, and *syringyl* units in various proportions depending on botanical types of the trees.[96] In hard wood species, such as oak species, lignin is composed largely of *syringyl* and *guaiacyl* units, with only trace of *p-hydroxyphenyl*.[97] That the concentration of lignin is mainly in the xylem bundles of wood explains why wood rich in lignin has the physical characteristic of strength.[98] The chemical and physical properties of lignin endow it with greater energy content than other substances such as celluloses which are also located in the xylem bundles of trees.[99] Thus, wood rich in lignin has higher heat content than wood with less or no lignin at all. This position has been reaffirmed by studies which have shown that there exists a highly significant linear correlation between heating values (HHVs)[100] of biomass fuels with their lignin content. [101] This further confirms that HHV of the biomass fuel is a function of lignin content in the wood.

Apart from its high energy content, lignin also helps in preserving the wood for long periods as it deters pests and pathogens form invading the wood.[102] Thus, firewood rich in lignin can be stored over a long period without wasting away. In addition, the technological properties of lignin such as durability, strength, paintability and glueability have a primary importance, not

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[95] <http://www.mrw.interscience.wiley.com/emrw/9780471238966/kirk/article/lignin.a01/current/pdf> (2012). Accessed 15th July, 2014.

[96] W. Boerjan, J. Ralph, M. Baucher (June 2003). "Lignin Biosynthesis". [*Ann. Rev. Plant Biol.* 54 (1)]. Pp. 519–549. Accessed at <http://www.dx.doi.org/10.1146/annurevarplant.54.031902.134938> (2011) and <http://www.ncbi.nlm.nih.gov/pubmed/14503002> (2010) 15th July, 2014.

[97] Assor, C., Placet, V., Chabbert, B., Habrant, A., Lapierre, C., Pollet, B., and Perre, P. (2009). *"Concomitant changes in viscoelastic properties and amorphous polymers during the hydrothermal treatment of hardwood and softwood,"* (J. Agric Food Chem. 57) pp. 6830-6837 accessed at <http://www.bioresource.com8(2)17199> on 20th July, 2014.

[98] Konovalova, N. N., Konovalov, N.T., Bazhenov, A.N., Shmitko, L.M., Stasova, V.V., Varaksina, T. N., and Anonova G.F. (2007). "The effect of supersonic treatment of the structure and components of oak wood," Iufro Proceedings *Wood Structure and Properties '06* Kurjakto (ed) accessed at <http://www.bioresource.com> on 20th July, 2014; Wardrop (1969). The structure of the cell wall in lignified collenchyma of *Eryngium* sp. (Aust. J. Botany 17) pp.229-240.

[99] Novaes, E., Kirst, M., Chiang, V., Winter-Sederoff, H., and Sederoff, R. (2010). "Lignin and biomass: A negative correlation for formation of wood and lignin content in trees," (*Plant Physiol.* 154) pp. 555-561 accessed at <http://www.bioresource.com> on 20th July, 2014.

[100] The quantity known as higher heating value (HHV) (or *gross energy* or *upper heating value* or *gross calorific value* (GCV) or *higher calorific value* (HCV)), measured in kJg^{-1}, is determined by bringing all the products of combustion back to the original pre-combustion temperature (usually $25^{o}C$) and in particular condensing any vapor produced. It is the same as the thermodynamic heat of combustion since the enthalpy change for the reaction assumes a common temperature of the compounds before and after combustion, in which case the water produced by combustion is liquid. Thus, the higher heating value takes into account the latent heat of vaporization of water in the combustion products.

[101] <http://www.sciencedirect.com/science/article/pii/S0196890400000509> (2013). Accessed 15th July 2014.

[102] ibid 56.

just to the use lignin *per se,*[103] but also to the usefulness of wood rich in lignin, such as: production of pulp used in paper manufacturing industry; dispersants in high performance cement applications; water treatment formulations; dyes in textile industry; additives in specialty oil field applications; raw materials for several chemicals, including agricultural chemicals and sugar; and environmentally sustainable dust suppression agent for roads.[104]

2.0.4 Wood Smoke

Apart from heat and ash, burning of firewood also produces smoke. The amount and composition of smoke produced during combustion depends on the wood species and its moisture content. Studies have shown that components of wood smoke and cigarette smoke are quite similar; and that many components of both are carcinogenic. Wood smoke contains over 100 toxic irritant components which can scar the lungs. These include: fine particulate matter,[105] carbon monoxide, methane, benzene, benzo(a)pyrene, formaldehyde, sulfur dioxide and nitrogen oxides.[106] Apart from these irritants, wood smoke also contains chemicals known or suspected to be carcinogens, such as polycyclic aromatic hydrocarbons and dioxin.

Thus, wood smoke is responsible for indoor pollution which may lead to various health complications. These may include: coughs, headaches, eye, and throat irritation. In acute cases, wood smoke exposure can depress the immune system, damage the layer of cells in the lungs that protect and cleanse the airways and even cause cancer.[107] The most affected by the pollution

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[103] Pucciarello, R., Villani, V, Bonini, C., D'Auria, M., and Vetere, T. (2004). "Physical properties of raw lignin-based polymer blends," (*Polymer* 45). Pp. 4159-4169: An emerging aspect of the use of lignin is the possibility of its use as a processing stabilizer for polystyrene and polyethylene instead of organic stabilizers which are not only toxic but are also expensive. <http://www.bioresource.com> accessed 20th July, 2014.

[104] Uses of lignin from sulfite pulping <http://lignin.org/whatis.html> (2008) accessed 15th July, 2014; E. Sjöström (1993). *Wood Chemistry: Fundamentals and Applications*. Academic Press. ISBN 0-12-647480-X.

[105] Environmental Protection Agency on Health Effects of Wood Smoke (2012). <http://www.epa.gov/woodstoves/healtheffects.html> accessed 21st July, 2014: particulate matter contained in wood smoke has the capacity to end up deep in the lungs where they remain for months, causing structural damage and chemical changes. Wood smoke's carcinogenic chemicals adhere to these tiny particles to cause serious health effects to the lungs.

[106] Ndegwa Geoffrey M, 'Woodfuel Chains in Kenya and Rwanda: Economic Analysis of Market Oriented Woodfuel Sector' (MSc Thesis, University of Cologne 2010); Environmental and Human Health Inc: *"The Health Effects of Wood Smoke."* <http://www.ehhi.org/woodsmoke/pr_wood_smoke_report10.shtml> accessed 21st July, 2014.

[107] Environmental Protection Agency on Health Effects of Wood Smoke (2012). Accessed at <http://www.epa.gov/woodstoves/healtheffects.html> on 21st July, 2014.

and its negative health effects are women, children[108] and the elderly persons due to their high probability of being exposed to wood smoke for long duration.[109]

For other people who are vulnerable such as people with asthma, chronic respiratory disease and those with cardiovascular disease, wood smoke is particularly harmful even with short exposures. The fine particles in wood smoke that go deep into the lungs increase the risk of heart attacks, strokes and arrhythmias. People with heart disease may experience chest pain, palpitations, shortness of breath, and fatigue even with short exposure.[110]

The Environmental Protection Agency estimates that a single fireplace operating for an hour and burning 10 pounds of wood will generate 4,300 times more polycyclic aromatic hydrocarbons, which are carcinogenic, than 30 cigarettes. [111] Thus, firewood that burns with a lot of smoke, toxic or otherwise, is undesirable regardless of its high calorific value.

2.0.5 Flame Colour and Temperature of Burning Wood

The word "flame" is derived from Latin word *flamma* which means the visible gaseous part of a fire. It is caused by a highly exothermic reaction taking place in a thin zone.[112] The colour and temperature of a flame are dependent on the type of fuel involved in the combustion. When heat is applied to fuel, the fuel molecules vaporize. The vaporized fuel molecules readily react with oxygen in the air, and give off enough heat in the subsequent exothermic reaction to vaporize yet more fuel, thus sustaining a consistent flame.[113]

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[108] Environmental Protection Agency on Health Effects of Wood Smoke (2012) <http://www.epa.gov/woodstoves/healtheffects.html> accessed 21st July, 2014: wood smoke interferes with normal lung development in infants and children. It also increases children's risk of lower respiratory infections such as bronchitis and pneumonia.

[109] WHO 'Statistical Information Systems,' WHOSIS, (2003) <http://www.who.int/whosis/menu.c.fm> accessed 11th October, 2013; Bailis R. Et al (2003) 'Greenhouse Gas Implications of Household Energy Technology in Kenya' Energy and Resources Group, University of California, Berkeley (2003); UNEP, 'Traditional Bio-energy' (2007) <http://www.unep.org/energy/act/bio/traditional_bionergy.htm> accessed 11th October, 2013.

[110] Environmental Protection Agency on Health Effects of Wood Smoke (2012) <http://www.epa.gov/woodstoves/healtheffects.html> accessed 21st July, 2014.

[111] ibid.

[112] Law, C. K. (2006). "Laminar Premixed Flame." *Combustion Physics*. (Cambridge, England: Cambridge University Press) ISBN 0-521-87052-6 at p. 300. <http://books.google.com/?id=vWgJvKMXwQ8C&pg=RA300> accessed 15th July, 2014.

[113] Gregory P. Smith, David M. Golden, Michael Frenklach, Nigel W. Moriarty, Boris Eiteneer, Mikhail Goldenberg, C. Thomas Bowman, Ronald K. Hanson, Soonho Song, William C. Gardiner, Jr., Vitali V. Lissianski, and Zhiwei Qin. (2008) <http://www.me.berkeley.edu/gri_mech/> accessed 21st July, 2014: The chemical kinetics

Sufficient energy in the flame excites the electrons in the vaporized molecules and some of the transient reaction intermediates, which results in the emission of visible light as these substances release their excess energy. As the combustion temperature of a flame increases, so does the average energy of the electromagnetic radiation given off by the flame.[114]

Flame color depends on several factors, the most important typically being black body radiation and spectral band emission. In the most common type of flames, hydrocarbon flames, the most important factor determining color is oxygen supply and the extent of fuel-oxygen pre-mixing. These determine the rate of combustion and thus the temperature and reaction paths, which produce different colour hues. In a science laboratory, this is illustrated by means of a Bunsen burner. Under normal gravity conditions[115] and with a closed oxygen valve, the burner's flame is yellow flame (also called a safety flame) depicting a temperature of around 1,000 °C. This is due to incandescence of very fine soot particles that are produced in the flame. With increasing oxygen supply by widely opening the oxygen valve, a blue flame results due to a more complete combustion representing a temperature of about 1,600°C.[116]

The colder part of a diffusion (incomplete combustion) flame will be red, transitioning to orange, yellow, and white as the temperature increases. These represent various temperatures as follows: dark red (first visible glow), 500-600°C; dull red, 600-800°C; bright cherry red, 880-1,000°C; orange, 1,000-1,200°C; bright yellow, 1,200-1,400°C; and white, 1,400-1,600°C. Thus, for a given flame's region, the closer to white on this scale, the hotter that section of the flame is. The transitions are often apparent in fires, in which the colour emitted closest to the fuel is white,

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occurring in the flame are very complex and involve typically a large number of chemical reactions and intermediate species, most of them radicals.

[114] ibid.

[115] National Aeronautics and Space Administration (NASA, 2000). "Candle Flame in Microgravity;" and "Spiral Flames in Microgravity." <http://quest.nasa.govv/space/teachers/microgravity/9flame.html> and <http://science.nasa.gov/headlines/y2000/ast12may_1htm> accessed 21st July, 2014: In microgravity or zero gravity such as in space, convection does not carry the hot combustion products away from the fuel source, resulting in a spherical flame front. Thus, gravity plays an indirect role in flame formation and composition. The flame becomes spherical, bluer and more efficient as the temperature is sufficiently evenly distributed to allow produced soot to be completely oxidized and complete combustion occurs.

[116] Jozef Jarosinski, Bernard Veyssiere (2009). *Combustion Phenomena: Selected Mechanisms of Flame Formation, Propagation and Extinction* (CRC Press) ISNN 0-8493-8408-7 at p. 172. <http://books.google.com/?id=hadB8msSl1EC&pg=PA172> accessed 21st July, 2014.

with an orange section above it, and reddish flames the highest of all.[117] In house fires, the cooler flames are often red and produce the most smoke. The red colour compares typical yellow colour of other flames which suggests lower temperature, often just 600-850 °C. Flame temperatures of common items include animal fat at 800-900 °C; kerosene at 990 °C; wood at 1027 °C; gasoline at 1026 °C; charcoal at 1390 °C; and a candle at 1,400 °C.[118]

2.0.6 Ash Content of Wood

Wood ash is the residue powder left after the combustion of wood. Whereas it often finds use traditionally by domestic gardeners as a good source of potash, its amount produced during combustion of firewood has a bearing on the energy quality of the wood. Studies have shown that typically between 0.43% and 1.82% of the mass of burned dry wood results in ash.[119] Whereas this variance may be attributed to the conditions of the combustion, wood species has been found to be a major factor as it gives the characteristic temperature for combustion.[120] According to Oduor and Githiomi, firewood which produces less of residue ash has a higher calorific value than that which produces more ash. This relationship also maintains for charcoal.[121]

2.1 GLOBAL WOOD FUEL ENERGY STATUS

Wood is the oldest source of energy for mankind, and by far the most important among the biomass sources.[122] Before the discovery of fossil fuel in the middle of the 19th century, majority of energy in the world was supplied by biomass which contributed to as much as 70% of the primary energy demand.[123] With the advent of industrial revolution in Europe, rapid fossil fuel use saw the quantity of biomass used decrease steadily with coal taking centre stage. From the

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[117] Christopher W. Schmidt, Steve A. Symes (2008). *The Analysis of Burned Human Remains (*Academic Press) ISBN 0-12-372510-0 at pp. 2–4. <http://books.google.com/?id=Q7Pb2wXV2woC&pg=PA4> accessed 20th July, 2014.

[118] Temperatures in Flames and Fires. Doctorfire.com (2007) <http://www.doctorfire.com/flametemp.html> accessed 21st July, 2014.

[119] Misra M.K, Ragland KW, Baker AJ (1993). "Wood Ash Composition as a Function of Furnace Temperature." [*Biomass and Energy* 4 (2)]. p 103. <http://www.fpl.fs.fed.us/documents/pdf1993/misra93a.pdf> and <http://dx.doi.org/10.1016/0961-9534(93)90032-Y> accessed 21st July, 2014.

[120] Etiegni L., Campbell A.G. (1991). "Physical and Chemical Characteristics of Wood Ash". [*Bioresource Technology* 37 (2)]. p. 173. <http://dx.doi.org/10.1016/0960-8524(91)90207-Z> accessed 21st July, 2014.

[121] ibid 42.

[122] ibid 50.

[123] ibid 6.

20th century onwards, refined oil and gas have gained central significance in industrial energy supply and consumption.[124]

It is estimated that about 1.65 billion cubic metres of wood is used annually as source of energy world over.[125] While biomass energy is mostly used in developing countries, averaging about 80% of energy supply, there has been increased use of wood energy in Europe where the growth in supply has been about 3.5% annually; accounting for about 50% of the renewable energy used, mainly for electricity generation and household heating.[126] Whereas global wood energy use is only 7%, the scenario in developing countries is different. Asia has the highest wood fuel use of about 44%; Africa, about 21%; and South America and the Caribbean, about 12% each.[127] However, most countries in sub-Saharan Africa supply more than 90% of their total primary energy demand from biomass.[128]

In developing countries, wood fuel is mostly consumed in form of firewood, and charcoal. In Africa, the consumptions are quite high. 94% of rural population and 73% of the urban population use wood fuels as their primary energy source.[129] In Kenya, rural population consumes 87.7% of firewood and 7.7% of charcoal; while the urban population consumes 10.0% of firewood and 30.2% of charcoal.[130] Thus, whereas the urban population is more dependent on charcoal, the rural population is heavily dependent on firewood. The preference of charcoal to firewood in urban areas of developing countries mainly arises from the following facts: its long-life storage; low-cost transportation; smaller volume; less weight; and high heat content. In fact, this preference continues to grow according to more recent studies indicating a drastic increase with about 80% of urban households depending on charcoal as a primary source of fuel.[131]

Studies show that in a year, global wood fuel demand ranges from 0.5 to 3.0 cubic metres per hectares. This is against the backdrop of an annual wood productivity of between 0.1 to 4.0 cubic

[124]Shukla P.R., (no date): Biomass Energy in India: Transition from Traditional to Modern. Published in The Social Engineer, Vol. 6, No. 2. <http://www.e2analytics.com> accessed 24th February, 2014.
[125] FAO (2007): Forests and energy in developing countries, FAO, Rome.
[126] ibid 6.
[127] ibid 65.
[128] Bailis R *et al*, (2007): Health and Greenhouse Gas Impacts of Biomass and Fossil Fuel Energy Futures in Africa.
[129] ibid.
[130] Kenya National Bureau of Statistics, 2007; Ministry of Energy 2002 report on annual consumption of various energy types in Kenya as contained in the International Journal of Applied Science and Technology, Vol. 2. No. 10, December, 2012.
[131] Energy for Sustainable Development in Africa (ESDA) (2005), 'National Charcoal Survey: Exploring the potential for a sustainable charcoal industry in Kenya. A product of the Kenya Charcoal Working Group' June 2005, P 74.

meters per hectares in fallow forests and closed forests respectively.[132] From these statistics, it is apparent that there is 'woodfuel famine' in areas which produce less than their annual demand. The 'wood famine' emanates from a worrying global trend of deforestation arising from population growth. While the per capita wood-growing stock is estimated at 65 cubic metres requiring 0.62 per capita forest,[133] there is continuous population growth which diminishes forest land. Thus, a huge biomass supply deficit results. The situation is aggravated by the imbalance in the distribution of global per capita forest. Whereas only ten countries[134] globally account for two thirds of the 2,620 million hectares of the global forest area, sixty four countries with a combined population of over 2 billion people have less than 0.1 hectares of forest per capita.[135] At the local level, similar situation abounds.

Whereas biomass remains the only source of energy in some developing countries, in Kenya it is the main source of energy. However, in all cases, its traditional sources of supply continue to dwindle.[136] In 1980, woodfuel was estimated to supply 71% of Kenya's total energy requirements. Some thirty years later, its contribution to the total national energy requirement is estimated at 68%.[137] According to National Biomass Energy Study,[138] the consumption was reported to total 34.3 million tonnes of which 15.1 million tonnes was in the form of firewood while 16.5 million tonnes was wood for charcoal. The upshot of this is that an annual harvesting of 240,000 and 298,000 hectares for firewood and charcoal respectively would be necessary. To sustain such a great demand on wood resource in the country, afforestration and regeneration management of a similar magnitude of land is necessary on annual basis. Current supply sources

[132] Takase K. (1997): The Crisis of Rural Energy in Developing Countries. Published in the journal; Environment, Energy and Economy: Strategies for Sustainability. United Nations University Press, Tokyo.

[133]FAO (2005a): Global Forest Resources Assessment 2005; 15 Key findings. FAO, Rome; Takase, (n 76).

[134] Forest Area in Million Hectors: United States 809; China 478; Democratic Republic of Congo 303; Australia 310; Indonesia 197; Peru 164; India 134; and Russian Federation 88; Brazil 69; Canada 68. (The researcher's construction from FAO 2005a (n 76).

[135] FAO 2005a (n 76).

[136] O'Keefe, P., Raskin, P. and Steve, B. (1984), 'Energy and Development in Kenya: opportunities and constraints,' Beijer Institute and the Scandinavian Institute of African Studies, Stockholm and Uppsala; Mugo, F.W. (1989), 'Woodfuel supply and demand in a rural set up: the case for Naitiri Sub-location, Bungoma District,' Masters of Arts in Planning thesis, University of Nairobi, Nairobi, Kenya; Mugo, F.W. (1997), 'Factors contributing woodfuel scarcity and the consequent use of crop residues for domestic energy in Rural Kenya,' A thesis presented to the Faculty of the Graduate School of Cornell University in partial fulfillment of the requirements for the degree of Master of Science. Ithaca, NY. USA.

[137] ibid 8.

[138] Ministry of Energy (2002) Study on Kenya's Energy Demand, Supply and Policy Strategy for Households, Small Scale Industries and Service Establishments. Kamfor Consultants, Nairobi, Kenya.

of fuelwood are on-farm production, which accounts for 84%, trust lands and gazetted forests each with 8%.[139]

Evidently, what was once regarded as a free good readily available for use, is currently growing scars by the day. As a scarce essential resource, there is every need to efficiently and sustainably manage wood. Inefficient and unsustainable management of wood sources result in a number of unfavourable options. First, there is increase in the distance to the wood sources in many regions. Many a household, especially in the urban areas turn to the nearby markets as sources of wood fuel.[140] Secondly, a preference for consumption than conservation has arisen, especially among developing countries. This not only interferes with the rain patterns but also with the carbon sink necessary for a healthy environment. Drought, poverty, hunger, disease and global warming and deaths ensue. Thirdly, the poor rural and urban populations in developing countries have been forced to shift to other, perhaps more costly, sources of energy.[141]

As a result of these challenges, and many others, woodfuel production, distribution and use have become major policy issues in many countries. At the global arena, FAO has recommended a systems approach to wood energy production and use linking forests, trees and people in a mutually supportive and interactive chain of benefits.[142] Similarly, many a government has taken the necessary policy and legislative actions to square the ramifications of inefficient and unsustainable use of wood on vital social, economic and environmental sectors. Sound planning, economic efficiency and environmental sustainability are key to the wood-energy sector.

In Kenya, the Forest Policy 2005[143] proposes a number of strategies and actions to enhance sustainable and efficient production of wood fuel. These include: promotion of sustainable production and efficient utilization of wood fuel; promotion of efficient wood fuel energy technologies and the use of alternative forms of energy; and regulation of the production and marketing of charcoal.

2.2 WOOD FUEL *VIS-À-VIS* NATIONAL ENERGY SUPPLY MATRIX

Various national energy studies in Kenya are unanimous that wood fuel is the largest form of primary energy used, accounting for 68% of the total annual energy consumption. Of the two

[139] Republic of Kenya (2005). Status of Environment Report 2004. National Environment Management Authority. Ministry Environment, P 248.
[140] ibid 46.
[141] Allen C. J. (1984): Wood Energy and Preservation of Woodlands in Semi-arid Developing Countries: The Case of Dodoma Region, Tanzania. University of California, Santa Barbara, USA.
[142] FAO, (2009): Sustainable Wood Energy. FAO, Rome.
[143] Sessional Paper No. 9 of 2005.

most popular forms of wood fuel, firewood and charcoal, the Integrated Household Budget Survey 2007 found that firewood was the most popular. Whereas the national percentage consumption of firewood as a source for domestic cooking was 68.3%, the consumption was much higher among the rural population, being 87.7%. This popularity of firewood surpassed that of charcoal many fold. The study found the national use of charcoal as type of cooking fuel to be 13.3% among all households.

With regard to sourcing of firewood, earlier studies established that 84% of firewood was sourced from agro-forestry or on-farms, 8% each from trust lands and gazetted forests. A striking fact is that about 76% of households obtain all their firewood free while 17% of households regularly purchase and 7% per cent supplement their free collection with purchase.[144]

Apart from the fact that wood fuel is the primary source of energy for the majority of Kenyan households, small-scale enterprises on their part also depend on it for cooking and heating services as illustrated in the Table 1 below.

Table 1: Annual Firewood and Charcoal Consumption by Cottage Industries

Industry	Quantity of Firewood (Tonnes/Year)	Quantity of Charcoal (Tonnes/Year)
Brick Making	55,772	-
Tobacco	78,365	-
Milk Processing	4,900	540
Fishing and Fish Smoking	17,960	-
Jaggary	180,000	-
Bakeries	20,665	622
Restaurants/Kiosks	**1,276,155**	**428,025**

[144] ibid 82.

Tea Industry	155,000	-
Total	**1,788,817**	**429,187**

Source: Ministry of Energy (2002) Study on Kenya's Energy Demand, Supply and Policy Strategy for Households, Small Scale Industries and Service Establishments. Kamfor Consultants, Nairobi, Kenya.

From Table 1 above, it is apparent that cooking related activities exert a lot of demand on both firewood and charcoal. Restaurants and kiosks used 71.3% (1,276,155 tonnes out of 1,788,817 tonnes) of total supply of firewood and 99.7% (428,025 tonnes out of 429,187 tonnes) of total charcoal supply. However, the supplies of both firewood and charcoal do not match the growing demand, thus occasioning a rapidly soaring deficit.

2.3 WOOD FUEL DEMAND AND SUPPLY TREND

Studies in biomass fuel demand and supply in Kenya have indicated that while the demand of wood fuel continues to increase, the supply has been declining in rural domestic energy requirements. Thus, the country is not able to match demand and supply leading to deficit in wood energy.[145] In 1980 biomass energy supplied 98% of Kenya's rural domestic sector's energy requirements. The other 2% was obtained from petroleum fuel which was mainly used for lighting. Of the 98% biomass energy for rural domestic sector, 93% was from wood fuel while 5% was from crop residues.[146] Eight years later, a similar study mounted in Bungoma district indicated that wood fuel supplied 54% of the energy required for cooking and heating annually while the rest 46% was from crop residues.[147] Although these were not national statistics, the inference is that the increase in the use of crop residues implies a reduction in the use of wood fuel. This is an indication of increasing scarcity of wood fuel which may either be physical or economic or both.[148] Thus, the supply of wood fuel is becoming less and less unable to absorb its energy demand. The deficit is filled up by crop residues, where applicable.

[145] Barnes, C., Ensminger, J. and O'Keefe, P. (1984) Wood, Energy and Households: Perspectives on Rural Kenya. The Beijer Institute and Scandinavia Institute of African studies, Stockholm, Sweden; KFMP (1994) Kenya Forestry Master Plan Development Programmes. Ministry of Environment and Natural Resources, Nairobi, Kenya; MoE (2002), (n 82).

[146] O'Keefe, P., Raskin, P. and Steve, B. (1984) Energy and Development in Kenya: Opportunities and Constraints. The Beijer Institute and the Scandinavian Institute of African Studies, Stockholm and Uppsala.

[147] Mugo, F.W. (1989) Woodfuel Supply and Demand in a Rural Set Up: the Case for Naitiri Sub-Location, Bungoma District. Masters of Arts in Planning Thesis. (University of Nairobi, Nairobi, Kenya).

[148] Foley, G. and Banard, G. (1984) Farm and Community Forestry. Technical Report No. 3. International Institute for Environment and Department. London; Dewees, P. (1995) Farmer Responses to Tree Scarcity: The case of Woodfuel. In: Arnold, J.E.M and P.A. Dewees (eds). Tree Management in Farmer Strategies: Responses to Agricultural Intensification. Oxford Forestry Institute. (University of Oxford. Oxford University Press. Oxford, New York, Tokyo, Melbourne).

The 2002 national report gives the following statistics which include projections for the future. An energy deficit arises when the total annual wood fuel consumption is higher than the total average annual increment.

Table 2: Projections of Biomass Consumption/Supply in Kenya

Years	2000	2005	2010	2015	2020
Population	28,686,607	32,694,444	36,810,671	40,941,673	44,981,767
Consumption (Tonnes/yr)	35,119,615	39,896,632	44,599,347	49,164,960	53,416,327
Sustainable Supply (Tonnes/yr)	15,024,510	15,488,936	16,634,550	17,984,406	19,559,738
Deficit (Tonnes/yr)	(20,095,105)	(24,407,696)	(27,964,797)	(31,180,555)	(33,856,589)
Deficit (%)	-57.2	-61.2	-62.7	-63.4	-63.4
Deficit (Tonnes/person)	-0.701	-0.747	-0.760	-0.762	-0.753

Source: MOE, 2002 Report (as for table 1).

A crucial observation from the above table is that the biomass deficit will increase to about 33.9 million tonnes in the year 2020 if no significant policy measures are taken. A number of scholars as well as reputable institutions in the energy field have identified this trend in the reduction in the supply of wood fuel *vis-à-vis* crop residues. They attribute this to a host of complex sociological, economic and ecological factors which actively mould and reshape the nature and magnitude of the energy crisis confronting mainly poor households. Reference has been made to inefficient end use utilization technologies; scarcity of labour force; transport difficulties; competing demands for wood products; land tenure systems; patterns of population settlements and movement; and limited participation of women in tree resource decision making and management.[149]

In addition, it has been stressed that there is a close link between energy, water and food. Wood fuel shortages are a symptom of widespread rural poverty and are linked to the more fundamental dimensions of survival, production and land management. Although the trend in the diminishing of wood fuel supply against its demand is a national concern, its magnitude varies by region, district, and village; and by household classes within a village. Moreover, there

[149] ibid 91; International Centre for Research in Agroforesty (1996) Annual Report. ICRAF. Nairobi, Kenya; Mugo, F.W. (1997) Factors Contributing Woodfuel Scarcity and the Consequent use of Crop Residues for Domestic Energy in Rural Kenya. A Thesis Presented to the Faculty of the Graduate School of Cornell University in Partial Fulfillment of the Requirements for the degree of Master of Science. Ithaca, NY. USA; Okoth-Ogendo, H.W.O. (1980). The Law in Relation to Land Practices in Kenya. In: Proceedings of Kenya National Seminar on Agro-Forestry, 1980. (ICRAF, Nairobi, Kenya).

exists diversity in the costs, levels of consumption and mix of other fuels employed for various end uses, technologies used in its production and consumption.[150]

Our discussion would not be complete if we ignored the fact that biomass as fuel in the rural areas is only but one aspect of the complex interrelated systems in which biomass is involved. Biomass is produced for food, animal feed, construction, and fuel. The non-fuel use aspects of biomass also contribute to the already observed trends in demand and supply. Thus, biomass energy demand and supply must, therefore, be considered within the wider context of other uses of biomass resources. And most often, the functional aspect of wood will ordinarily dictate the use to which the wood is put. Such use may not necessarily be fuel related. Where wood is put to use as timber, though, the fuel-use aspect only benefits from the left overs which may not necessarily be of good energy qualities.

Even as the trend of supply continues to diminish, wood fuel as an energy source has since pre-historic times suffered one peculiar problem: the wasteful consumption practices. While inefficient wood fuel production and consumption technologies and practices are still prevalent, on the other hand, the penetration and use of improved efficient kilns and stoves is also low and unsatisfactory.[151] These have a combined effect of aggravating the wood fuel deficit, resulting mainly from massive waste. Moreover, research and development necessary to stimulate improvement of efficiency of wood fuel production processes is not given the desirable priority in terms of budgetary and policy support. There is therefore need to embrace new technologies of wood fuel production as well as embracing higher end-use efficiency for cooking and heating. The continued unsustainable wood fuel production might render lose in environmental services offered by forests besides giving rise to severe soil erosion and land degradation. However, the deficit in national supply and demand balance can be reduced to surplus through wood fuel policy intervention strategies aimed at improving management and conversion efficiencies. The result is bound to be improved income for the rural population and biomass energy savings.

2.4 CONCLUSION

From a global perspective, right to the national level, the overwhelming contribution of wood fuel is undisputed. Statistics indicate very high consumption rates. However the issue of non-

[150] Leach, G. and Gowen, M. (1987) Household energy Handbook: an interim guide and reference manual. (World Bank, Washington DC).

[151] Mbuthi, P. (2008). Current Status of the Bio-Energy Sector in Kenya and Associated Stakeholder Analysis. PISCES Project, Practical Action.

conservation attitudes plays to greatly put the supply of wood fuel at a risk. This is aggravated by the fact that in Africa, and developing world in general, firewood – which forms the essential proportion of wood energy uses – is used largely in its round or split traditional form which is replete of any value addition to the firewood.

Thus, wood fuel in Africa and developing world has no chance of competing with more robust forms of energy such as petroleum and electricity. Lack of government interest in the wood fuel energy sub-sector is eminent. The effect is that demand/supply chain is riddled with shortcomings associated with a poor man's handling of the trade prospects of wood fuel, leading to low income and uncertain contribution to the GDP.

The situation may, however, be reversed if the various quality firewood species peculiar to various communities in Kenya are protected as TK through GIs. This would lead to embracing modern technology in wood fuel production, processing, marketing and supply to enable firewood occupy its rightful position in resonance with the global and national statistics on its consumption in relation to other forms of primary energy sources.

CHAPTER THREE

LEGAL ASPECTS OF FIREWOOD ENERGY SUB-SECTOR

VIS-À-VIS COMMUNITY IP RIGHTS

INTRODUCTION

This Chapter brings to sharp focus the legal status of firewood energy sub-sector in Kenyan; and uses this as a spring board in proposing meaningful development through recognition, development, enhancement, protection and enforcement of IP rights of the local communities in the identification of high energy quality traditional firewood. The recognition, development protection and enforcement of the IPR of *Seme* clan in the identification of *Seme Midat* lingers in the hindsight. The Chapter further highlights the various challenges encountered at every stage in dealing with community IP rights. It gives an insight into the local solutions to the national

energy crisis, especially in the domestic sector, by proposing a shift in attention from importation of petroleum products to development of traditional firewood energy sub-sector.

3.0 LEGAL ASPECS OF FIREWOOD ENERGY SUB-SECTOR IN KENYA

3.0.1 INTRODUCTION

The role played by firewood energy subsector in Kenya is enormous. Government statistics[152] show that firewood contributes 68% of the total energy consumption annually. Of this, firewood contributes 80.6% and charcoal, 19.4%. In spite of firewood's enormous contribution to the national energy supply matrix, the firewood energy sub-sector is not regulated by the Energy Regulatory Commission (ERC), established under section 4 of the Energy Act 2006. This has led to its haphazard marketing and uncertain contribution to the GDP. The loss in national revenue is an obvious consequence.

3.0.2 THE LEGAL AND REGULATORY FRAMEWORK

Although Article 69(1)(b) of the Constitution mandates the State to "work to achieve and maintain a tree cover of at least 10% of the land area of Kenya," no legislation has been enacted pursuant to this Article to specifically address firewood energy sub-sector. This is in spite of the inadequacy of current policies, legislations and regulations governing the energy sector. The legal frame work governing energy sector in Kenya, the Energy Act 2006, is not explicit on the firewood energy sub-sector.

The Energy Act 2006 in letter promotes the development and use of renewable energy technologies in firewood;[153] and energy efficiency and conservation programmes.[154] Further, the Ministry of Energy and Petroleum is meant to, *inter alia,* provide an enabling framework for the efficient and sustainable production, distribution and marketing of biomass. This is in line with the Energy Policy 2004 which provides for sufficient supply of biomass to meet demand; and advocates for formulation of a national strategy for coordinating biomass energy research, among other things. In practice, however, the Ministry's concentration has been on energy saving stoves and not the type of firewood to be used in those stoves. Worse still, development

[152] ibid 82.
[153] Energy Act 2006, Laws of Kenya, section 103.
[154] ibid, section 104.

of the energy saving stoves does not take into account the architectural designs of the various dwelling places spread throughout the country in which the stoves are supposed to be used.

Although the Ministry of Energy and Petroleum has kept the data of Energy Centres which coordinate biomass energy countywide,[155] the centres are established, maintained and managed by the Ministry of Environment and Natural Resources (MENR). These centres, however, lack the capacity to monitor firewood production.

Section 4 of the Energy Act 2006 creates a powerful Energy Commission with wide powers to, *inter alia,* make proposals to the Cabinet Secretary, of regulations which may be necessary or expedient for the regulation of the energy sector or for carrying out the objects and purposes of the Act.[156] The Commission's objectives include regulation of production, distribution, supply and use of renewable and other forms of energy.[157] Pursuant to section 110 of the Act, the Cabinet Secretary for Energy and Petroleum has published two regulations relating to energy while two others are still in draft form. The published regulations are the Energy Management Regulations 2012 (Legal Notice No. 102)[158] and the Solar Photovoltaic Systems Regulations 2012 (Legal Notice No. 103). Those still in the draft form are *Improved Cookstove Regulations* and *Biogas Regulations*. None of these regulations, both gazetted and in draft form, does address or is intended to address the firewood energy sub-sector so as to fill up for the statutory inadequacy.

The Environment Management and Conservation Act (EMCA) provides for formulation of operational guidelines for the planning and management of the environment and natural resources in the National Environment Action Plan;[159] promotes the use of renewable energy sources by creating an incentive scheme to encourage tree planters.[160] The Act is not specific as to firewood nor is it concerned with the type of trees to promote in its bid to conserve the environment. The enabling policy, the Environmental Policy 2010 although decries low

[155] Energy Centres (2012). <www.energy.go.ke> accessed 27th February, 2014: There are a total of 12 energy centres countrywide. These are: Jamhuri (Nairobi), Kericho, Bukura, Lodwar, Kisii, Kitui, Uasin Gishu, Mitunguu, Nyeri, Migori, Mtwapa and Busia.
[156] Energy Act 2006, Laws of Kenya, section 6(b).
[157] ibid, section 5(a) (iii).
[158] Regulation 1 provides that the Regulations apply to owners or occupiers of industrial, commercial and institutional facilities using any form of energy.
[159] EMCA 1999, Laws of Kenya, s 38.
[160] ibid, s 36.

incentives for biomass energy supply and conservation that lead to unsustainable utilization of woodfuel and the use of inefficient end-use technologies, it is silent on firewood policy within itself.

Although the Forest Act 2005 comes close to providing for firewood bestowing on Community Forest Associations (CFAs) the forest user rights to harvest fuel wood,[161] its emphasis on wood fuel is outright on charcoal and not firewood. Pursuant to section 47 of the Forest Act 2005, the Minister for Energy has published the Forest (Charcoal) Rules, 2009 to guide charcoal production, processing and marketing. This has left the firewood energy sub-sector in limbo. The Forest Policy 2010 on its part generally provides for poverty reduction, employment creation and improvement of the livelihoods through sustainable use, conservation and management of forests. It focuses on sustainable production and efficient utilization of woodfuel; and the promotion of efficient wood energy technologies. Explicitly though, it does not narrow down to firewood energy sub-sector.

3.0.3 CONCLUSION

The legal status of firewood energy sub-sector is uncertain. As a result, the sub-sector runs largely informally. This trend needs to be reversed by introducing purposeful legislative amendments to directly address the sub-sector. Firewood regulations pursuant to section 110 of the Energy Act 2006 should be formulated and effected. Similarly, the current Energy Policy 2004 should be reviewed with a view to providing focus on the firewood energy sub-sector. These strategies will enable firewood energy sub-sector to contribute significantly to the country's GDP.

3.1 COMMUNITY IP RIGHTS

3.1.1 INTRODUCTION

Over centuries, community IP rights have been expressed through traditional knowledge (TK), geographic indication (GI), and appellation of origin (AO). In recent times, these community rights have also been accorded recognition in the mainstream IP laws of trade mark, patent, and

[161] Forest Act 2005, Laws of Kenya, s 47.

copyright as may be applicable. It is therefore common to find a combination of IP laws addressing a given community IP right.

3.1.2 TRADITIONAL KNOWLEDGE (TK)

The identification of high energy qualities in *Midat* tree by *Seme* community is an expression of TK of the community. Traditional knowledge is not so-called because of its antiquity. It is a living body of knowledge, know-how, skills and practices that are developed, imbedded, sustained and passed on from generation to generation within a community, often forming part of its cultural or spiritual identity. The living nature also means that TK is not easy to define. However, in a general sense it embraces the content of knowledge itself as well as traditional cultural expressions, including distinctive signs and symbols associated with it. In the narrow sense, it refers to knowledge as such, in particular the knowledge resulting from intellectual activity in a traditional context, and includes know-how, practices, skills, and innovations.

TK can be found in a wide variety of contexts, including: agricultural, scientific, technical, ecological and medicinal knowledge as well as biodiversity-related knowledge. It is crucial for the subsistence and survival of a community and is generally based on accumulations, with extended history, of empirical observation and interaction with the environment. TK not only typically distinguishes one community from another, but can also reflect a community's interests. Identification of high energy qualities in *Midat* as a species of traditional tree by *Seme* community falls within the confines of biodiversity related TK. This particular type of TK may benefit from the protection of IP laws of GI and trade mark.

3.1.3 GEOGRAPHIC INDICATION (GI)

GI is one of the most ancient forms of IP. Famous ancient brands, such as wine from Greek island of Chios, are products associated with specific GIs and go back as early as the 5th century BC. GI may be defined as a distinctive sign used on products that have a specific geographical origin and possess qualities or a reputation that are due to that origin.[162] Specifically, TRIPS Agreement has defined GI as:

> "… indications which identify a good as originating in the territory of a Member, or a region or locality in that territory, where a given quality, reputation or other characteristic of the good is essentially attributable to its geographical origin."[163]

[162] The Design and Geographical Indication Law Section of the World Intellectual Property Organization (WIPO).
[163] TRIPS Agreement, Article 22 (1).

Despite these recent definitions, GIs have traditionally been considered to be IP. The Paris Convention for the Protection of Industrial Property (1883)[164] refers to *'indications of source'* and *'appellations of origin'* as objects of industrial property; and further specifies that the term *'industrial property'* is not limited to *'industry and commerce'* proper, but applies also to agricultural and extractive industries and to all manufactured or natural products, such as *'wines, grain, tobacco leaf, fruit, cattle, minerals, mineral waters, beer, flowers and flour.'*[165] In the context of this study, it is proper to include high energy quality traditional firewood to this list. To this end, *Seme Midat* would pass as an industrial property.

Ordinarily, a GI consists of the name of the place of origin of the good, such as *'Seme Midat.'* However, non-geographical names, such as *'Feta'*, which is not a place in Greece but is so closely connected to Greece as to identify a typical Greek wine; or symbols commonly associated with a place can also constitute a GI. If well managed, GIs are intangible assets with high potential for product differentiation, the creation of added value, as well as spin-off effects in areas related to the primary product for which the GI is known.[166] The qualities or reputation of the *Seme Midat* as a high energy quality traditional firewood is essentially due to *Seme* as the place of origin. The geographical factors peculiar to *Seme*, such as climate and the soil determine these qualities. The identification of *Seme Midat* as a high energy quality traditional firewood is due to the human factors imbedded in the traditions of *Seme* community.

3.1.4 AN APPELLATION OF ORIGIN (AO)

An appellation of origin is a special kind of GI. The term is used in the Paris Convention[167] and defined in the Lisbon Agreement[168] as:

> "….the geographical denomination of a country, region, or locality, which serves to designate a product originating therein, the quality or characteristics of which are due

[164] WIPO (2013): 'Treaties,' 'Intellectual Property Protection Treaties,' and 'Paris Convention.' <http://www.wipo.org> accessed 2nd March, 2014: The Paris Convention is complemented by the Madrid Protocol of 1891. It was revised at Brussels (1900), Washington (1911), The Hague (1925), London (1934), Lisbon (1958), and Stockholm (1967), and amended in 1979. As of 1 October 2006 the Paris Convention had 169 signatory states.
[165] Paris Convention, Article 1(2) and (3).
[166] Because of the geographical connotation, a GI is a matter of national law and consumer perception.
[167] Convention for the Protection of industrial Property (1883): Revised at Brussels on 14th December, 1900, at Washington on 2nd June, 1911, at the Hague on 6th November, 1925, at London on 2nd June 1934, at Lisbon on 31st October, 1958, and at Stockholm on 14th July, 1967 and as amended on 28th September, 1979.
[168] Agreement for the Protection of Appellations of Origin (1958).

exclusively or essentially to the geographical environment, including natural and human factors." [169]

Although this definition suggests that AOs consist of the name of the product's place of origin, traditional indications that are not place names but refer to a product in connection with a place are protected as AO under the Lisbon Agreement.[170] An AO differs from a GI to the extent that it has a stronger link with the place of origin. The quality or characteristics of a product it protects must result exclusively or essentially from its geographical origin. This generally means that the raw materials should be sourced in the place of origin and that the processing of the product should also happen there. In the case of GIs, a single criterion attributable to geographical origin is sufficient, be it a quality or other characteristic of the product, or only its reputation. The term AO is often used in laws that establish a specific right and system of protection for GIs, in the *sui generis* systems of protection.

In the context of this study, the intellectual property in the identification of` high energy qualities in *Midat* tree by *Seme* community may best be protected as a GI and not an AO for the simple reason that industrial processing of the firewood so as to enhance value addition is not peculiar to the customs and traditions of *Seme* community but may only be imported from jurisdictions that have succeeded in it such as South Africa, China and Britain.

3.1.5 TRADE MARKS

This refers to the dealing in a trade associated with the trade mark. Dealing with marks is closely associated with the exploitation of the trade mark through own use, voluntary licensing, assignment, transmission or Government use. Own use includes, but not limited to, attaching the mark to goods or services, using the mark in advertisements, and also preventing any unauthorized third party from using the mark. Whether registered or not, a trade mark can be assigned or transmitted with or without goodwill of the business concerned and in respect of either all the goods or all the services in respect of which it is registered or of only some of those goods or services.[171] *Seme* community may use *Seme Midat* trade mark by themselves; or they

[169] Lisbon Agreement for the Protection of Appellations of Origin and their International Registration, Article 2(1).
[170] Comté Cheese. <www.comte.com> (2010) accessed on 22nd March 2014: The Gold of The Jura Mountains in the North of the Alps in Eastern France, where winters are harsh and long, but their varied flora and large prairies are perfect for obtaining high-quality cow's milk exclusively from the Montbéliarde and French Simmental breeds. In 1958, Comté was recognized as an appellation of origin by a French court
[171] Trade Marks Act 2001, Laws of Kenya, section 25.

may license other persons to use it for associated firewood; or they may as well assign it to the future generations.

3.2 RECOGNITION, EXPLOITATION AND ENFORCEMENT OF COMMUNITY IP RIGHTS

3.2.1 RECOGNITION OF COMMUNITY IP RIGHTS

3.2.1.1 International Level

At the international scene, the recognition of community IP rights is espoused in international treaties. Of resent, the collective human rights of indigenous and local communities have been increasingly recognized. The International Labour Organization (ILO) 169 (1992); the Declaration of the Rights of Indigenous Peoples (2007); and the Rio Declaration (1992) recognize indigenous and local communities as distinct groups with special concerns that should be addressed by States. The Convention on Biological Diversity (CBD) (1992) recognizes the value of TK in protecting species, ecosystems and landscapes, and incorporated language regulating access to it and its use. In order to harmonize World Trade Organization (WTO) Agreement on Trade-Related Aspects of Intellectual Property (TRIPS) with agreements made under CBD, World Intellectual Property Organization (WIPO) established the Inter-Governmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (IGC-GRTKF) in 1999.

Earlier, due to rapid rise in global civil society, the Brundtland Report (1987) had recommended a change in development policy that allowed for direct community participation and respect for local rights and aspirations. This followed a successful petition to the United Nations (UN) to establish a Working Group on Indigenous Populations (WG-IP). WG-IP made two early surveys on treaty rights and land rights. These led to a greater public and governmental recognition of indigenous land and resource rights, and the need to address the issue of collective human rights, as distinct from the individual rights of existing human rights law.

In perspective, some of the leading international treaties which have recognized TK are highlighted hereunder:

3.2.1.1.1 The Paris Convention for the Protection of Industrial Property (1883)[172]

The Paris Convention was the first international multilateral treaty to include provisions relating to indications of GI. As already stated herein above, it recognizes *'indications of source'* and *'appellations of origin'* as subject matter for industrial property. Although the Convention does not directly define either of these terms, it contains language that allows one to infer the following definition of an indication of source:

> 'an indication referring to a country, or to a place situated therein as being the country or place of origin of a product.'[173]

3.2.1.1.2 The Madrid Agreement for the Repression of False or Deceptive Indications of Source on Goods (1891) [174]

The Madrid Agreement recognizes GI through its protection against false indications of source under the Paris Convention[175] to deceptive indications of source as well.[176] Deceptive indications are those which, although literally true, may be misleading. The Agreement recognizes the deception which may arise due to homonymous place names in two different countries if only one of the places is known for the production of a particular good. If the name were used on goods from the similarly named place, the indication of source would be considered deceptive as the public would likely be led to believe that the good came from a different place.

3.2.1.1.3 The Lisbon Agreement for the Appellations of Origin (1958)[177]

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[172] Revised at Brussels on 14th December, 1900, at Washington on 2nd June, 1911, at the Hague on 6th November, 1925, at London on 2nd June 1934, at Lisbon on 31st October, 1958, and at Stockholm on 14th July, 1967 and as amended on 28th September, 1979.

[173] ibid 116.

[174] WIPO (2013): 'Treaties,' 'Intellectual Property Protection Treaties,' and 'Madrid Agreement.' <http://www.wipo.org> accessed 2nd March, 2014: The Madrid Agreement was revised at Washington (1911), The Hague (1925), London (1934), and Lisbon (1958). It was supplemented by the Additional Act of Stockholm (1967), and had a membership of 34 signatory states as of 1 September 2006. In the last 20 years (1982-2002) only five new states became party to the treaty: Czech Republic (1993), Republic of Moldova (2001), Slovakia (1993), Yugoslavia (2000) and Iran (2004).

[175] ibid 95.

[176] Madrid Agreement, Article 1(1).

[177] <http://www.wipo.int/lisbon/en/members/pdf/contacts.pdf> (2013) accessed 2nd March, 2014.There are 25 signatories of the Lisbon Agreement, [Algeria, Bulgaria, Burkina Faso, Congo, Costa Rica, Cuba, France, Gabon, Georgia, Haiti, Hungary, Iran, Israel, Italy, Mexico, Nicaragua, Peru, Portugal, Moldova, Serbia and Montenegro, Slovakia, Czech Republic, Togo, Democratic People's Republic of Korea (North), Tunisia]. For the 6 EU Member States, namely France, Portugal, Hungary, Slovakia and Czech Republic it means that their appellations of origin registered in the International Register of WIPO are protected in all the countries that are parties to the Lisbon Agreement.

The Agreement recognizes AOs by providing its proper definition as:

> "….the geographical denomination of a country, region, or locality, which serves to designate a product originating therein, the quality or characteristics of which are due exclusively or essentially to the geographical environment, including natural and human factors."[178]

This recognition of AOs forms the basis of dealings with AOs under the Agreement.

3.2.1.1.4 The Madrid System of International Registration of Marks.[179]

The Madrid system recognizes GI by providing for their registration as collective, certification or protected marks. The system, however, only recognizes GIs that have been recognized by Member States via a certification trade mark regime and which do not have *sui generis* rules on the protection of GI.

3.2.1.1.5 The TRIPS Agreement (1994)[180]

TRIPS was the first multilateral treaty dealing with GIs. It dedicates the entire Part II section 3[181] to GIs. It expands the recognition of the concept of AO contained in Article 2 of the Lisbon Agreement to goods which merely derive a reputation from their place of origin without possessing a given quality or other characteristics which are due to that place.[182]

3.2.1.1.6 The Convention on Biodiversity (CBD), 19994

CBD's main objectives are conservation of biodiversity; sustainable use of genetic resources; and fair and equitable sharing of benefits arising from the genetic resources. **Article 8(j)** of CBD mandates each contracting Party to:

> 'as far as possible and as appropriate; subject to national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of

[178] ibid 109.
[179] <http://www.wipo.int/lisbon/en/members/pdf/contacts.pdf> (2013) accessed 2nd March, 2014.The Madrid system comprises two treaties: the Madrid Agreement Concerning the International Registration of Marks, 14th April, 1891, (as revised at Brussels on December 14, 1900, at Washington on June 2, 1911, at The Hague on November 6, 1925, at London on June 2, 1934, at Nice on June 15, 1957, and at Stockholm on July 14, 1967); and the Protocol Relating to the Madrid Agreement of 1989, which entered into force on 1 December 1995 and became operative on 1 April 1996. As of 1 September 2006 there are 56 countries Parties to the Agreement and 68 to the Protocol.
[180] The Marrakesh Agreement Establishing the World Trade Organization, signed in Marrakesh, Morocco on 15th April, 1994.
[181] TRIPS Agreement, Articles 22-24.
[182] TRIPS Agreement, Article 22.

biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge innovations and practices.'

The position taken by the CBD was reaffirmed on 12 October, 2013 at the 8th Meeting of the Ad Hoc Open-ended Working Group on **Article 8(j)** and Related Provisions, held in Montreal, Canada. The meeting expanded the need to recognize and integrate TK systems of indigenous and local communities into the future work of the CBD, including Nagoya Protocol on Access to Genetic Resources and the Fair Sharing of Benefits Arising from their Utilization.[183] The CBD embraces the precautionary approach as affirmed in Principle 15 of the Rio Declaration.[184]

3.2.1.2 Regional Level

3.2.1.2.1 The African Intellectual Property Organisation (OAPI) Agreement[185]

Although OAPI Agreement does not specifically mention GI or AO or TK, it remains relevant to their recognition in a number of ways. First, it embodies the national laws of the Member States and therefore applies directly in each of them. Second, all the Member States of the OAPI are party to both the Paris Convention and TRIPs Agreement. Through Paris Convention and TRIPS, they recognize GIs, AO and TK. Third, some Member States of OAPI such as Burkina Faso, Congo, Gabon and Togo are also Parties to the Lisbon Agreement which recognizes AOs.

In addition, it has become common to incorporate provisions for the recognition of GIs in free trade agreements such as the North America Free Trade Agreement between United States, Canada and Mexico (1992); and between European Union and South Africa (2001).

3.2.1.2.2 The Banjul Protocol on Marks (1997)[186] *and the African Regional Intellectual Property (ARIPO) (1976)*[187]

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[183] <http://www.cbd.int/doc/press2013/pr-2013-10-12-8j-en.pdf> (2013) accessed 1st March, 2014.

[184] Principle 15 of the Rio Declaration: 'In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.'

[185] <http://www.oapi.wipo.net/> (2009) accessed 2nd March, 2014.OAPI Agreement was signed in Bangui on 2 March 1977, revised in 1999 and entered into force in February 2002. Members States of OAPI, which are French speakers, are: Benin, Burkina Faso, Cameroon, the Central Africa, Chad, Congo, Co'te d'Ivoire, Gabon, Guinea, Guinea Bissau, Equatorial Guinea, Mali, Mauritania, Niger, Senegal and Togo.

ARIPO was established by the Lusaka Agreement, adopted in Lusaka, Zambia in December 1976 for the purpose of consolidating the resources of its member countries in industrial property matters in order to avoid duplication of work. The Banjul Protocol on Marks was adopted by the Administrative Council in 1993 and establishes a trademark filing system. Thus, under ARIPO and Banjul Protocol, GIs are recognized among Member States.

3.2.1.2.3 The African Model Legislation for the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resources(2000)[188]

The main aim of this Model Law is be to ensure the conservation, evaluation and sustainable use of biological resources, including agricultural genetic resources, and knowledge and technologies in order to maintain and improve their diversity as a means of sustaining all life support systems. Part IV of the Model Law is dedicated to community rights. Specifically, this Part deals with: the recognition of the rights of the local and indigenous communities;[189] application of the law on community rights;[190] and the recognition of community intellectual rights,[191] among others.

3.2.1.3 National Level

At the local scene, the Constitution is a mile stone in the recognition of community rights. These rights include IP rights. Whereas Article 40(1) of the Constitution provides for the right of every person, either individually or in association with others, to acquire and own property of *any description* in any part of Kenya, where this property is IP, sub-Article 5 provides that the State shall support, promote and protect the IP rights. The IP rights associated with the identification of high energy quality traditional firewood among a community are essentially cultural based rights. As a result of its unique culture, a people may identify a given tree species for its superior energy qualities. Such a cultural orientation is a constitutional right of the people. Article 44 of

[186] <http://www.aripo.org> (2012) accessed 2nd March, 2014: States currently party to the Banjul Protocol are: Botswana, Lesotho, Malawi, Namibia, Swaziland, Tanzania, Uganda and Zimbabwe.
[187] <http://www.aripo.org> (2012) accessed 2nd March, 2014: For English speaking States: Member States are 16: Botswana, Gambia, Ghana, Kenya, Lesotho, Malawi, Mozambique, Namibia, Sierra Leone, Somalia, Sudan, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe.
[188] Organization of African Union (OAU) Model Law, Algiers, Algeria.
[189] ibid, Article 16.
[190] ibid, Article 17.
[191] ibid, Article 23.

the Constitution protects this right by expressly providing for participation in and enjoyment of the cultural life of one's people.

The Constitution, at Article 69(1) mandates the State to protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities; and to ensure sustainable exploitation, utilisation, management and conservation of the environment and natural resources which form the bed rock of such IPs. The IP rights under discussion here are tree based. These find further recognition by the Constitution in so far as Article 69 mandates the State to work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya.

In addition, via Article 2(6) of the Constitution all international treaties ratified or acceded to by Kenya form part of the national laws. Kenya is a signatory to the following international treaties which recognize community IP rights: the Paris Convention for the Protection of Intellectual Property [acceded to on 14th May, 1965 and came to effect on 14th June, 1965];[192] the Madrid Registration System (the Madrid Agreement Concerning the International Registration of Marks [signed and became effective on 14th June, 1965];[193] and the Madrid Protocol Concerning the Madrid Agreement [acceded and effective on 26th June, 1998];[194] the TRIPS Agreement [acceded and effective on 1st January, 1995]; [195] the United Nations Convention on Bio-Diversity [acceded and effective on 11th June, 1992];[196] and the Africa Regional Intellectual Property Organization [1976].[197]

Section 2 of the Trade Marks Act, Cap 506 (K) provides a wide definition of the term "mark" to include:

> "a distinguishing guise, slogan, device, brand, heading, label, ticket, name, signature, word, letter or numeral or any combination thereof whether rendered in two-dimensional or three-dimensional form."

This definition is wide enough to recognize GIs which consists mainly of *brands* or *names* or a combination of both.

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[192] <http://www.wipo/treaties/en/ShowResults/jsp?lang=en&Treaty_id=2> (2011) accessed 9th March, 2014.
[193] <http://www.wipo.int/export/sites/www/treaties/en/documents/pdf/madrid_marks.pdf> (2010) accessed 9th March, 2014.
[194] <http://www.wipo.int/treaties/en/ShowResults/jsp?lang=treaty_id=8> (2008) accessed 9th February, 2014.
[195] <http://www.wipo.int/wipolex/en/other_traeties/parties.jsp?treaty_id=231&group_id=22> (2008) accessed 9th March, 2014.
[196] <http://www.cbd.int/information/parties.shtml> (2009) accessed 9th March, 2014.
[197] <http://aripo.org> (2010) accessed 9th March, 2014.

3.2.2 DEVELOPMENT OF COMMUNITY RIGHTS USING IP LAWS

3.2.2.1 Rationale

Community IP rights, such as the identification of high energy quality traditional firewood may be exploited through IP laws. The relevant IP laws are TK, GI and trademark. This requires that a TK is first established; and a GI be developed before it can be protected through trademark. The interest in the development of GIs has escalated in the recent past partly due to the obligation under the TRIPS Agreement requiring Members of the WTO to protect GIs; and also because GIs are seen as useful tools in marketing strategies and public policies.[198] From mere source indicators to brands, GIs act as differentiation tools in marketing strategies. Consumers pay increasing attention to the geographical origin of products, and care more about specific characteristics present in the products they buy. The inherent belief is that the place of origin assures consumers that the product will have a particular quality or characteristic that they may value. As a result, consumers are prepared to pay more for such products. This has favored the development of specific markets for products with certain characteristics linked to their place of origin.

Since most GIs are associated with rural communities, the brands developed attach to the specific communities. The character and strength of the quality and geographical link varies according to the natural and cultural history of the resources and their transformation processes and the legal framework in which the GIs develop. Under appropriate conditions, GIs can contribute to development of rural areas in economic, social and environmental fronts. In the economic front, GIs promote economic diversity; and strengthen local product system by ensuring availability of quality products. Apart from enhancing identities and developing territories, they are a powerful tool in the hands of local producers to differentiate their offer through quality and make economies of scale in the management of their businesses. Through innovation and entrepreneurship GIs help producers to obtain premium brand prices, improve

[198] WIPO: Geographical Indications: An Introduction [WIPO Publication No. 952(E) ISBN 978-92-805-2280-8] pp14-17. <www.wipo.int> (2009) accessed 3rd May 2014; Malobika Banerji (2012), "Geographical Indications: Which Way Should Asean Go?" (Boston College Intellectual Property & Technology Forum) pp 3-4. <http://www.bciptf.org> (2009) accessed 3rd May 2014.

redistribution of the added value, bring added value to the region of origin and attract and develop eco and cultural tourism.[199]

The social benefits of GIs include fairness, transparency, increased production, creation of local attachment and employment which ultimately may help in preventing rural-urban exodus, preservation of TK, natural resources and social cohesion.[200] On the environmental front, GIs help in preservation of landscapes and biodiversity; combating desertification and maintaining environmental standards. The environmental quality resulting from establishment of GI protection is usually due to the fact that products protected under a GI are environmentally friendly.[201] This is because such products are: associated with predominance of low intensity production methods; and are locally referenced. As such, traditional locally developed varieties have a potential to mobilize local communities in the exploitation of rare or endangered species of flora and fauna.[202] However, the mere fact of developing a GI for a product does not guarantee automatic success or development for the region. For GIs to contribute to development, several conditions must be present in the region and in the way in which the specific GI scheme is designed.

3.2.2.2 GIs as Means to Preserve TK[203]

Products identified by a GI are often the result of traditional processes and knowledge carried forward by a community in a particular region from generation to generation. GIs are compatible with the nature of TK in that they provide protection that is potentially unlimited in time, as long as the qualitative link between the products and the place is maintained and the indication has not fallen into genericity. They work as a collective right. While GIs do not directly protect the subject matter generally associated with TK, they can indirectly contribute to their protection in several ways. First, GI protection recognizes the cultural significance of TKs and can help preserve them for future generations. For example, in designing a GI scheme for a product, the

[199] FAO Regional Expert Meeting: GIs, *in situ* Conservation and Rural Development: Considerations and Recommendations (20-21 October 2009, Budapest) p 3.
[200] ibid p 4.
[201] ibid p 5.
[202] ibid 139.
[203] These may also be Traditional Cultural Expressions (TCEs) being traditional artistic heritage developed in a given region which include tangible products such as handicrafts made using natural resources and having qualities derived from their geographical origin; as well as indigenous and traditional names, signs and symbols.

production standards (also known as the code of practice or regulations of use) may include a description of a traditional process or TK.[204]

Second, through the added value of a GI scheme, producers are less tempted to replace traditional processes by possibly less costly ones. In India, for example, cheap powerloom-produced sari[205] is sold as highly-reputed "Banarsi" handloom sari within and outside the Varanasi region (where authentic Banarsi saris are produced). Powerloom imitations cost only one-tenth of the price of real handloom Banarsi saris, thereby creating tough competition for local craftsmen. However, the handloom saris are still sought after due to the added value of the existing GI scheme. This has sustained the TK (the skills and knowledge) involved in the traditional handloom technique.[206]

Third, GIs can provide protection for TK against misleading and deceptive trading practices; benefit indigenous communities by facilitating the commercial exploitation of TK; and encourage TK-based economic development. GIs provide indigenous communities with a means to differentiate their products and benefit from their commercialization, thereby improving their economic position.

3.2.2.3 Developing a GI [207]

Recognition of a GI, whether through registration, a court or administrative decision or other means, is not enough, *per se*, to realize the potential benefits realized in a GI. Although protecting a GI is important, it is not the only condition for its success. In order for a GI to effectively create brand equity for a product, or to have a positive effect on rural development or the preservation of TK or biodiversity, it is necessary to develop a comprehensive GI scheme. A GI scheme is the set of rules and mechanisms underlying the functioning of a GI. Developing a GI scheme involves a number of important steps discussed hereunder.[208]

3.2.2.3.1 Identification of the Product's Characteristics

The product's characteristics must first be isolated and assessed to determine their peculiarities *vis-à-vis* same characteristics of similar products from other geographical origins. The assessment helps to determine whether the product has potential in internal or external markets due to its superior characteristics.

[204] ibid 138, WIPO pp 16-19.
[205] A Hindu woman's chief traditional garment consisting of cotton or silk elaborately draped around the body.
[206] ibid 138, WIPO p 19.
[207] ibid 138, WIPO pp 21-22.
[208] ibid 138, WIPO p 21.

3.2.2.3.2 Strengthening the Cohesion of the Group of Producers

Once the product's characteristics have been identified and the product's potential in internal and external market is established, it is important to strengthen the cohesion among the members of the group of producers. This cohesion is important for synergy in the production of the brand which in turn ensures coordinated production to sustain the brand. Other operators involved in the production should also be strengthened since they are also pillars of the GI scheme.

3.2.2.3.3 Setting a Code of Practice

A code of practice, also known as regulations of use, forms the standards upon which the GI system operates. It usually, among other things, circumscribes the product's geographical region of production, and describes the production and processing methods. It may also describe the factors, natural and human, that are present in the region and which contribute to the characteristics of the product.

3.2.2.3.4 Devising a Mechanism to Effectively Attribute the Right to Use

A mechanism to effectively attribute the right to use the indication to any producer and other operators concerned must be devised if the GI is to be protected. The right to use a GI can only the attributed to producers and other operators who are within the established boundaries and according to agreed standards. The GI should be registered in accordance with the relevant national IP laws in operation.

3.2.2.3.5 Establishing Traceability, Verification and Control Schemes

Traceability, verification and control schemes are necessary in ensuring continued quality and compliance with the code of practice. Any product claiming the GI should easily be traceable and verified to be genuine. This ensures quality and fends off unfair competition. Legal action should be taken against infringers of the GI.

3.2.2.3.6 Devising Marketing Strategies

The main reason of establishing a GI is to promote trade in the product. The product should therefore be marketed to fully exploit its economic viability. A well marketed product will attract many consumers whose contributions will motivate the producers and other operators in the GI.

3.2.2.3.7 Obtaining Legal Protection and Enforcement Strategy

The GI should be protected using the relevant national IP laws. IP laws may provide for exclusive rights of the groups conferred with the rights as well as provide enforcement regimes in case of infringement. Such legal protection serves the life of the GI.

3.2.2.3.8 Costs and Duration of Developing a Complete GI Scheme

From the above steps in the development of a GI scheme, it is evident that there are associated costs. It would be difficult to quantify the costs involved in each of the steps mentioned above. Moreover, those steps are not single, isolated acts. Protecting a GI does not only involve obtaining a right through registration or other appropriate means, but also enforcing that right. Verification and control must take place regularly throughout the lifetime of a GI, not just once. Promoting the GI is a continuing process. In short, a GI scheme must be managed throughout its existence.

A complete GI scheme may take several years to establish, as it involves several actors and requires taking into account different interests and policy considerations. The actual time taken to develop a complete GI scheme may depend on some of the following factors, among others: the existence of institutional support; the level of cohesion and organization of the group of producers and other operators concerned; the number and degree of conflicting interests and the way in which such interests are managed; and the number and level of obstacles to legal protection of the GI domestically or in foreign markets.[209]

3.2.3 PROTECTION AND ENFORCEMENT OF COMMUNITY IP RIGHTS

3.2.3.1 Use of Trade Mark

A community IP right protected under a registered trade mark continues in perpetuity subject only to the conditions that it is used, renewed periodically and the registered proprietor takes prompt action against infringers. Similarly, a community IP right identified as an unregistered trade mark can be kept *'alive'* and protected for as long as it continues to be used provided the owner of the mark takes appropriate action against infringers by passing off action or by criminal proceedings. [210] The trade mark developed in connection to a GI may be assigned, transmitted or

[209] ibid 138, WIPO p 22.

[210] This is also referred to as the common law trade mark by P. Narayanan: *Intellectual Property Law, Third Edition, at page 145,* Eastern Law House.

licensed to persons who industrially produce a product provided they strictly use the raw materials from the given geographic origin. In Kenya assignments and licenses must be registered with the Registrar in accordance with Section 28(1) of the Trade Mark Act.[211] However, such an assignment or licensing cannot be extended to manufacturers outside the geographic origin of the raw materials in the case of an AO.

The assignee or licensee of a trade mark must comply with the conditions or limitations to which such use as well as the registration of the mark is subject. His use of the mark must be such that first, it does not result in causing confusion or deception among the public. He must refrain from dealing in his entire business as if to depict to the world that even his own goods are connected to the trade mark; and are dealt in under the license and hence the trade mark. Second, it does not destroy the distinctiveness of the mark. The trade mark must continue, before the public eye, to distinguish the goods connected with the owner of the mark from those connected with others. Third, a connection in the course of trade consistent with the definition of the trade mark continues to exist between the goods or services and the owner of the trade mark. The licensee or assignee should not deal in the goods connected with the trade mark as to depict to the world that the goods are associated with him or that since acquiring the license or assignment, the goods have ceased to be connected with the owner of the trade mark.

The registered proprietor must continue, in whatever manner, to exercise proper control over the use of the trade mark. Based on the common law principle that any use of a trade mark by a person other than the proprietor will lead to deception of the public, for it will indicate that the goods or services originate from a particular source when in fact it does not, it is not permissible for the owner of a trade mark to allow others to use his trade mark in relation to goods not connected with him. Kenyan law concurs with the common law position, albeit with minor modification to permit licensing or assignment. The use of a trade mark by a licensee or assignee is deemed to be use by the proprietor thereof.[212]

3.2.3.2 Use of GI

3.2.3.2.1 Introduction

[211] Trade Marks Act, Chapter 506, Laws of Kenya.
[212] Trade Marks Act, 2001, Laws of Kenya, section 31(2).

A GI is more than just a name or a symbol. Its reputation is a collective, intangible asset strongly linked to a geographical area. This gives it an emotional component. Like trade mark, if not protected, it could be used without restriction and its value diminished and eventually lost. This would be detrimental to legitimate producers and consumers. Legitimate producers may not only suffer damage arising from loss of business thereby affecting the established reputation of their product, there may also arise circumstances where they are prevented from using the indication themselves, for instance if it is registered as an individual trademark by a company. Such use deceives consumers and leads them to believe they are buying a genuine product with specific qualities and characteristics, whereas they get an imitation.[213]

Protecting a GI enables those who have the right to use the indication to take measures against others who use it without permission (free riders) and benefit from its reputation free of charge. Protecting a GI is also a way to forestall registration of the indication as a trademark by a third party and to limit the risk of the indication becoming a generic term.

3.2.3.2.2 Deterring Free-Riding

The reputation of a GI is the result of efforts undertaken by producers in a given region to work according to the specifications for that GI. These specifications may at times be restrictive. Producers who do not adhere to them, or who are not located in the defined production region, may be tempted to use the GI to free-ride on its reputation. Whether such unauthorized use is made in connection with high or lower quality products is not the issue. The issue is that those who have the right to use a GI must prevent its unauthorized use to avoid losing business, and also to ensure the GI is used only in relation to products that possess the qualities or characteristics to which it owes its reputation.[214]

3.2.3.2.3 Forestalling Registration of a GI as a Trademark by a Third Party

If a GI is not protected, it may be registered as a trademark by a third party for goods identical or similar to those identified by the GI. At the international level, if a GI is not protected in one jurisdiction it may appear as a distinctive sign available for registration as a trade mark in that jurisdiction. Based on the *"principle of first to file,"* a third party would obtain the trademark

[213] ibid 138, WIPO p 23.
[214] ibid 138, WIPO pp 23-24.

which might give him the right to exclude its use by anyone else, including the producers who had historically and genuinely used it in their country of origin.

3.2.3.2.4 The Effects of Protecting a GI

Protection of a GI bestows on the proprietor a right over the sign that constitutes the indication. The right can be a *sui generis*[215] or specific and exclusive right designed for GIs or AOs and separate from a trademark right or any other IP right. It can also be a collective or a certification mark. A GI right enables those who have it to use the indication to prevent its use by a third party. For example, if *Seme Midat* becomes a protected GI in any jurisdiction, its producers can exclude use of the term *"Seme Midat"* for traditional firewood not grown in Seme, or not produced according to the standards set out in the code of practice for the *Seme Midat* GI. Protecting a GI and enforcing the right obtained over it also contribute to reducing the risk of genericisation of the term. However, a protected GI does not enable the holder to prevent someone from making a product using the same techniques as those set out in the GI standards.

3.2.3.3 The International Legal Framework

3.2.3.3.1 Introduction

The *"territoriality principle"* governs IP rights. Thus, rights obtained in a particular jurisdiction are limited to the territory of that jurisdiction. It is therefore necessary to protect a GI in markets in which it is commercialized abroad. To do this it may be required to first protect the GI in the country of origin.

There are four main routes for protecting a GI abroad: first, by obtaining protection directly in the jurisdiction concerned; second, through the Lisbon Agreement for the Protection of AO and their International Registration; third through the Madrid System for the International Registration of Marks (in which the GI concerned is protected in the country of origin as a

[215] <www.wipo.int> accessed 4th March, 2014: For instance, in Moldova, Parliament adopted Law No. 322-XV of 18.07.2003 on the Declaration of the Complex "*Combinatul de Vinuri 'Cricova'* S.A.", an Object of the National-Cultural Heritage of the Republic. This is a special regime for the use of the GI "*Cricova*" for wine. This law recognizes "*Cricova*" as part of the country's cultural heritage and as a landscape complex of national importance. "*Cricova*" is famous for its unique underground labyrinths. The greatest part of "*Cricova's*" wine production facilities is placed underground, at a depth of 60-80 meters, creating a huge underground wine city with avenues, streets and broadways. These labyrinths offer a truly unique, favorable microclimate that gives typicity to the wines. All year round, the naturally constant temperature there remains at +12° to +14°C, and the humidity at about 97% to 98%, the most propitious conditions for developing and aging exquisite, fine wines. This humid, cool environment contributes to the formation of the authentic character of "Cricova" wine products.

collective or certification mark); and fourth by concluding bilateral agreements between States or commercial partners.

3.2.3.3.2 The Paris Convention for the Protection of Industrial Property (1883)[216]

The Paris Convention requires its members to ensure effective protection against unfair competition. For example, the use of an indication of source on a good that can mislead the public as to the true geographical origin of the good is an act of unfair competition. The Convention stipulates that, in cases of use of false indications of source on goods, the goods in question are to be seized upon importation or, ultimately, to be subject to the actions and remedies available in the country of importation. It further sets forth the obligation of Member States to ensure appropriate legal remedies for repressing the use of false indications of source.[217]

3.2.3.3.3 The Madrid Agreement for the Repression of False or Deceptive Indications of Source on Goods (1891)[218]

Articles 1 and 3^{bis} of the Agreement are explicit on the protection and enforcement of GIs. Article 1(1) provides that for the seizure, upon importation into a Member State, of all goods bearing a false or deceptive indication. Further, Article 1(4) provides that for the operation of the national laws against all goods bearing a false or descriptive indication where those laws do not provide for seizure upon importation; nor prohibition of importation; nor seizure within the country. Article 3^{bis} mandates Member States to prohibit the use of all indications in the nature of publicity capable of deceiving the public as to the source of the goods. Such use may be in connection with sale, display, advertisement or any other such business maneuvers as may import commercial communication.

3.2.3.3.4 Lisbon Agreement (1958)[219]

The Lisbon Agreement offers a means of obtaining protection for an AO originating in one Member State in the territories of all other members through a single registration called "an international registration."[220] Only an AO that is recognized and protected in its country of origin may be the subject of an application for international registration. Applications for international

[216] ibid 116.
[217] Paris Convention, Articles 10, 10^{bis} and 10^{ter}.
[218] ibid 99.
[219] ibid 101.
[220] Lisbon Agreement, Article 5(1).

registration can only be filed with WIPO by the competent authority of the country of origin and not by individual applicants. WIPO notifies the other States party to the Lisbon Agreement of any applications it receives.[221] Any Member State may declare, within a period of one year, that it cannot protect the appellation of origin notified to it.[222] The Agreement does not set forth the grounds on which a notification of international registration may be refused, but leaves it to Member States to determine the grounds on which it cannot protect a given international registration in their territory.

If no declaration of refusal is communicated to WIPO by a Member State within the one-year time limit following receipt of a notification of registration, the protection of the appellation of origin takes effect in that country as of the date of international registration.[223] However, a Member State may declare that protection is assured in that country as of a different date, which may not be later than the date of expiry of the one-year refusal period. AOs registered under the Lisbon Agreement are protected against any usurpation or imitation of the appellation, even if the true origin of the product is indicated or if the appellation is used in translated form or accompanied by terms such as "*kind*", "*type*", "*make*", "*imitation*" or the like.[224] Once an appellation of origin has been internationally registered, it is protected without any limitation in time, meaning with no need for renewal.[225] An appellation that has been granted protection by a Member State cannot be deemed to have become generic in that State as long as it is protected as an appellation of origin in the country of origin.[226]

3.2.3.3.5 The Madrid System

Madrid system[227] offers the protection of GIs in several countries as collective, certification or guarantee marks by filing one application (an international application) directly with the applicant's national or regional trademark office (the office of origin) and obtaining one

[221] ibid, Article 5(2).
[222] ibid, Article 5(3).
[223] ibid.
[224] Ibid, Article 3.
[225] Lisbon Agreement, Article 7.
[226] ibid, Article 6.
[227] The Madrid Agreement Concerning the International Registration of Marks (1891) and the Protocol relating to the Madrid Agreement adopted in 1989 and administered by WIPO.

registration (international registration).[228] The system is open for use by anyone with a connection[229] with a Contracting Party to the Agreement and/or Protocol.[230]

To apply for international registration, an applicant must first register the mark or apply for its registration with his national trade mark office or the trade mark office of the Contracting Party with which the applicant has the necessary "connection" to the system.[231] The applicant may designate, in the international application, the Contracting Parties in whose territories protection is sought.[232]

Upon receipt of the application, WIPO communicates the mark to the offices of the designated Contracting Parties. These Parties examine the mark as though it had been filed as a national application. If examination identifies grounds for refusal, or if a third party files an opposition, the office of the designated Contracting Party may, within a fixed time limit,[233] refuse protection in its territory. If there are no grounds for refusal, or if a refusal/opposition is subsequently withdrawn, the international registration obtained for the mark has the same effects, in the Contracting Party concerned, as a national registration. An international registration is initially valid for 20 or 10 years and can be renewed indefinitely for 20-year or 10-year terms. [234]

3.2.3.3.6 The TRIPS Agreement (1994)[235]

Part II, section 3 of the TRIPS Agreement[236] basically deals with the protection of GIs among Member States of the WTO. It mandates WTO Members to provide protection against misleading use of a GI and against use that constitutes an act of unfair competition. It also requires Members to refuse or invalidate registration of a trademark that contains or consists of a GI with respect to goods not originating in the territory indicated, if use of the indication on the trademark for such goods might mislead the public as to the true place of origin. Generally, WTO Members should provide protection against any use of GIs for wines and spirits and

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[228] Madrid Protocol, Article 2(1).
[229] ibid: The connection must either be a real and effective commercial or industrial establishment, domicile, nationality or a combination of either.
[230] Kenya is a Contracting Party to the Madrid Protocol, having joined on 26th June, 1998.
[231] Madrid Agreement, Article 1(3) and Madrid Protocol, Article 2(1).
[232] Madrid Agreement, Articles 3, 3*bis* and 3*ter*.

[233] The Agreement provides for a 12 months' period [Article 5(2) of the Agreement] and the Protocol provides for an 18 months' period [Article 5(2) of the Protocol.
[234] 20 years under the Madrid Agreement [Articles 6(1) and 7(1)] and 10 years under the Madrid Protocol [Articles 6(1) and 7(1)].
[235] ibid 106.
[236] TRIPS Agreement, Articles 22, 23 and 24.

against registration as trademarks of those indications, even if such use or registration does not mislead the public as to the true origin of the goods.

3.2.3.4 Obtaining Protection for a GI

Because of the *"territoriality principle,"* a GI obtained in a particular jurisdiction, unless protected abroad may face the risks usually associated with lack of protection. A GI must of necessity be protected in each market in which it is commercialized. Protection of a GI abroad may require that it is first protected in the country of origin.

Different countries protect GIs through a variety of approaches.[237] This may include a combination of two or more approaches involving international, regional or national systems.[238]

An approach or system of approach chosen by a country depends on certain legal traditions developed within a framework of certain historical and economic conditions. The three main modalities of protection for GIs: *sui generis* systems; collective and certification marks; and business oriented modalities such as administrative product approval schemes, may differ with respect to questions as to conditions for protection or the scope of protection. On the other hand,

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[237] Tea Board of India. <www.teaboard.gov.in/> accessed 10th March, 2014: For example, there are varying modes of protection around the world for the Darjeeling (Indian tea) word and logo: in INDIA • Copyright registration A-67292/2004 for DARJEELING logo • Certification Mark 532240 for DARJEELING logo • Certification Mark 831599 for DARJEELING word • DARJEELING word as a geographical indication No. 1 • DARJEELING logo as a geographical indication No. 2; in AUSTRALIA • Certification Mark 998593 for DARJEELING logo • Certification Mark 998592 for DARJEELING word; in EU • Community Collective Mark 004325718 for DARJEELING word • Community Collective Mark 008674327 for DARJEELING logo • PGI for DARJEELING word under Regulation No. 510/06, Commission Implementing Regulation (EU) No. 1050/2011 of 20 October 2011; in JAPAN • Trademark 2153713 for DARJEELING logo • Regional Collective Mark for DARJEELING TEA word (Application No. 007-103568); in TAIWAN • Certification Mark 01327971 for DARJEELING word (Province of China) • Certification Mark 01327972 for DARJEELING logo; in USA • Certification Mark 1632726 for DARJEELING logo • Certification Mark 2685923 for DARJEELING word; in CANADA • Official Mark 0903697 for DARJEELING logo; and in INTERNATIONAL REGISTRATION (MADRID SYSTEM) • Collective Mark 528696 for DARJEELING logo for Austria, France, Germany, Italy, Montenegro, Portugal, Serbia, Spain and Switzerland.

[238] *Consorzio del Formaggio Parmigiano-Reggiano Consejo Regulador de la Denominación de Origen Calificada Rioja)* <www.wipo.int/romarin> (2010) accessed on 4th March, 2014: In a combination of different means of protection, a mark may, for instance, be used to protect the product label, which can include the GI and an additional figurative element affixed to the product to indicate to consumers that it complies with the product specifications for the appellation of origin. Examples of a combination of different means of protection are: 1. An Italian cheese brand known as *Parmigiano Reggiano.* It is recognized as an AO registered as a Protected Designation of Origin (PDO) in the EU for a cheese produced, according to specification, in the provinces of Parma, Reggio Emilia, Mantua (to the right of the Po River), Modena and Bologna (to the left of the Reno River), in Italy. At the same time, the name *Parmigiano Reggiano* is protected by a collective mark for the pin-dot writing printed on the rind of the cheese, where it is commercialized pre-packaged. In addition, a label including the name *Parmigiano Reggiano* is used on the packaging. That label is also protected as a collective mark. 2. *RIOJA* wine brand in Spain. It is recognized as a qualified AO registered as a PDO in the EU for a wine produced in the Rioja region of Spain. The PDO protects the name *RIOJA* as such. In addition, two logos including the name *RIOJA* are registered in order to reinforce protection of the name against misuse. These logos are protected by a collective mark and an individual mark, respectively.

sui generis and collective or certification mark systems share a some common feature in so far as they set up rights for collective use by those who comply with defined standards.

3.2.3.4.1 Sui Generis

Sui generis systems are specific and exclusive rights designed for GIs or AOs; separate from a trademark right or any other IP right. These types of protection system exist all over the world: in the European Union (EU), India, Switzerland, the Andean Community countries; and the African Intellectual Property Organization (OAPI). However, different jurisdictions use different terminology to refer to *sui generis* rights over GIs. Such terms include: AO, controlled AO, protected designations of origin, protected GI, or GI.

In Kenya, the motivation to develop a *sui generis* has been building by the day. This is enhanced by the availability, among Kenyan communities, of various famous Kenyan products such as: coffee, tea, handicrafts, carvings, soapstone, horticultural products, flowers; plant based products such as: aloe-vera, bixa, gum Arabic and high quality energy firewood e.g. *Seme Midat,* among others. In spite of famous reputation inherent in the rich cultural heritage, there have been low returns for value.

As a result of this motivation, the Government partnered with international organizations to conduct feasibility studies of GIs in Kenya in 2007[239] and 2011.[240] The studies produced positive results which showed that Kenya has a high potential of GIs with a number of GI products identified. These included: products with highest potential i.e. coffee, tea, soapstone, honey & wild silk; potential for dairy industry, handicrafts, horticulture and other indigenous products. Most of these products are already well researched and documented. In some instances there are quality labels in use as well as producer associations[241] which are reasonably well informed. The studies emphasized the fact that the country has incomplete legal framework on GIs. Currently, GIs are administered through trademark laws and bi-lateral agreements. The studies, thus, gave rise to the Kenya Geographical Indications Bill 2007 and a revised one of 2011.[242]

[239] The Kenya Government partnered with the Swiss Intellectual Property Institute.
[240] The Kenya Government partnered with the European Union.
[241] Producer Associations are found in various forms. These include: farm union; cooperative; consortium; specific group of producers who come together to create the GI; local community (e.g. village); municipality/regional authority; marketing board or commodity exchange; processors of the product; traders and distributors (e.g. persons selling product to consumers); and informal association or single operator, among others.
[242] Ramba GM, (2013): Protection of Geographical Indications in Kenya: A Paper Presented at the EU/ARIPO/KIPI Workshop on Geographical Indications, Best Western PREMIER HOTEL, Nairobi-Kenya, 7-8 October 2013.

With a strong GI *sue generis* Kenya stands to gain immensely for the following reasons: various brands will be development and products will be removed from commodity status and sustained competition; advantage will be taken of the fact that some of Kenya's products are highly sought after as they are already unique in themselves. The producers stand to gain through value adding and branding; and various regions in Kenya can be positively identified with particular products characteristics associated with unique qualities.

An application for registration of a *sui generis* right should contain the following elements: a delimitation of the geographical area within which the product identified by the GI is produced; a description of the product's characteristics, quality or reputation; and the standards of production with which users of the right should conform. All those elements constitute "the product specification." In addition, verification and control schemes should be put in place to ensure that users of the GI comply with the agreed standards of production. Thus, protection against any use of the GI that would mislead consumers as to the true geographical origin of the product, or that constitutes an act of unfair competition is ensured.

3.2.3.4.2 Collective Marks and Certification Marks

Some jurisdictions such as Australia, Canada, China and the United States of America protect GIs under trade mark law.[243] This is done through collective marks, certification marks.[244] Although what is meant by a collective mark or certification mark differs from one jurisdiction to another, their common feature is that they may be used by more than one person, as long as the users comply with the regulations of use or standards established by the proprietor.[245] Those regulations or standards may require that the mark be used only in connection with goods that have a particular geographical origin or specific characteristics. The proprietor acts as a certifier verifying that the mark is used according to established standards. Generally, the proprietor of a certification mark does not have the right to use the mark.

3.2.3.4.3 Laws Focusing on Business Practices

[243] TRIPS Agreement, Article 16.

[244] Also called guarantee marks in some jurisdictions.

[245] <http://www.WIPO/STrad/INF/6.www.wipo.int/export/sites/www/sct/en/meetings/pdf/wipo_strad_inf_6.pdf> (2012) accessed 4th March, 2014: In some jurisdictions, the main difference between collective marks and certification marks is that the former may only be used by members of an association, while the latter may be used by anyone who complies with the standards defined by the proprietor of the mark.

GIs may be protected through certain laws that focus on business practices. Such laws may relate to the repression of unfair competition, consumer protection laws or laws on the labeling of products. Although these laws do not create an individual industrial property right over the GI, they indirectly protect GIs insofar as they prohibit certain acts that may involve their unauthorized use.

3.2.4 CHALLENGES OF IMPLEMENTING COMMUNITY IP RIGHTS

3.2.4.1 Challenges in Identifying a Community IP Right

The identification of a community IPR has a number of challenges. These include, but not limited to the following. First, there may exist a problem with the selection of an appropriate term or terms to describe the subject matter for which protection is sought. Second, where a term has been selected to describe the subject matter, there might be non-clarity of the definition or description of what is meant for IP purposes by the term so selected. Third, a challenge may exist with regard to lack of awareness on the IP system, particularly among sectors of society and communities unfamiliar with it, such as indigenous and local communities and Governmental offices not directly involved in IP law and administration. Fourth, a challenge may exist with the analysis of how prior art is established for purposes of patent examinations in the context of TK. Fifth, there may be lack of understanding by the IP community of the perspectives, expectations and needs of TK holders. Sixth, where there is inconsistent knowledge of customary laws and protocols in local and traditional communities, including conclusions relevant for the formal IP system, it may be difficult to identify a salient community IPR. Seventh, where there is inadequate provision of IP advice and assistance in respect of legislation, regulations, guidelines, protocols, agreements (including model terms), policies and processes on access to and benefit-sharing in genetic resources it may be difficult for a community to realize its inherent potential in their IPRs. Eighth, where there is no provision of legal and technical assistance with TK documentation, including information and advice on the IP implications of TK documentation, it may be difficult to isolate the peculiar community IPRs.

3.2.4.2 Challenges in Developing GIs

A number of challenges exist in creating GIs. These may include the following. First, there is the risk of poor design or inadequate governance structures. These can lead to domination by narrow interests or a single enterprise. If not well designed, GIs can exclude the poorest producers or

stimulate inappropriate outcomes like ending traditional practices. Second, GIs are not easy to establish. Thus, patience, sustained commitment and adequate time are necessary as the various steps are scaled before a GI is realized. Third, there is need to ascertain that the product does not lack distinguishing characteristics or specific reputation. If it is a food product, the FAO web tool for identification of origin linked production and GI development potential is needed.[246] Four, costs can be quite high especially with regard to organizational and institutional structures as well as ongoing operational costs, such as marketing and promotion. Producers may be encouraged to bear some of the costs such: establishing producer organisations, defining the product specification, and achieving and maintaining the unique qualities of the product. Fifth, there is need for controls appropriate to the product and to the market. A 3rd party certification system may be needed for internationally traded product. For locally distributed product, a self-certification scheme may be necessary.

3.2.4.3 Potential Obstacles in Protecting a GI

From a legal perspective a myriad of obstacles may arise when seeking protection for a GI. These are:

3.2.4.3.1 Conflict With a Prior Mark

If a GI is considered identical or similar to a mark that already exists in a foreign jurisdiction, it may be refused protection in that particular territory. A trade mark exists in a given jurisdiction if it has previously been: applied for, registered or acquired through use, in good faith, and that use of the GI would result in a likelihood of confusion with the mark.

3.2.4.3.2 Generic Character

Where a GI constitutes a common name for the kind of product which it seeks to protect in a given jurisdiction, it may be refused protection in that jurisdiction. In such cases the GI is said to have been genericized.

3.2.4.3.3 Homonymous GIs

If two or more GIs are spelt or pronounced alike but identify products originating in different places, usually in different countries, they are said to be homonymous. In principle, these indications should coexist, but such coexistence may be subject to certain conditions. For

[246] <www.foodquality-origin.org/webtool> (2011) accessed on 22nd July, 2014.

example, it may be required that they be used in association with additional information as to the origin of the product in order to prevent consumers from being misled. A GI may be refused protection if, due to the existence of another homonymous indication, its use would be considered potentially misleading to consumers with regard to the product's true origin.

3.2.4.3.4 The GI is the Name of a Plant Variety or Animal Breed

In certain jurisdictions, protection may be refused to a GI if it conflicts with the name of a plant variety or an animal breed and may, as a result, mislead the consumer as to the true origin of the product. This, however, is not a general principle. Plant names such as *"potatoes"* have been used with reference to a GI. [247]

3.2.4.4 Challenges with the Trade Marks Law

There are various challenges to the use of trade mark both from the point of view of the common law and from statute law. We highlight some of these challenges as here under: First, the use of a trade mark may only be sustained through periodic renewal of its registration. Kenyan law sets the lifetime of trade mark to ten years upon registration.[248] However, this lifetime may run into perpetuity subject to such periodic renewals. A registered proprietor is therefore under duty to periodically renew the registration of his trade mark so that it does not suffer from non-use. Second, the owner of a trade mark is under obligation to prevent any unauthorized third party who may infringe on his trade mark. This may mean bringing actions for equitable remedies or criminal actions. Either way, litigation is a time consuming and expensive undertaking that often takes up the litigants' time away from direct business in connection with the trade mark.

Third, with regard to assignment or transmission, the law imposes certain restrictions to guard against creation of multiple exclusive rights.[249] Where the assignment is without goodwill of the business, special conditions are imposed. First, associated trade mark can be assigned or transmitted only as a whole, and certification of a trade mark cannot be assigned or transmitted without the consent of the Registrar. Second, since trade mark is part of business goodwill, any sale and transfer of goodwill of business effectively transfers to the purchaser or transferee the

[247] "*Idaho*" Potatoes from Idaho, United States of America.
[248] Trade Marks Act, 2001, Laws of Kenya, section 23(1): This compares with the lifetime of trade mark in other jurisdictions such as India
[249] ibid.

trade mark used in the business by implication even if the trade mark is not specifically mentioned in the deed of assignment. Third, where an unregistered trade mark which is in use is assigned without goodwill of the business, the assignee cannot protect the trade mark through action for passing off. He may only do so through criminal proceedings; the reason being that the object of the law of passing off, as a form of tort, is to protect the goodwill and the reputation of business from encroachment by dishonest competitors.

Fourth; the owner of a trade mark may license a third party to use his trade mark strictly in relation to goods connected with him. With regard to licensing the fact that all acts of a licensee are deemed to be the acts of the owner of the trade mark, places an onerous task on the registered proprietor to supervise the acts of the licensee during the subsistence of the license. Fifth; in trafficking of trademarks, the main challenge is that the distinctiveness of the goods and services connected with the mark may be lost. This occurs when the mark is registered primarily for the purpose of making money without due regard to the class of goods or services that should be connected with it, as has been alluded to herein above, with the example of the trade mark "Citizen." Sixth, in trade mark merchandizing, the fact that the mark is used in its own right as property means that it may be associated with goods which have no connection with the GI. This may erode the reputation of the GI.

CHAPTER FOUR

DATA ANALYSIS

INTRODUCTION

This Chapter presents analysed data of the study. It lays the foundation for general and specific inferences of the study which may inform future Government policies on firewood energy sub-sector with special emphasis on assignment of trademark to TK as well as application of a *sui generis* model law on TK as the means to an end of the domestic energy crisis in Kenya. The research was conducted among old ladies, who were at least 60 years old, in *Seme* constituency.

The data from the survey was collected by use of a comprehensive focus group interview schedule administered by the researcher, assisted by 3 research assistants, to 32 respondents in

eight separate sessions. Since there were a total of four discussants in every session, the researcher and the three assistants secretly assigned themselves a discussant each. The initial response of each discussant for every question was noted separately. Thereafter the group would discuss the issue and come to a general consensus where possible. Presentation of data has largely followed the sequence of the survey questions. It consists mainly of descriptive statistics which dealt with answers to major survey questions explored in the survey.

4.0 ANALYSES OF RESPONSES

4.0.1 Personal Information

Table 3: The Respondents' Bio-Data

Age (Years)	Frequency	Percentage (%)
60-64	10	31.25
65-69	12	37.5
70 and Above	10	31.25

Source: The Study (2014).

The bio-data in Table 3 shows that the research was confined to a group of old ladies aged between 60 and over 70 years, resident in *Seme*. The assumptions made in settling on this age group ware twofold. First, given that the ladies were over 60 years of age, they must have been at least 10 years old at the time Kenya gained independence. Thus, they must have participated in firewood identification and collection from around independence time to date. Their knowledge of the various types of wood that provide good firewood was therefore central to the validity and reliability of the data collected.

Secondly, apart from collecting firewood, these ladies have had long enough experience with firewood of different types in the course of their cooking duties. In the African tradition, cooking is a woman's domain. Although various sources of energy have permeated the rural Kenya, by and large, firewood remains the main source of heating among many rural households. National statistics indicate that 80% of the rural households in Kenya use firewood for domestic heating. Thus, ladies who have had long enough experience with firewood as their main source of heating were considered to provide reliable information in the research.

The data in Table 1 shows that 62.5% (20 out of 32) of the respondents were in the combined age brackets of 60-64 years and 70 years and above, whereas 37.5% (10 out of 32) were in the age

bracket of 65-69 years. Further, the respondents had not only used firewood for cooking all their lives, but had also identified and collected firewood since their tender age.

This illustrates that the research elicited responses from respondents who were reliable and credible. Their responses were therefore a fair representation of the views the wider Kenyan rural communities that are highly experienced in the use firewood for domestic heating. The data collected was therefore both reliable and credible and hence valid.

4.0.2 The Energy Qualities in Firewood

The data collected on energy qualities in firewood were twofold. On the one hand, respondents were asked to enumerate the general qualities they considered desirable in firewood. On the other hand, they specifically stated the unique qualities found in *Seme Midat* as firewood. The results are illustrated in a comparative form in Table 4 below.

Table 4: Energy Qualities in Firewood and the Unique Energy Qualities in *Seme Midat*

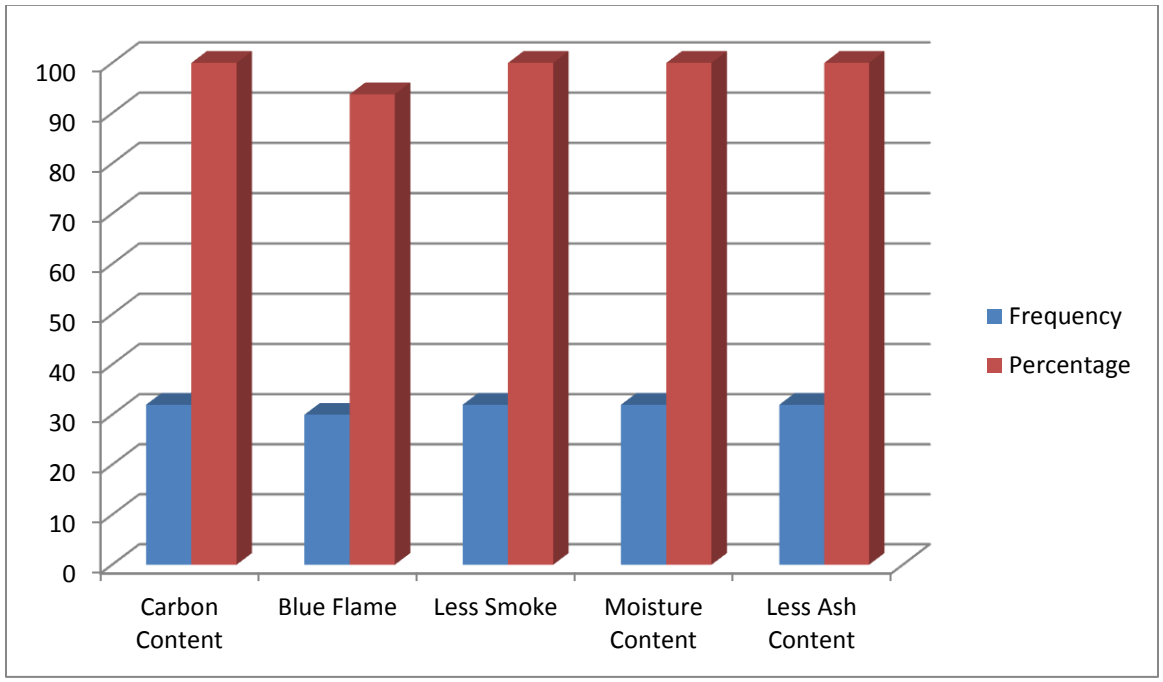
Fire wood Qualities	**Firewood Generally**		***Seme Midat***	
	Frequency	**%**	**Frequency**	**%**
Well Seasoned	32	100	-	-
Burns Slowly and Steadily	26	81.25	32	100
Burns with a Blue Flame	22	67.85	30	93.75
Burns with Less Smoke	30	93.75	32	100
Burns with no Repugnant Odour	23	71.87	31	96.79
Easy to Split when Dry	30	93.75	25	78.13
Burns with no Sparks	15	46.88	15	46.88
Has Long Lasting Coal	28	87.5	32	100
Carbonizes as it Burns	24	75	28	87.5
Has Low Ash Content	31	96.79	32	100

Source: The Study (2014).

4.0.2.1 Unique Energy Qualities in Seme Midat

From Table 4, the energy qualities of *Seme Midat* firewood under the study may be isolated and represented in the bar graph below.

Figure 2: Blue Flame, Smoke, Moisture Content, Carbon Content and Ash Content



Source: The Study (2014).

The results show that *Seme Midat* has quite superior energy qualities that have been considered in the study. The carbon content of *Seme Midat* has been represented by both the quality to burn slowly and the low ash content. 100% (32 out of 32) respondents reported that *Seme Midat* does not only burn slowly and steadily but also produces low ash residue upon combustion. Fuel that burns steadily imports a steady supply of the reactants for combustion. The major reactant in fuels that support combustion is carbon. The gist is that the percentage of the carbon content in *Seme Midat* in comparison to its volatile matter is higher. Thus, *Seme Midat* provides a high supply of combustible carbon during heating.

Low ash content, on its part, depicts that in a given sample of *Seme Midat*, the matter that is dissipated into energy is more than what remains as residue. Applying Einstein's theory, the implication is that *Seme Midat* is composed of more matter which burns to give off energy than

that which does not produce energy during heating. Since energy cannot be created nor destroyed but is converted from one form to another, the residue ash is that form of energy that has not been converted to heat energy during combustion. Thus, the import of the low ash content is that a larger proportion of *Seme Midat* is carbon. The results therefore illustrate that *Seme Midat* has high carbon content which is necessary for production of heat during combustion.

Seme Midat burns with a blue flame. This was illustrated by a majority of the respondents, 93.7% (30 out of 32), who reported that all their life they have noticed that *Seme Midat* burns with a blue flame. A blue flame is the epitome of high temperatures which tend towards 1,600^{o}C. The exothermic reactions of the reactants in *Seme Midat* are responsible for this high temperature of the resultant flame. Apart from carbon, the other reactants that evolve a lot of heat in good firewood are lignins. The blue flame therefore depicts that the diffusion of oxygen and the active combustible content of *Seme Midat* occurs fully, resulting in complete combustion. This eliminates soot which is responsible for the low temperature yellow flame. Therefore, from the data it can be concluded that *Seme Midat* has a high calorific value.

100% (32 out of 32) of the respondents were unanimous that firewood burns well when dry. Although the research could not determine the requisite moisture content, the responses were generally in agreement with results from studies that have been conducted in this field by various scholars. Firewood is considered dry at moisture content which is between 20% and 25%, otherwise it is green wood. Between these ranges, the energy produced during combustion is not significantly utilized in vaporizing the water in the wood. Thus, a very high percentage of energy produced is used for heating.

Moreover, if it gets to light at all, green logs will result in a fire that smoulders and produces a lot of tar and smoke. Tar can be corrosive and also results in the black coating of the outer surfaces of cooking pots, thereby raising hygiene issues. Therefore, coupled with the fact that the respondents were also unanimous that *Seme Midat* takes a few days to dry, the import is that this type of firewood is most appropriate for use as it easily attains an acceptable dry mass.

The respondents were unanimous, 100% (32 out of 32), that *Seme Midat* burns with less smoke. Because smoke has serious health effects much needs to done to protect not only the users of firewood but also neighbours from wood smoke exposures. In some jurisdictions, such as the

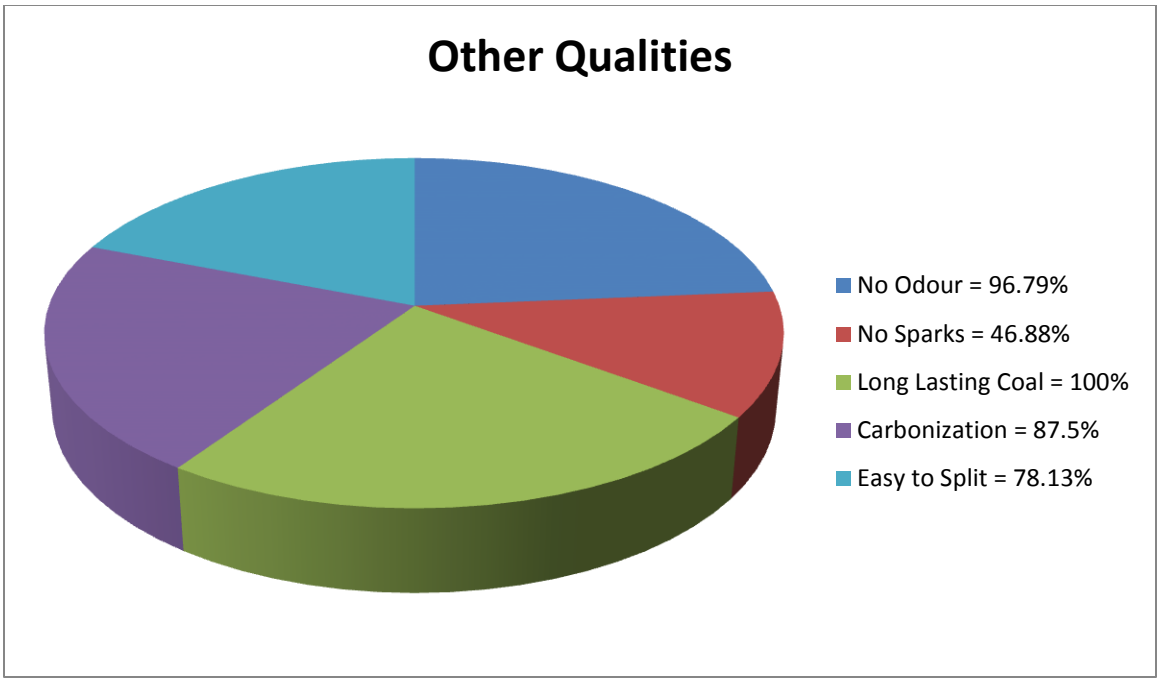
United Kingdom, some of the measures that have been taken include: disclosing energy qualities of various species of firewood; and regulating fireplace and wood stove chimneys so that they are high enough to protect users and neighbours from exposures.

All the respondents, 100% (32 out of 32), were unanimous that the greatest side effect of use of firewood for cooking emanates from the smoke produced. They enumerated breathing problems, cough, eye irritation, soot and headache as some of the negative effects of smoke. Clearly, these are all public health issues. From this study, since *Seme Midat* produces less smoke during combustion, it passes an important public health test. It is therefore a variety of firewood that is a safeguard unto itself with regard to steps that need to be taken to protect the public against wood smoke. This is, therefore, a significant energy quality of *Seme Midat.*

4.0.2.2 Other Qualities of Seme Midat Firewood

From Table 4, other qualities of *Seme Midat* are as illustrated in Figure 3 below.

Figure 3: Other Qualities of *Seme Midat* Firewood



Source: The Study (2014).

The data in Figure 2 above shows that apart from the energy qualities considered in this study, *Seme Midat* boasts of additional qualities which combine to make it the firewood of choice among the *Seme* community. 96.79% (30 out of 32) of the respondents reported that seasoned *Seme Midat* burns with a characteristic pleasant smell. It was the respondents' case that they could easily tell which household in the community was using *Seme Midat* for cooking at any time due to its characteristic smell.

Smell produced by a given fuel quite determines either its popular use or outright rejection. For instance, among many traditional communities in Africa, while the use of dung from domesticated herbivorous animals was encouraged, dung from domesticated omnivorous or carnivorous animals has been rejected as fuel for its offensive odour. The fact that *Seme Midat* produces a pleasant smell characteristic only to its species makes it the firewood of choice.

All the respondents, 100% (32 out of 32), reported that glowing coal from burning *Seme Midat* took long to retain its fire. The respondents claimed that after every cooking, they would cover the glowing coal with ash overnight and be able to retrieve the glowing coal to start their morning fires. This characteristic of *Seme Midat* is probably an illustration of its high density which goes to the root of its high carbon content. It is the view of this study that firewood which

produces long lasting glowing coal is desirable, especially if the glowing coal from one cooking would be used to start a fire for the next cooking. This will take away the expenses of using igniters such as match sticks every other time fire has to be lit.

87.5 % (28 out of 32) of the respondents reported that *Seme Midat* carbonizes into active charcoal when, after cooking, its hot glowing coal is completely covered with earth for long. The resulting charcoal has been used in charcoal stoves with impressive results. Ordinarily, the process of wood carbonization is delicate and requires utmost care to achieve maximum results. As shown in the picture below, freshly cut logs are heated in a kiln in the absence of sufficient oxygen so that full combustion does not occur. This allows pyrolysis to take place, driving off the volatile gases and leaving the carbon or charcoal.

Figure 4: Photo: ICRAF: Traditional Charcoal Kiln accessed at <http://blog.worldagroforestry.org/wp-content/uploads/2013/10/Mozambique-Farmers_Ziantoni_2010_2829290.jpg> on 20th July, 2014.

That *Seme Midat* firewood initially burned in sufficient supply of oxygen during cooking can still be salvaged to provide charcoal in a non-odious process is a further indication of its superior quality as energy source.

46.88% (15 out of 32) of the respondents reported that *Seme Midat* produces sparks while burning. This means that 53.12% (17 out of 32) of the respondents held otherwise. The closeness

of these opposing figures indicates that it is not a settled fact that *Seme Midat* does not produce sparks while burning. This finds a probable explanation. Sparks may occur for various reasons related to chemical reactions within the wood during the heating and burning process. These reactions may have their bearing from the species of the wood, its age and moisture content. Heating wet wood causes the moisture pockets in the wood to heat up and explode into sparks. Thus, since moisture content is a factor for sparking, the responses from the respondents were indicative of combustion of *Seme Midat* with varying degrees of moisture content.

78.13% (25 out of 32) of the respondents reported that *Seme Midat* splits easily. The respondents stated that they split firewood using normal axe. Generally, firewood splits easily when wet since the fibers are slightly separated by the moisture in the wood. However, hardwoods are easy to split than softwoods since softwoods tend to have many knots. The results from the respondents show that *Seme Midat* is easy to split, the moisture content notwithstanding.

4.0.3 Non Energy Uses of Seme Midat

The study sought to find out if *Seme Midat* finds other uses apart firewood among the *Seme* community. The responses are summarized in Table 5 below.

Table 5: Non-Energy Uses of *Midat* Tree

Other Uses	Yes	
	Frequency	Percentage (%)
Intercropping	32	100
Building	30	93.75
Tooth Brush	26	81.25
Medicinal Value	29	90.63
Furniture and Wood Curvings	32	100

Source: The Study (2014)

From Table 5, it is clear that apart from the energy use under study, *Seme Midat* finds an array of other uses that is considered beneficial to the community. Outstanding in this list is its use in agro forestry. All the respondents, **100%** (32 out of 32), stated that *Seme Midat* sustains intercropping. This particular vegetative characteristic of *Seme Midat* is important for the carbon cycle since plants which sustain intercropping are good nitrogen fixers. Thus, *Seme Midat* has the potential of improving and sustaining soil fertility due to its nitrogen fixing ability. When intercropped with food crops, it is therefore expected that yields are bound to improve.

In addition, the fact that *Seme Midat* is an agro forest means that its farming may be made easy since it would be tended by the farmers at the same time food crops that are intercropped with it are tended. This should therefore provide an incentive for large scale farming of *Seme Midat* as it would facilitate the growing of various food crops alongside.

The data also reveals that *Seme Midat* is of medicinal value. 90.63% (29 out of 32); and 81.25% (26 out of 32), of the respondents stated that *Seme Midat* tree has medicinal value and used as tooth brash respectively. Although the study was not concerned with specific medicinal value of the tree, its value in dental and oral health has been underscored.

As hardwood *Seme Midat* also finds use in curvings, and furniture in general. All the respondents, 100% (32 out of 32), stated that *Seme Midat* is used in a variety of wood curvings including wooden cooking implements. 93.75% (30 out of 32) stated that *Seme Midat* is also used in constructing houses and huts in the community. The import of these statistics is that *Seme Midat* is non-poisonous tree which provides timber that can withstand harsh weather as well as attacks from pathogens and pests. The implication is that *Seme Midat* is rich in lignins which are known chemical substances which are not only hydrophobic but also resistant to pests and pathogens.

4.0.4 Sources and Cost of Firewood

Table 6: Farming of *Midat* in Seme

Particular	Yes		No	
	Frequency	%	Frequency	%
Farming Midat	12	37.5	20	62.5
Vegetative Propagation	32	100	00	00
Support to Farmers	04	33.3	08	66.7

Source: The Study (2014).

From Table 6, 37.5% (12 out of 32) of the respondents actually engage in growing *Midat* tree and 62.5% (20 out of 32) of the respondents do not. This figure imputes serious costs in procuring *Seme Midat* for firewood. It also means that despite its superior energy qualities, the people do not actively engage in its agro forestry as a means of improving their food reserves as

well as boost their income. The study did not delve into reasons responsible for this poor show of the respondents.

The study revealed that only 37.5% (12 out of 32) of the respondents sourced firewood from their farms; 43.75% (14 out of 32) sourced their firewood from the bushes in their neighbourhood; while 18.75% (06 out of 32) bought firewood from the local markets. These statistics actually show that a significant 43.75% may be collecting their firewood illegally from land that does not belong to them. Thus, if the community enforced their rights over land and became more vigilant on trespass to land, an overwhelming majority [62.5% (20 out of 32)] of the respondents would have to source firewood from the local markets.

The market rates reported by the respondents were that enough firewood for a week's ordinary use in a household of 5 people cost KSh. 350.00. A bundle of ten (10) pieces of firewood, each measuring approximately 3 feet by 2½ square inches thick, sells at KSh. 50.00. This is adequate for a day's ordinary use by a family of 5 people. Thus, such a family would need to purchase seven (7) of these bundles weekly to satisfy their ordinary domestic heating. Considering the large percentage of the respondents who would otherwise need to buy firewood, this figure translates to a huge amount which impacts negatively for a rural economy, especially as expense. The monthly firewood costs would be KSh. 1,400.00 while annual firewood cost would be between KSh. 18,250 and 18,300.

On the converse, if the community engaged in active agro forestry in *Seme Midat,* they would stand to boost their economic wellbeing given that 80% of households in rural Kenya use firewood for domestic heating. Thus, the people of *Seme* stand to economically gain from investing in *Midat* farming which will improve their incomes and also boost their food production.

All the respondents, 100% (32 out of 32) reported that Seme Midat has the capacity to propagate vegetatively. Those who grew the tree in their farms, 37.5% (12 out of 32) indicated that they used the vegetative method to propagate the tree as they had difficulty in germinating the *Midat* seeds. In addition, *Midat* grows fasted when propagated vegetatively. The farmers, however, cited the following as the challenges which hampered their engagement in *Midat* farming: small

farm sizes, lack of incentive to plant trees, trees take too long to mature, and lack of adequate know how on best tree farming practices.

In all these challenges, only 33.3% (04 out of 12) of the Midat farmers received some sort of assistance from the Government (through the Ministry of Environment and Natural Resources, MENR) or Non Governmental Organizations (NGOs). The remaining 66.7% (08 out of 12) did not get any support from either quarters. The respondents reported that MENR and NGOs assisted them with regard to supply of free or cheap tree seedlings as well as dissemination of information on tree nursery establishment and management.

That the proportion of the respondents who received Government assistance were assisted by MENR and not the Ministry of Energy and Petroleum confirms the fact that despite being the largest supplier of the total national energy requirements, biomass sub-sector thrives without any strategic planning by the relevant Ministry nor the Energy Regulatory Commission (ERC). This is in spite of the fact that section 103(2) of the Energy Act 2006 mandates the Ministry of Energy and Petroleum to, among other things: formulate a national strategy for coordinating research in renewable energy; provide an enabling framework for the efficient and sustainable production, distribution and marketing of biomass and charcoal; and promote the use of fast maturing trees for energy production. As for ERC, section 5 of the Act mandates it to *inter alia* regulate the production, distribution, supply and use of renewable and other forms of energy.

It was the respondents' plight that the Government as a whole needed to actively involve itself in the promotion of tree farming through incentives; putting up firewood factory to dry and cure the firewood; and the supply of affordable domestic firewood cooking stoves to facilitate more public health friendly use of firewood and to address firewood conservation as an ingredient of the overall national energy conservation strategy.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

INTRODUCTION

This Chapter concludes the research findings. It forms the quick reference for energy solutions as relates firewood energy sub-sector. It also outlines the recommendations with regard to policy, statute, commercial and processing methods of traditional firewood for value addition necessary for meaningful economic growth.

5.0 CONCLUSION ON RESEARCH FINDINGS

The research has revealed that *Seme Midat* has quite superior energy qualities. The fact that well seasoned *Seme Midat* burns slowly and generates low ash content as residue imports a very high percentage of the carbon content in the wood. The volatile matter in *Seme Midat* is therefore low; consequently, *Seme Midat* provides a high supply of combustible carbon during heating process. Thus, the matter in *Seme Midat* that is dissipated into heat energy during combustion is very high in comparison with what remains as residue.

The research also revealed that *Seme Midat* burns with a blue flame. A blue flame is the epitome of high temperatures in the region of 1,600^{o}C. The high temperatures of the flame produced by *Seme Midat* during combustion are as a result of the exothermic reactions of the reactants in the wood. This not only depicts the presence of high carbon content but also a high presence of lignins in *Seme Midat.*

The blue flame is the consequence of the slow burning characteristic of *Seme Midat* which enhances the diffusion of oxygen and the active combustible content of the wood resulting in complete combustion. This eliminates soot and hence reduces the smoke which is evolved during combustion. The upshot is that the use of *Seme Midat* as firewood significantly reduces the chances of respiratory diseases common among people who are exposed to smoke. With the use of improved stoves, the effect of the little smoke produced by *Seme Midat* should be further minimized. Additionally, the production of less smoke by *Seme Midat* during combustion means that the firewood's contribution to greenhouse gases in the atmosphere is less.

It was also revealed by the study that *Seme Midat* burns with a characteristic pleasant smell. This has contributed to its popularity as the firewood of choice among the Seme community. It is a fact that the smell produced by a given fuel determines either its popular use or outright rejection. This is the reason for the non-use of dung from the domesticated omnivorous animals among the traditional communities in Africa since they produce an offensive smell during combustion.

The research also revealed that glowing coal from burning *Seme Midat* has the peculiar characteristic of retaining its fire over a long period when covered with ash to cut off oxygen supply. Thus, this makes it easy and cheap for the respondents to light fires in their next cooking using the preserved "fire" in the burning coal. As has been suggested, this characteristic of *Seme Midat* is probably an illustration of its high density which goes to the root of its high carbon content. Moreover, this also signifies that *Seme Midat* would carbonize better during pyrolysis in the absence of sufficient oxygen to produce high energy quality charcoal.

The study confirmed that the popularity of *Seme Midat* as the firewood of choice among the Seme community is because of its peculiar energy qualities. Through usage over many decades, the Seme community has come to identify *Seme Midat* as being possessed of high energy qualities. The high energy qualities of *Seme Midat* are as a result of the geographical and climatic conditions peculiar to Seme region.

The identification of *Seme Midat* as firewood of high energy qualities is a Traditional Knowledge (TK) attributable to *Seme* community. This TK is an IPR of the *Seme* community which requires protection as a Geographical Indication (GI). As a GI, *Seme Midat* stands a chance of having its stakes significantly rising for meaningful commercial exploitation. The meaningful commercial exploitation of *Seme Midat* will not only contribute to the alleviation of the energy crisis in the country but will also significantly contribute to the country's GDP.

Apart from the energy use under study, *Seme Midat* finds an array of other uses that are considered beneficial to the community. Outstanding in this list is its use in agro forestry. *Seme Midat* is adaptable to fast growth due to its vegetative nature of propagation. As an agro forest, *Seme Midat* plays a significant role in the carbon cycle since it is a nitrogen fixer. Its growth therefore improves and sustains soil fertility.

The research also revealed that *Seme Midat* is of medicinal value. Its use as tooth brush among the rural community is widespread. *Seme Midat* is also used in the construction of houses as well as in curvings and furniture making. In spite of all its superior energy qualities, coupled with its agricultural significance, the research revealed that farming of *Seme Midat* was not popular among the *Seme* community. In fact the situation was graver owing to the fact that Government support in the afforestration programme among the Seme community was minimal. Only 33.3% of the *Midat* farmers received some sort of assistance from the Government (through the Ministry of Environment and Natural Resources, MENR) or through Non Governmental Organizations (NGOs). The loud silence kept by the Ministry of Energy and Petroleum together with the Energy Regulatory Commission in addressing the production of firewood was underscored by the study.

The import of all this is that the cost of firewood was significantly increased as only 37.5% of the respondents sourced *Midat* firewood from their own farms. The rest of the respondents had to contend with other means of procuring firewood. The research revealed that the market rates reported by the respondents were that enough firewood for a week's ordinary use in a household of 5 people cost KSh. 350.00. This translates to a monthly firewood cost of KSh. 1,400.00 and an annual firewood cost of KSh. 19,600.00. By any standard, these are very high sums of money for a typical village population, not to mention the associated low disposable incomes.

Seme Midat, like any other resources in Kenya with superior qualities that ought to benefit from value addition through a *sui generis* IPR regime, has been treated ordinarily. This has denied the community revenue associated with its exploited. In spite of the development of the African Model Law on TK, Kenya still lacks a TK protection regime that should enable communities realize and exploit their TKs. The wide variation in Kenya's climatic conditions presents a unique opportunity for every community to realize accelerated rural development through the exploitation of their TKs. It is time that Kenya, as a prominent Member of the Organization of African Union, took the advantage of the African Model Law to establish guidelines for developing legislation for the protection of the TK of its communities. This would re-inform the Geographical Indication Bill 2007 (revised 2011) before it is passed into law.

5.1 RECOMMENDATIONS

5.1.1 Sensitization of Seme Community on the Intellectual Value of *Seme Midat* and Need to Ensure Protection of the IPR

Given the high energy qualities of *Seme Midat,* there is need for the Government to sensitize the *Seme* community on the intellectual property value of tree species and also to ensure the protection of the IPR thereof. In this regard, the Government should develop a *sui generis* law pursuant to Article 22(2) of the TRIPS Agreement for the protection of IPR in the TK. This will go a long way in achieving the requirements under Articles 40(5) and 69(1)(c) of the Constitution respectively mandating the State to *support, promote and protect the intellectual property rights of the people of Kenya*; and to *protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and genetic resources of communities.* Whereas paragraph 12 of Part 1 to the Fourth Schedule to the Constitution assigns "intellectual property" rights to the National Government, from the energy perspective, paragraphs 31 of Part 1 and 8(e) of Part 2 of the Fourth Schedule to the Constitution respectively assign *energy policy and energy regulation* to the National Government and *county planning and development of energy regulation* to the County Governments. Thus, both levels of Government have a duty in sensitizing the Seme community on the intellectual value of *Seme Midat* and the need to ensure the protection of the IPR therein for its high energy qualities.

5.1.2 Tree Farming

There is need to enhance the farming of indigenous trees that have superior energy qualities. This will help in addressing the energy gap existing in the country. The Ministry of Energy and Petroleum and the Energy Regulatory Commission need to take a lead in this since it is their statutory mandate to enhance research and development in the renewable energy sub-sector. The fact that *Seme Midat* is an agro forest means that its farming may be made easy since it would be tended by the farmers at the same time food crops that are intercropped with it are tended. This should therefore provide an incentive for large scale farming of *Seme Midat* as it would facilitate the growing of various food crops alongside.

Apart from the incentive deriving from agro-forestry, given its high value, members of the community ought to understand that even with the minimal Government support, it is in their interest to take steps within their powers to protect and conserve *Seme Midat.*

5.1.3 Wood Fuel Conversion Technologies

Wood can be used as a fuel in various forms. These include; solid wood, charcoal, chips, briquettes, gas and liquid fuels popularly referred to as modern firewood. Kenya needs to embrace modern technology in the firewood sub-sector. The advancement in the conversion technologies of firewood in Kenya will ensure that firewood becomes competitive as a fuel compared to fossils like oil and coal, which is the case in countries where the conversion technology already exists.

5.1.4 Wood Fuel as a Source of Revenue

With the introduction of modern firewood, the downstream management of wood fuel should be more profitable not only to the farmers but also to the Government. The Government needs to encourage the modernization of wood fuel industry with a view to enhancing the marketing and sale of modern wood fuel. As happens in developed economies, wood fuels should find their space in the supermarket and other stores' shelves. This will streamline revenue collection in this sub-sector that supports 68% of the primary energy consumption in Kenya.

5.1.5 Improved Firewood Cookstove

With the modernization of wood fuel, there should be need to refocus on the innovation in the firewood stoves. The innovations should take into account the various types of modern firewood that are industrially processed. Such forms as solid wood, charcoal, chips, briquettes, gas and liquid should be used in their appropriate stoves. These stoves will not only help in conservation of energy but will also reduce the exposure to smoke from burning wood.

In respect, the draft *Improved Biomass Cookstove Regulations* that has been gazetted[250] should be amended to provide for specifications which include chimney schedule to take care of indoor pollution. As it were, the draft Regulations' central concern is licensing of business persons dealing in the "improved biomass cookstove." The draft Regulations refers to cookstove that conforms to Kenya Standard KS 1814-1:2005 which is basically concerned with performance requirements and test methods. It does not provide for industrial processing of wood fuel, neither does it provide for energy rating of various wood fuels.

[250] Kenya Gazette Vol. CXV-No. 65, Part IV, dated 26 April, 2014.

5.1.6 Determination of Energy Qualities in Traditional Firewood

Kenya is endowed with vast traditional trees that possess high energy qualities. This is mainly due to its vast geographical and climatic diversity. Since firewood forms the popular source of primary energy, it is possible that every community in Kenya, through TK, may have identified some peculiar trees that possess high energy qualities.

In this study, the determination of the energy qualities of Seme Midat was mainly through a deductive process and not by experimentation in a science laboratory. Laboratory experimentation in determining the energy qualities in a given wood sample is a highly specialized area in Physics. The use of a bomb calorimeter is necessary. This makes the process very expensive. It is our recommendation that the Ministry of Energy and Petroleum should team up with the local universities, especially the University of Nairobi, to conduct thorough research in determining the energy qualities of the various communities' high energy firewood. This will ascertain the energy qualities in the various woods and hence provide a reasonable basis for rating the firewood in the market.

5.1.7 Legal Status of Firewood Energy Sub-Sector

5.1.7.1 The Existing Legal Framework

The legal status of firewood energy sub-sector is uncertain. As a result, the sub-sector runs largely informally. This trend needs to be reversed by introducing purposeful legislative amendments to directly address the sub-sector. The Energy Bill 2014 should be amended to address the recommendations 5.1.1 to 5.1.6 outlined above.

In addition, Firewood Regulations pursuant to section 110 of the Energy Act 2006 should be formulated and effected in line with the above recommendations. Similarly, the Draft Energy Policy 2014 should give more weight to firewood energy sub-sector by addressing the above recommendations. These strategies will not only change the perspective that firewood is a poor man's source of energy but will also enable firewood energy sub-sector to contribute significantly to the country's GDP. Kenya's strength in the energy sector lies in firewood as the primary source of energy. Modernization of wood fuel is the way to go.

5.1.7.2 Sui Generis

As a GI, the protection of the TK in the identification of *Seme Midat* as quality firewood should be protected *sui generis.* This would be in line with Article 22(2) of the Agreement on the Trade-Related Aspects of Intellectual Property Rights (TRIPS) requiring Member States to provide *sui generis* laws for the protection and working of GIs. In respect, Kenya should develop and enact a *sui generis* law on GI protection. The *sui generis* ought to suit the provisions of the CBD, Nagoya Protocol and the African Model Law. Thus, apart from protecting *Seme Midat* as a GI, the *sui generis* should also provide for access and benefit sharing regime in line with international standards. Accordingly, the Draft Geographical Indication Bill 2011 requires a review before it is tabled in Parliament to ensure that Kenya enacts a purposeful and effective *sui generis* law on GI.

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APPENDIX A: DETERMINATION OF FIREWOOD ENERGY QUALITIES

1. Determination Moisture Content, Volatile Matter and Ash Content

These may accurately be determined through laboratory experiments. The procedure followed is adopted from **British Standards BS: 3631 of 1973.** The following apparatus and materials will be required: a muffle furnace, a desiccator, an electron weighing balance, a stop watch, three crucibles, muffle furnace tongs and seasoned wood samples.

The Procedure 1: Moisture Content.

Recondition the crucible by putting into a muffle furnace at 900±25ºC for 2 minutes.

Cool in a desiccator for 10 to 15 minutes and weigh to the nearest 0.1 mg… **(Mass of Crucible).**

Weigh into the crucible 1.000 g of the test sample in triplicate…. **(Initial Mass).**

Place the crucibles with test samples in the oven set at 100±3ºC for 12 hours. Cool in desiccators for about 15 minutes.

Weigh each crucible and the test sample, and subtract the mass of crucible. Calculate the average of the three weight differences…. **(Oven Dry Mass of sample).**

Calculate the percentage of Moisture Content using the formula below.

$$\text{Percentage Moisture Content} = \frac{\text{Initial Mass - Oven Dry Mass}}{\text{Oven Dry Mass}} \times 100\% \quad \text{.....(1)}$$

Procedure 2: Volatile Matter

Then using the muffle furnace tongs transfer the crucibles into the muffle furnace ensuring that the maximum clearance between crucibles is between 0.5mm and 1.00mm. Close the furnace door. After exactly 7 minutes (from the time of putting the crucibles into the muffle furnace) remove the crucibles. Cool in desiccators for about 15 minutes.

Weigh each crucible with the residue, and subtract mass of crucible. Calculate the average of the three weight differences… **(Mass of Residue).**

Then calculate the percentage Volatile Matter using the formula below:

$$\text{Percentage Volatile Matter} = \frac{\text{Oven Dry Mass – Mass of Residue}}{\text{Oven Dry Sample}} \times 100\% \quad \text{.....(2)}$$

Procedure 3: Ash Content

Return the crucibles and their residues into the muffle furnace set at 900±25ºC for one hour. Cool the crucibles in desiccators for 15 minutes.

Weigh each crucible with its residue, and subtract the mass of the crucible. Calculate the average of the weight differences… **(Mass of Ash Content).**

Then calculate the percentage Ash Content using the formula:

$$\text{Percentage Ash Content} = \frac{\text{Mass of Ash Content}}{\text{Dry Oven Mass}} \times 100\% \quad \text{..... (3)}$$

Procedure 4: Fixed Carbon

Calculate the percentage Fixed Carbon using the formula:

Fixed Carbon = {100 – [**(1) + (2) + (3)**]} % .....**(4)**

2. Determination of Calorific Value

In these experiments, the following procedure from Advanced Level Physics by Nelkon and Parker (1995) is used. The gross calorific value or heat of combustion is the amount of heat energy released per unit mass when combustion is completed and the products have cooled to the initial temperature. This is determined on adiabatic bomb calorimeter model 1013-B having a working power of 100 Volts. The apparatus and materials required are: bomb calorimeter, 30kg of oxygen, cylinder filled with distilled water up to 2100g, Benzoic acid, an electron weighing balance, a piece of platinum ignition wire, a thermometer, a grinder, tissue and seasoned wood samples.

Procedure

Grind the test samples in a grinder.

Weigh 1 g of the sample in triplicate… **(Dry Oven Mass).**

Wrap with tissue paper of a known calorific value and mass

Tie with an ignition wire (Platinum) of known calorific value.

Connect both ends of the ignition wire to the bomb calorimeter electrodes (+,-) and place in a bomb and firmly closed.

Introduce 30 kg of oxygen into the bomb and immerse the bomb into a cylinder filled with distilled water up to 2100 g.

Calibrate the bomb calorimeter with benzoic acid of a known calorific value.

Use the following formula to calculate the Calorific Value, C_v, of the test samples:

$$C_v \text{ (Cal/g)} = \frac{[\text{Water Equivalent (g)} + \text{Water Quantity of inner Cylinder (g)}] \times \text{Temperature Rise } (^oC) - \text{Correction Value}}{\text{Dry Oven Mass (g)}}$$

…….. (5)

Where**,** the Correction Value is the sum of the calorific values for the tissue paper and the ignition wire.

The water Equivalent is to be computed as follows:

$$\text{Water Equivalent} = [C_v \text{ of Benzoic Acid} \times \text{Mass of Benzoic Acid}] - [\text{Mass of Water in inner Cylinder/Temperature Rise } (^oC)]$$

…… ……..…… (6)

APPENDIX B: THE FOCUS GROUP INTERVIEW SCHEDULE

PART A: PREAMBLE

This questionnaire is for collecting information on identification and selection of firewood from indigenous trees in Seme constituency. It will aid in establishing the main wood type that is known by Seme community since time immemorial to provide the best firewood; and the reasons for its choice by Seme community. This research will also establish if there are other uses of the identified tree, apart from its use as firewood. Finally the research will establish estimated costs, revenues and the challenges faced in farming of the identified tree. The results of this research will help in the value chain analysis of the firewood sector and how it can be transformed into a market oriented profitable and sustainable sector. The information collected during this research is only for academic purposes and will be treated as confidential.

PART B: PERSONAL INFORMATION

1. Name: ……..…….. (Optional). Age: ……
2. Location: ..... Sub-location: .....
3. Date of Interview: ……..…… Day of ……, 2014.
4.

PART C: FIREWOOD IDENTIFICATION AND COLECTION

1. Do you use firewood for cooking? Yes ☐ No ☐
2. Have you ever collected firewood in your life? Yes ☐ No ☐
3. What qualities do you look for in the firewood?

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4. What are the unique energy qualities inherent in *Midat* tree as firewood?

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5. Apart from use as firewood, in what other areas is *Midat* tree useful?

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6. What side effects of use of firewood are you aware of?

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7. Apart from the market, where else do you source your firewood from?

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   ……

8. How much does it cost you to buy firewood to last a week of ordinary use in your household?

   ……

   ……

PART D: FARMING IN MIDAT TREE

9. Do you grow *Midat* tree in your farm? Yes ☐ No ☐

10. What method of propagating Keyo tree do you prefer?

    Vegetative ☐ Seed Sowing ☐

11. Give reasons for your answer in 10 above.

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12. Do you use your *Midat* trees as source of income? Yes No

13. What are the main problems you face in the course of your farming activities?

    a. .....

    b. .....

c. .....

d. .....

14. Do you get any support from any organization or government department?

Yes ☐ No ☐

15. If your answer is Yes, which ones?

a. .....

b. .....

c. .....

16. If your answer in 14 is Yes, specify the kind of support?

a. .....

b. .....

c. .....

d. .....

17. What changes would you like to be implemented by the Government to facilitate your access to quality firewood?

a……

b ……

c …….

d ……