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The Impact of Access to Renewable Energy Technology
on Economic Development and Socio-Cultural
Transformation in Remote Rural Areas of Developing
Countries, A Case Study for Zimbabwe.

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Affidavit

I hereby affirm that, this PhD thesis entitled, “The impact access to renewable energy technology on economic development and socio cultural transformation in remote rural areas of developing countries, A case study of Zimbabwe”, represents my own written work. I have used no sources and aids other than those indicated. All passages quoted from publications or paraphrased from these sources are properly cited and attributed.

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Abstract

Chipendeke rural community in Zimbabwe witnessed a milestone in 2010 when a Micro Hydro Power plant started to generate modern energy, thereby breaking long vicious cycles of seemingly perpetual reliance on traditional biomass energy. This community case study is presented in this thesis where the impact of access to renewable energy technologies on economic development and socio-cultural transformation is explored. Peasant farming being the main economic activity, the research employed the difference in difference methodology to analyze agricultural output for two time periods, before and after electrification. A treatment group comprised of purposefully sampled 38 farmers with access to electricity and a control group comprised of 77 randomly selected farmers without access to electricity. The product of the variables Time and Access was processed from the data set to generate a new variable named TAP. This variable is instrumental to the methodology because it shows the effect of treatment on the treatment group and compares it to the control group for the two time periods. Results obtained by modelling crop harvests and farmers income levels failed to reject the working hypothesis. Furthermore, the thesis scrutinises the impact of development on socio-cultural transformation by focusing on main attributes of the indigenous Zimbabwean culture. Subsequently, qualitative combined with quantitative analysis of culture attributes failed to reject the working hypothesis on dressing, foreign music, and language use when youth are communicating with elders, but the working hypothesis was rejected on love relationships, traditional & contemporary music, and language use when youth are communicating among themselves. To conclude the research, 18 rounds of collective action simulation experiments using death reflection situation cues were conducted. The outcome showed that as more rounds were played, willingness to contribute towards conservation of public goods increases as free riders in the initial rounds were transformed to cooperators.

Abstract (Deutsch)

Chipendeke, eine ländliche Gemeinde in Simbabwe, erlebte eine wichtige Veränderung im Jahr 2010. Ein Mikro Wasserkraftwerk wurde installiert, wodurch die Produktion moderner Energie ermöglicht wurde, damit endete ein langer Teufelskreis der ewigen Abhängigkeit von traditioneller Biomasse-Energie. In dieser Arbeit wurde die gemeinschaftliche Fallstudie präsentiert, in der die Auswirkungen des Zugangs zu erneuerbaren Energie-Technologien auf die wirtschaftliche Entwicklung und soziokulturellen Wandel erforscht wurde. Die wichtigste ökonomische Aktivität, Bauernwirtschaft, "Difference in Difference" Methodik, wurde benutzt um die landwirtschaftliche Leistung für zwei Zeiträume, vor und nach der Elektrifizierung zu analysieren. Die Behandlungsgruppe besteht aus gezielt abgetasteten 38 Bauern mit Zugang zu Strom und Kontrollgruppe, bestehend aus 77 zufällig ausgewählten Landwirten ohne Zugang. Das Produkt der Variablen "Zeit" und der Variablen "Zugriff" wurde mit dem Datensatz generiert, um die Variable "TAP" zu erzeugen. Diese Variable ist entscheidend für die Methodik, weil sie die Wirkung der Behandlung auf die Behandlungsgruppe zeigt und diese mit der Kontrollgruppe für zwei Zeitperioden vergleicht. Die Ergebnisse, die durch die Modellierung der Getreideernte und des Einkommensniveaus der Bauern erhalten wurden, liefern keinen Grund die Hypothese zu verwerfen. Die Arbeit befasst sich des Weiteren mit der Frage nach den Auswirkungen der Entwicklung auf die sozio-kulturelle Transformation und legt den Fokus auf die fünf wichtigsten Attribute der indigenen simbabwischen Kultur. Dabei zeigt eine auf qualitativen und quantitativen Analysen basierende Untersuchung, dass die Arbeitshypothese für die kulturellen Attribute „Kleidungsstil“, „ausländische Musik“ und „Sprachkommunikation zwischen Jugendlichen und Älteren“ nicht zurückgewiesen werden kann, wohl aber für die Attribute „Liebesbeziehungen“, „traditionale und zeitgenössische Musik“ und „Sprachkommunikation unter Jugendlichen“. Abschließend wurde ein 18 ründiges "Collective Action" Simulationsexperiment zum eigenen Todesbewusstsein durchgeführt. Die Bereitschaft sich kooperativ zu verhalten stieg mit der Anzahl der gespielten Runden.

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The success of this research is attributed to the time and effort of different individuals and organizations that were willing to collaborate with the author. In particular, my appreciation goes to an International Non-Governmental Organisation called Practical Action. The organization engaged me as a partner through signing of a Memorandum of Understanding, (MoU) which allowed me to conduct research in rural communities of southern Africa where it is implementing community based renewable energy projects. In the same manner, my sincere appreciation goes to the Head Office for the Primary and Secondary Education in Harare, Zimbabwe which granted me permission to conduct the research on selected schools in Harare and Manicaland provinces.

I further express my deep gratitude to Mr Jefferson Philime who worked tirelessly to drive the research team in all the areas targeted for research. Most importantly, I would like to acknowledge the assistance and support I received from my supervisor, Professor A. Cunat who among other things, dedicated his time and effort to operationalize my research question as well as recommending appropriate statistical procedure for analyzing my data.

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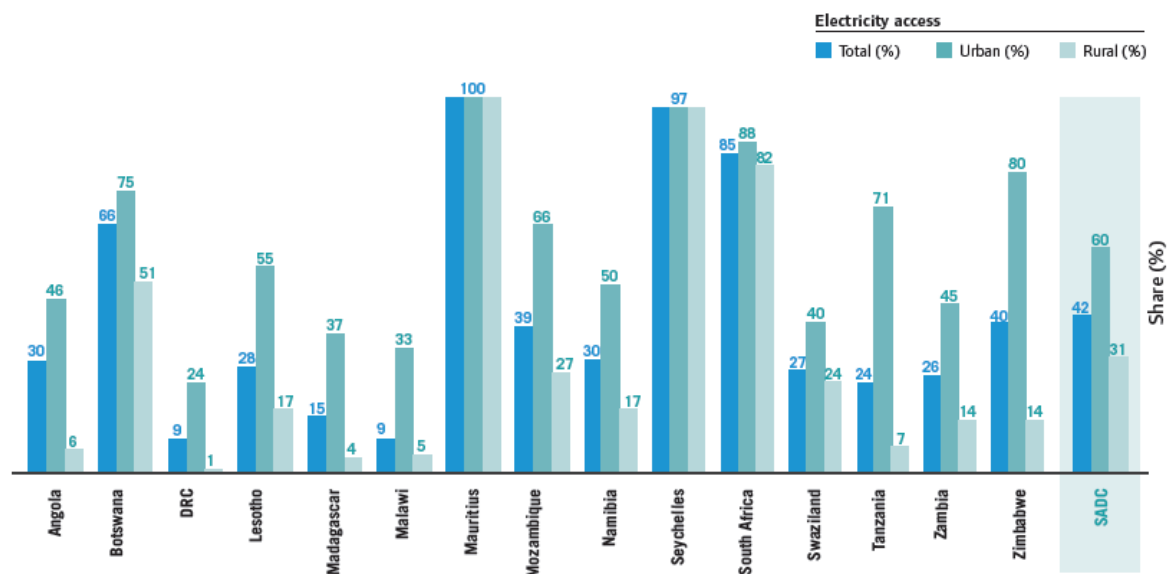
1 Introduction

Access to modern forms of energy is crucial in transforming remote rural communities in developing countries from poverty traps entangling them since time immemorial. The process of liberating these communities from energy poverty results in cultural and economic shake ups. Hence, the impact of development initiatives on indigenous cultures became an interesting field among practitioners of international development. Economic development is a broad topic. For the purpose of this study, it is confined to agriculture output, socio-cultural transformation, and environmentally sustainable farming practises in rural communities found in developing countries. By definition, developing countries constitute a cluster of about 120 countries located in Asia, Africa, Middle East, Central, and Latin America, many of them being former European colonies. Although these countries are all classified as developing, they differ on economic performance, degree of political stability, and religious practices. Arthur and Marenin study (Arthur & Marenin, 1995) states that in terms of political stability countries like Brazil, Nigeria and Myanmar have a history of military interventions and military rule. Some like the Central African Republic are permanently on the brink of chaos. Regarding their economic performance, countries such as Somalia are poverty stricken while others like Brazil, Korea, India and South Africa are developing. With respect to their religious and political systems countries like Iran and Brunei are governed by religious leaders while other countries like Cuba and Vietnam are socialist and secular. Despite these differences, all developing countries share the struggle regarding the transition from traditional to modern societies. In particular, the degree of political stability and instability in a country has serious consequences on the possibility for donor community to intervene with energy access projects and other community transformational development projects.

For the majority of the developing countries, agriculture is the main economic sector. History shows that in Africa, especially in the Sub-Saharan countries, colonialism encouraged a non-inclusive type of development pattern where unproductive areas in terms agriculture output were deliberately sidelined by development. This resulted in the servicing of infrastructure only in areas which produce raw materials. As a consequence, most rural communities lacked basic infrastructure like tarred roads, tapped water, and most importantly access to electricity which is a critical catalyst for development. In addition to the non-inclusive development pattern fostered by the colonial system, most post-colonial governments failed to electrify rural areas by grid extension due to financial constraints (Austin, 2010). Figure 1 illustrates this by

comparing urban and rural areas for countries in the Southern Africa Development Community (SADC).

Figure 1: Share of access to electricity in SADC countries rural areas and urban in 2012



Source: (SADC Renewable Energy and Energy Efficiency, Status Report, 2015).

To address this dire lack of access to modern energy in rural areas depicted in Figure 1, decentralization of electricity is a prime condition. As Karekezi and Kythioma show (Karekezi & Kithyoma, 2002), renewable energy technologies offer feasible and affordable solutions for establishing a decentralized supply of electricity in rural areas. The choice of one particular technology as well as its implementation in a particular area mainly depends on the geographical and climatic conditions prevailing in that area. For example, photovoltaic technologies will be the best choice for areas receiving adequate solar radiation, micro hydro power stations may be ideal in an area where fast flowing rivers exist, and wind turbines may be competitive regarding the generation of energy if wind blows freely. Given the choice between different renewable energy technologies, micro hydro powers plants are more preferred due to their simple design, comparable low cost of initial investment and maintenance and as a consequence they have low price per kilo watt (Fulford et al., 2000). Given those advantages, small hydro projects are widely implemented in rural communities, in addition to providing heating and lighting, they also accelerate rural economic development (ESMAP, 2003).

1.1 Energy Access analysis at world scale

According to World Bank (2001), one way to cope with the multidimensional aspects of poverty such as low income levels, low life expectancy, and poor health and education systems is to create opportunities such as enhancing access to modern forms energy. Energy access refers to a situation where people can secure modern energy which is commonly consumed at an affordable price (Bhattacharyya, 2006). Energy access is classified into three categories: house hold access, where specific households in a community are connected to electricity; community access, where the whole community is connected, and illegal access where some households obtain electricity through risky and unauthorized connections with no meters to charge their electricity consumption (Pachauri et al., 2004). OECD (2006) states that nearly 1.6 billion out of the total world population of 6.5 billion do not have access to electricity and 2.5 billion depend on biomass; that means mainly the poor lack access to modern energy and this lack of access is a contributing factor to the poor remaining poor. Furthermore, a study of the International Energy Agency alludes that:

“...more than 1.4 billion people worldwide lack access to electricity, 585 million people in Sub Saharan Africa (including over 76 million in Nigeria and some 69 million in Ethiopia) and the rest in developing Asia (including 400 million in India and 96 million Bangladesh). 85% of those without access to modern forms of energy live in rural areas” (International Energy Agency, 2010, p. 248).

Table 1 show the number of people without access to electricity and Figure 2 presents the same data in proportions and geographical locations. The proportion and number of people without access to electricity differs significantly across regions, but it is higher in Least Developed Countries, (LDC's) and Sub Saharan Africa than in other regions.

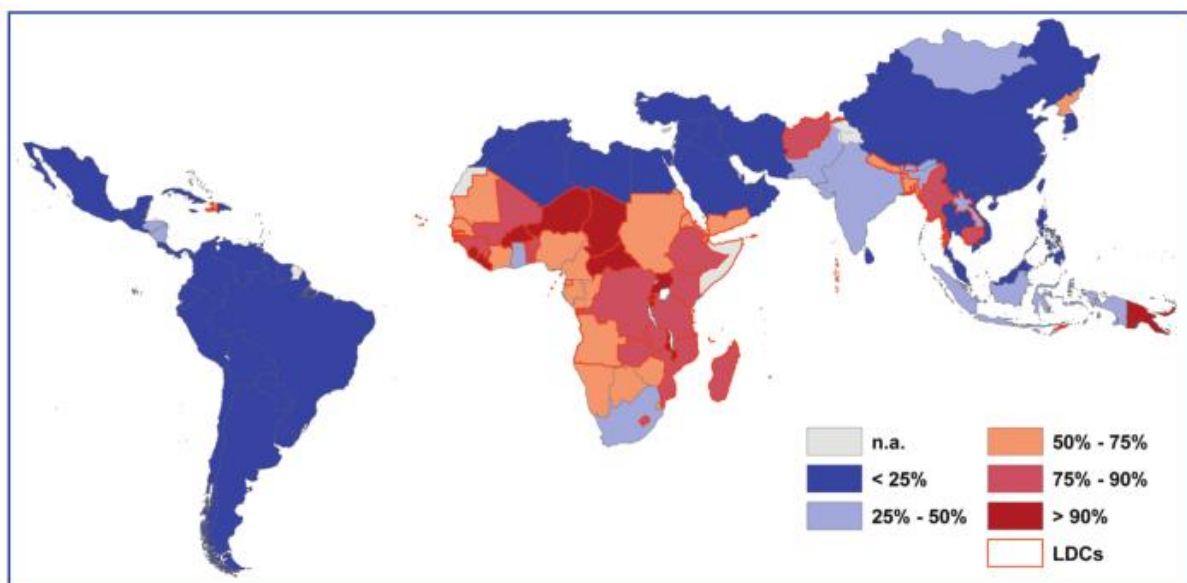
Table 1: People without access to electricity and relying on the use of biomass (numbers are in millions)

	Number of people lacking access to electricity	Number of people relying on the traditional use of biomass for cooking
Africa	587	657
<i>Sub-Saharan Africa</i>	585	653
Developing Asia	799	1 937
<i>China</i>	8	423
<i>India</i>	404	855
<i>Other Asia</i>	387	659
Latin America	31	85
Developing countries*	1 438	2 679
World**	1 441	2 679

*Includes Middle East countries. **Includes OECD and transition economies.

Source: (International Energy Agency, 2010, p. 248).

Figure 2: Proportion of people without access to electricity at a global scale



Source: (United Nations Development Programme, 2009, p. 11).

As can be noted in Figure 2 and Table 1, the LCD's and Sub Saharan Africa have a lower share of people with access to electricity 21% and 26% respectively, compared to developed countries which have access rate of above 90%. As a consequence of differences in access,

global effort to reduce the energy poverty gap has led to the establishment of three United Nations global energy goals to be achieved by 2030. The goals are as follows:

- Universal energy access by 2030,
- Reduced global energy intensity by 40 percent by 2030 and
- 30 percent of the world's energy to come from renewable sources by 2030,

Source: (The Secretary General Advisory Group on Climate Change, 2010).

Decentralization of electricity through renewable energy technologies is one of the most feasible means of attaining these goals since some remote areas in developing countries cannot be reached through grid extension. The United Nations Secretary General's Advisory Group on Energy and Climate (AGECC) took a leading role in setting these goals and it is responsible for steering discussions between Chief Executive Officers of leading global industries and representatives of the international community on issues pertaining to energy and environmental sustainability. Progress towards the achievement of the above goals is remarkable and different players such as the private sector and Non-Governmental Organizations are pre-occupied with implementing strategies to reduce the energy poverty especially in rural areas of developing countries. For the period 1970 to 1990, there was a worldwide progressive increase of rural electrification by 10% at the end of each decade (Food and Agriculture Organization, 2000).

Table 2: Increase in rural electrification for the period 1970-90, (Units are in billions)

	1970	1980	1990
World population	3,6	4,4	5,3
Developing countries rural population	2, 6	3,0	3,2
Rural residents with access to electricity	0,61	1,0	1,4
Rural residence without access to electricity	2,0	2,0	1,8
Percentage rural access	23%	33%	44%

Source: (Food and Agriculture Organisation, 2000).

The percentage increase after every decade from 1970 to 1990 is 23%, 33% and 44% respectively. Figures for the year 2000 and 2010 are not captured in the table above but, if the trend continues, worldwide rural electrification would have increased by 84% by 2030. This

forecast instills a sense of hope that the World energy goals set by the United Nations will be achieved in 2030:

1.1.1 Energy access in Southern African Development community, (SADC)

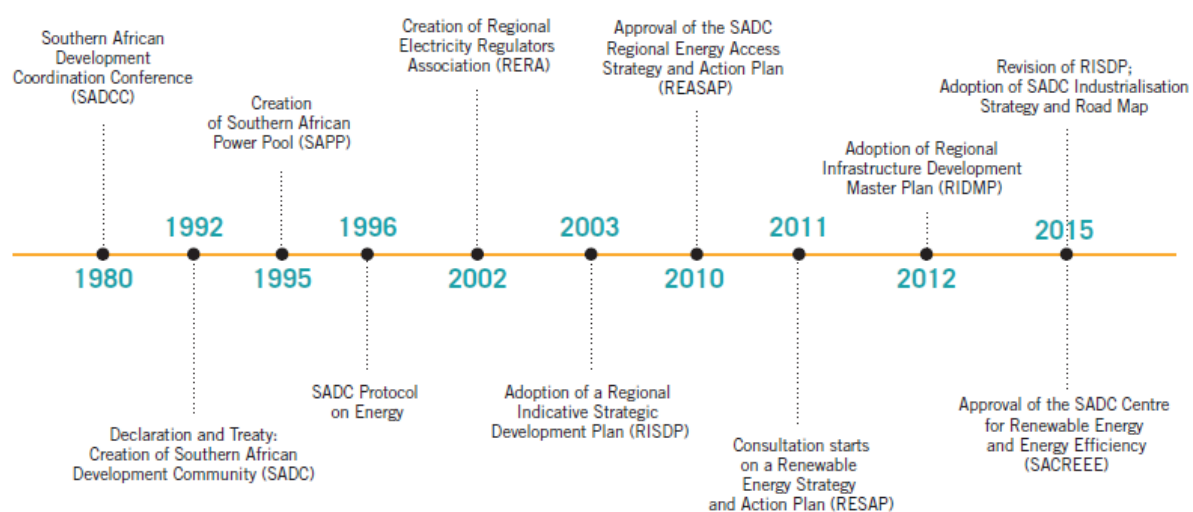
The SADC Regional Energy Access Strategy and Action Plan (REASAP), approved by the SADC energy ministers in 2010 set the following two goals regarding energy access for its 15 member states

- Firstly the strategic goal to harness energy resources in the region and to coordinate national action among member states to ensure that all SADC people have access to environmentally sustainable and reliable energy services at minimum costs.
- Secondly, an operational goal to reduce by half the percentage of people without access to electricity within 10 years and to reduce this by half again in the subsequent 5 year periods until universal access for all end users is achieved (AfDB, 2014).

1.1.2 Milestones for energy co-operation and integration in SADC

Excluding apartheid South Africa, SADCC (Southern African Development Coordination Conference, today SADC) was formed in 1980 in order to reduce the people's dependence on biomass as the primary form of energy. Its goal was to provide its member states with an effective coordination regarding the development of an effective energy infrastructure. As shown in Figure 3, several milestones were achieved in this process of energy co-operation.

Figure 3: Energy cooperation milestones in SADC region



Source: (SADC Renewable Energy and Energy Efficiency, Status Report, 2015).

SADC has developed two additional organisations in the energy field, which are considered to be subsidiary components of its Secretariat; the Southern Africa Power Pool (SAPP) and Regional Energy Regulators Association (RERA). The Southern Africa Power Pool (SAPP) was instituted in 1995 responding to the lack of interconnectedness expressed by member states. For this to be practical the SADC region was subdivided into two sections; the Northern section comprising Angola, Democratic Republic of Congo (DRC), Malawi, Mozambique, Tanzania, Zambia, and Zimbabwe where the base load is primarily supplied by hydropower. The Southern section; comprising Botswana, Lesotho, Namibia, Swaziland, and South Africa after the end of apartheid in 1994. Thermal power mainly supplies the base load in this section. The Regional Energy Regulators Association (RERA) was formed in 2002 responding to the increasing importance of access to electricity and the increasing role of energy regulatory bodies in the region. As of 1990, only three Southern African states had regulatory bodies. These bodies were not powerful in terms of enforcing measures in essential areas like tariffs and capacity development. To date, 12 out of 15 countries have either functional electricity or energy regulators. (SADC Renewable Energy and Energy Efficiency, Status Report, 2015). The SADC Centre for Renewable Energy and Energy Efficiency (SACREEE) is another subsidiary organisation approved on 24 July 2015 during a meeting of SADC energy ministers and the decision was subsequently endorsed by the SADC Council of Ministers in August of the same year. It is based in Namibia. Since its inception, the United Nations Industrial Development Organization (UNIDO) provided overwhelming support which includes completing a detailed feasibility study and roadmap in 2013 (SADC Renewable Energy and Energy Efficiency, Status Report, 2015).

1.1.3 Renewable energy capacity in SADC member states, 2014

Figure 4 shows the capacity of each SADC member state in using renewable energy technologies and it specifies the technologies by type.

Figure 4: Renewable energy capacity among SADC member states

	Technology type								Total	Percentage change 2000-2014
	Large-scale hydro	Medium-scale hydro	Small-scale hydro	Pumped storage	Solar PV	Onshore wind	Biomass/waste	Biogas		
	MW									
Angola	861	16	1	0	0	0	0	0	878	225%
Botswana	0	0	0	0	1	0	0	0	1	100%
DRC	2,360	50	6	0	0	0	0	0	2,416	1%
Lesotho	72	3	2	0	0	0	0	0	77	0%
Madagascar	130	34	1	0	3	1	0	0	169	55%
Malawi	346	4	1	0	1	0	17	0	369	21%
Mauritius	42	17	2	0	18	1	271	0	351	32%
Mozambique	2,182	3	1	0	1	0	0	0	2,187	0%
Namibia	332	0	0	0	5	0	0	0	337	35%
Seychelles	0	0	0	0	0	6	0	0	6	600%
South Africa	653	30	3	1,590	922	570	242	13	4,023	60%
Swaziland	55	6	2	0	0	0	75	0	138	48%
Tanzania	553	14	6	0	11	0	62	0	646	8%
Zambia	2,244	11	2	0	2	0	43	0	2,302	26%
Zimbabwe	680	6	2	0	5	0	97	0	790	6%
SADC	10,510	194	29	1,590	969	578	807	13	14,690	26%

Note: An entry of "0" means either that there is no use of the technology in that country, or that this use is very small and therefore not registered statistically.
Source: See endnote 1 for this section.

Source: (SADC Renewable Energy and Energy Efficiency, Status Report, 2015).

1.2 Relationship between development and culture

Assessing the relationship between developments associated with access to modern energy and culture change is one of the main themes of this thesis. An important step to approach this theme is to clarify the complex link between culture and development. Access to modern energy by traditional rural communities is treated in this thesis as an indicator of development. However, embracing this mode of development is likely to have some connotations on culture, given that some communities existed for generations without external forces of development. Programs such as the United Nations' sustainable energy for all initiative Flammini et al., (2014) and compulsory immunization of children under the age of 5 years Topuzoglu et al., (2005) are part of the modern day, all-inclusive paradigm shift in development. Their implementation is associated with some waves of culture change. For a holistic understanding of the relationship between culture and development, the departing point is spell out clear operational definitions of the two concepts.

1.2.1 What is culture?

Ukeje (1992) and Shoremi (1999) elucidate culture as the completeness of people's social conduct as seen from their material and non-material aspects of life such as belief systems, clothing, norms, and values. Mbakogu (2004) further postulates that culture comprises of material and non-material expressions of any society. This includes social, scientific, artistic, and technological expressions shared by people of the same ethnicity living within the same geographical boundaries. Culture depicts similarities among societies within the same territories and fosters a feeling of togetherness, which is passed down to future generations. Furthermore, certain features of a culture shared by members of a community are historically transmitted throughout generations. Culture is dynamic and is created by a process of adjustment to social setting. Accordingly, culture is thus a network of traits learned by interaction or deduced from history (Oyeneye & Shoremi, 1985). The pride of any society lies in its culture and there is no society worldwide which is great without reference to its indigenous culture and tradition (Dabaghian, 1970).

In addition to the various scholarly views cited above, I posit culture as a unifying factor in a community, it is used as an identity tag for individuals especially, in international settings. Moreover, it is something admirable; for example, a cultured person is someone with good manners, regardless of the culture he or she comes from. Therefore, it defines knowledge which

is transferred inter and intra-generationally among people in a particular society to shape their values, attitudes, and belief systems. It guides person's behaviour in different situations, such as in times of happiness or in times of sorrow. Furthermore, an important aspect of culture is that it operates at two levels: the conscious and unconscious level. From the time of conception, infancy, and the point of death of a human being, culture operates at an unconscious level. It is imposed on the subject by society and the recipient has no choice. Firstly, from the time of conception to birth and infancy of a human being, a child is recipient of the cultural practices of parents. Also, when a person dies, the funeral proceedings are conducted according to the culture of the deceased person's family. In both of these instances, the new born child and the deceased person are passive recipients of their family and community culture. This is the unconscious level of culture where the subject has no choice. Secondly, the conscious level of culture is when the subject is an active participant, aware of his or her cultural practices, and has a choice to strictly follow or to engage in culture change through various ways such as by migration and acculturation. The discourse surrounding the conscious level of culture is the focus of this research where development initiatives implemented in traditional communities occupy a central position for people to express their culture. Thus, people decide to maintain doctrines of their culture in pure form or to welcome culture change.

Zimbabwe is one of the countries where the effect of development in remote rural communities is being felt, especially by conservative communities which place high value on their traditional culture. At present, these communities face transformation on some aspects of their culture, which is becoming cause for concern among community elders and politicians. The indigenous Zimbabwean culture is defined by the native tribes inhabiting the country. Tribes in Zimbabwe are made up of 98% Africans and 2% non-Africans. The country's populations consist of two major Bantu groups, the "Shona" and the "Ndebele" people. The "Shona" constitute the majority, adding up to about 82%, and the "Ndebele" accounts for 14%. The "Shona" tribe is divided into several subgroups, such as the "Korekore" group located in the north of Zimbabwe, the "Zezuru" located in centre around Harare, the capital city of the country, the "Karanga" located in the South, the "Ndau" and "Manyika" in the east, and the "Kalanga" are located in the west. In contrast, the "Rozwi" inhabit no particular region of Zimbabwe but are spread country-wide. The "Ndebele" located in the south originally emigrated from South Africa and constitute the majority in the second capital city of Zimbabwe known as "Bulawayo". The "Tonga" people, located near the Lake Kariba, and the "Sotho", "Venda", and "Hlengwe" located along the southern border of Zimbabwe, constitute the remaining 11%

of the country's population. Only 1% of the Zimbabwe's population are non-Africans, mainly white Europeans, who emigrated from the United Kingdom or South Africa, like the Dutch Afrikaners.

1.2.2 The concept of development

Depending on the emphasized characteristics, authors define "development" differently. There is no "one-size-fits all" definition. Thus, the concept "development is contested, complex, and ambiguous" (Thomas, 2004, p. 1). However, multiple scholarly definitions seem to agree "development" refers to change in different aspects of human life and that one of the simplest definitions of "development" is the notion of good change (Chambers, 2004). The post-modern perspective, also known as the post-development or post-colonial stance, is hinged on the premise that development has traditionally been comprised of bad change and negative outcomes by imposing western ethnocentric views on the Third World (Foucault, 1969). Its position is that development is a discourse that shapes reality and power relations because it places high value on some issues over others. For instance, from a materialistic point of view, those without economic stamina (non-industrialised societies) were viewed by the western societies as inferior because it was thought that for principal reasons such as laziness, ignorance, and other imagined national characteristics, it was impossible to educate them and increase their economic performance (Parfitt, 2002). The rise of this perspective was in response to rapid development which has been occurring since the end of the Second World War but, during most of this post war period, this perception has changed. It was thought that by studying the historical development of Western industrial societies, it would be possible to obtain a blueprint for the development of non-industrialized countries. (Sachs, 2010).

1.2.3 Criticism of the postmodern approach to development

The main criticism of the postmodern approach is that the definition of development is regarded as a synonym for modernity and in the discourse on development, "modernity" is presented as a normative issue which is superior to the tradition of under-developed countries. In a nutshell, viewing development as a discourse constructed in the North and imposed on the South is the root of postmodern theorists' criticisms. Such a discourse is socially constructed and is deliberately made to highlight some aspects which are not found in the South. For instance, indigenous knowledge systems in the South or the so called traditional non-Western approach to medicine and other aspects of social life are viewed as inferior (Booth et al, 2006).

Furthermore, Western political and intellectual representations of the Third World have been integral to subordinate them through the concept of orientalism. Orientalism is a systematic discipline where European culture have imaginatively become capable to produce the “Orient” politically, ideologically, and scientifically (Said, 1995, p. 3). The “orient” in this sense is synonymous to all non-Western societies or Third World countries. An analysis of Western novels, operas, and media portrays a link with Western imperialism. The Western cultural representation and conquest of Third World countries dominates Western literature, especially the writings of Dickens, Austen, James, and Hardy, and the same applies to contemporary media representations of developing countries. These representations are not neutral as they contain a will to power. Therefore, the “Orient” is analogous to all developing countries or non-western states and lack of access to electricity is one of the characteristics of the orient. The concern of post development writers is that development workers and intellectuals can be complicit with neo-colonial knowledge and their practices can silence marginalised Third World countries (Said, 1995).

1.2.4 United Nations’ perspective on culture and development

For comprehensive understanding of the relationship between culture and development, a blueprint is provided by assessing the activities and stance of United Nations Education and Scientific Organisation (UNESCO), which, from its inception, stressed the connection between culture and development (Mbakogu, 2004). UNESCO’s mission statement, which focuses on the objectives of achieving peace, common welfare for mankind, advancing education, scientific and cultural relations of all people in the world, highlights this relationship. Driven by this mission statement, emphasis on culture became crucial in the period of 1960s, the so-called post-colonial phase. In this phase, people from the South who were liberated from colonialism became of their existence. They constantly disagreed with the notion that to be development means becoming westernised, instead they quest for their own cultural norms and values to be the guiding blocks in their path of development. Further support to this is found in Article 1, used at the declaration of 1966 UNESCO General Conference, which states that every culture has dignity and rich values that have to be respected and preserved. It is the responsibility of all people to develop and sustain their culture. Moreover, the 1970 Inter-Governmental Conference focusing on Administrative and Financial Issues of cultural policies held in Venice, was the catalyst for the process of placing culture at the core of policy making.

The summary of the conference and the point for the world to take home was from the then UNESCO Director-General, Rene Maheu, whose message to the world was:

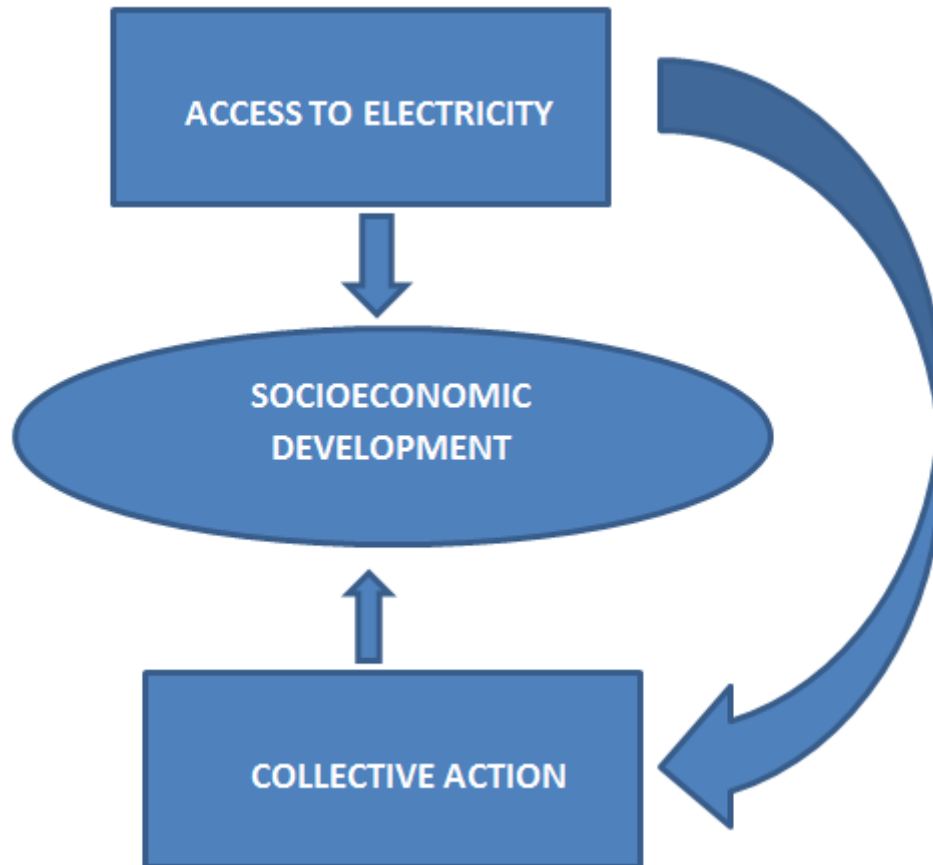
“Man is the means and the end of development; he is not the one-dimensional abstraction of homo economicus, but a living reality, a human person, in the infinite variety of his needs, his potentials and his aspirations... in the concept of development the centre of gravity has thus shifted from the economic to the social, and we have reached a point where this shift begins to approach the cultural”
(Mbakogu 2004, p. 40-41).

Equally important was the Intergovernmental Conference on Cultural Policies in Europe held in Helsinki in 1972. It pointed out that development based purely on economic growth is maladjusted and cannot stand the test of time in the current environment. In addition, the World Conference on Cultural Policies held in Mexico City in 1982 came up with a unique definition which linked development and culture. The conference points to culture as a holistic, complex, intellectual material and spiritual feature which characterises any social group. Lastly, the world decade of culture development was rolled out and covered a ten year period from 1988 to 1997 where UNESCO was set to archive the following key objectives: to highly emphasise cultural aspects in development, to affirm and enrich cultural identities and to enhance and promote international cooperation among states (Mbakogu, 2004).

1.3 Simplified research Model of the thesis

Below, Figure 5, illustrates a simplified summary of this study. It shows the causal relationship between access to electricity, collective action, and socio-economic development in a community.

Figure 5: Thesis research model



The top middle arrow illustrates that access to electricity has a direct impact on socio-economic development in a community. The long arrow on the right side shows that environmental side effects which accrue to increase in farming activities as a result of access to electricity can be mitigated by community involvement in collective action. Lastly, the middle arrow at the bottom show that when a community engage in collective action to mitigate environmental problems, it leads its socio economic development as indicated by the middle circle.

1.4 Thesis problem statement

Enhancing access to modern forms of energy in remote rural communities of developing countries is a catalyst for their economic development. In this respect, a wide range of research had until now pointed to a positive relationship between energy input and output in farming Singh et al., (2004), Kumar et al., (2007) and Shabani et al., (2011). However, this energy input and output relationship is not so obvious; there are some aspects, such as energy ownership which also have a bearing on output. A study by Kirubi et al., (2008) show that ownership of micro grids involving multiple stakeholders in the community was an influencing factor on agriculture output. Given this result, this study will streamline ownership to focus on a single beneficiary stakeholder instead of spreading it to a range of stakeholders and establish if the impact remains worthwhile to the community.

Apart from the relationship between access to renewable energy and crop harvest output, access to energy affects the dynamics of indigenous culture in a community. In line with this subject, a study by Mbaiwa (2011) alludes that implementation of community development initiatives triggers major culture changes in the Okavango Delta, Botswana. These findings inspired further exploration into the dynamics between development associated with access to renewable energy and the indigenous Zimbabwean culture. Furthermore, the relationship between access to energy and environmentally sustainable farming practices grounded on providing market based incentives to farmers will be investigated. The background to this is the outcome of the following studies; Sommerville et al., (2010) : Reeson & Tisdell (2010). Results of these studies showed that use of market-based incentive has little impact on collective action towards conservation of natural resources. The decision of some participants who decide to free ride on the effort of others is highlighted as a limiting factor to collective action in these studies.

1.5 Thesis objectives

1.5.1 To assess the impact of access to renewable energy on crop harvest output

While the issues of access to energy on crop harvest output have been researched before, many authors have not gone at length to consider the issue of energy ownership as an influencing factor on output. Authors mainly show a positive relationship between energy input and output. A case study in Kenya by Kirubi et al., (2008) shows that, involving a wide range of stakeholders in energy ownership increases output. In the study, ownership of diesel-powered

micro grid involved local institutions, local entrepreneurs, and farmers who contributed through labour and cash. On the other hand, ownership as a factor influencing output at Chipendeke community was confined to the direct beneficiaries of the energy project by recognising their sweaty equity contribution in construction phase as dividend shares in the project. No other community stakeholders were involved. Given this reduction in ownership factors at Chipendeke community, the first objective of this thesis is to investigate if the output remains meaningful to the community when ownership is confined to a single actor.

1.5.2 To explore the relationship between access to modern energy and culture change

In a study focusing on cultural erosion and the crisis of development in Nigeria, Yakubu (2002) points to a decaying rich indigenous cultural heritage vis-a-vis the consequent development crisis facing the nation. Youths are abandoning attributes of their indigenous cultural heritage such as: languages, clothes, music, festivals, sex, relationships, arts and crafts, and religion opting for western values; yet, the predominant mode of living in the country is divorced from western lifestyles. As a consequence, a hybrid culture has emerged, posing further complications on the task to overcome complex development challenges in the country. In another study Mbaiwa (2011) shows that tourism development triggered major cultural changes in the Okavango Delta, Botswana. As a result of tourism development in the Delta, traditional livelihoods activities and lifestyles, such as hunting and gathering crops declined. Moreover, development in the Delta saw the emergence of new forms of livelihoods such as formal employment in the tourism project and the sale of crafts to tourists, and thatching grass to tourism lodges. In addition, income they earn enables them to build modern houses replacing the traditional huts, and purchase foreign foods, among other things.

Inspired by these two studies where development is explained as a cause of culture change, the second objective of this thesis is to explore the relationship between development triggered by access to electricity and the indigenous Zimbabwean culture. Before conducting this study, the research team gathered views on culture change from community leaders in Zimbabwe. The views obtained show a causal link between access to electricity (use of various electrical gadgets by the youth) and cultural changes which are taking place. To ascertain these views, this study considers the following main attributes of the indigenous Zimbabwean culture; dressing, music, love relationships, and language usage. This is done by examining two provinces of Zimbabwe with contrasting levels of access to electricity and development levels.

1.5.3 To assess the relationship between access to energy and environmentally sustainable farming practice

Rustagi et al., (2010) study states that collective action towards conservation of natural resources in most rural settings is based on social norms. Introducing formal institutions such as Payment for Ecosystem Services (PES) as an economic instrument provides little additional incentives. It crowds out the moral incentive for conservation as some participants choose to free ride on the effort of others (Sommerville et al., 2010). In a similar way, another study concludes as follows:

“In our experimental scenario, there was no increase in public good provision following the introduction of the more competitive tender, even though additional funds were being paid out as incentives. Therefore under some circumstances, introducing market-based institutions to provide incentives for the provision of public goods may have unintended consequences” (Reason and Tisdell, 2010, p. 452).

In addition, findings on collective action research show that the temptation to free ride on collective benefits is a universal problem. Accordingly, in self-organised resource governance regimes, participants invest in monitoring and sanctioning each other in order to reduce the probability of free riding (Ostrom et al., 1994). All these cited studies point to the use of market based incentive and formal institutions in collective action as associated with the challenges of free riding. However, in this thesis, a market based incentive for farmers to sell their produce on the lucrative market for organic farm products, where prices are higher, is guaranteed. This will be on the condition that they substitute the current use of chemical fertilizers with organic fertilizers when cultivating their crops. In line with this measure, the last objective would be to conduct a collective action simulation experiment. In the simulation, farmers are to be induced with death reflection situation cues. Doing this enables them to conduct introspection of environmental consequences associated with their farming practices.

1.6 Working hypothesis and thesis structure

The following working hypothesis has been constructed for this study:

Access to renewable energy technology triggers specific consequences; increases in agricultural output, environment sustainability, social, and cultural changes in remote rural communities of Zimbabwe.

Economic development alluded to in the working hypothesis is confined to farmers crop harvest output because farming is the main form of livelihoods in rural communities. Culture change and environmentally sustainable farming practice are highlighted in the hypothesis because they constitute important components in attaining economic development.

To achieve the objectives of this thesis, it is structured into six chapters. Chapter one gives the introduction of the whole study. It shows the situation of energy access at world scale where attention is focused on rural areas of developing countries with particular reference to countries in the Southern African Development Community (SADC) region. Definitions of culture and development are elaborated as well as the linkage between these two concepts. In addition, research objectives and working hypothesis is formulated. Chapter two gives a detailed background information of Chipendeke community case study. An analysis of energy situation and culture and the indigenous Zimbabwean culture in the broad African context is conducted. Specific tribal groups inhabiting the country are outlined and this is preceded by a detailed explanation of the five selected main attributes of the Zimbabwean culture. Chapter three focuses on the literature review and a theoretical frameworks which underpins this research. The theory of sustainable agriculture intensification states that sustainable intensification of agriculture systems improves agriculture yields without damage to the environment. Moreover, heuristics, terror management, and generative theories in the field of psychology are used to understand impact of development on culture and the role of collective action in protecting the public goods. Furthermore, studies on rural electrification programs in Vietnam, Bolivia, Tanzania, Kenya, and South Korea are reviewed.

Chapter four outlines methodological procedures employed to conduct the research. The Difference in Difference methodology is an econometric procedure used to analyse impact of an intervention before and after an intervention has been used. This methodology is set to establish the effect of treatment on farmers in the treatment group. The effect of treatment is confirmed during the second time point when the outcome of the treatment and control groups is compared. Moreover, to determine the impact of development on culture, a structured survey questionnaire will be designed and administered to youth in high schools in the two purposefully sampled provinces. In addition, a public good simulation experiment by inducing death awareness and death reflection situation cues will be implemented. This methodological procedure will establish the extent to which farmers are willing to engage in collective action to preserve their farmland from further deterioration. Chapter five presents results in three

sections. The first section shows results on the impact of access to renewable energy on crop harvest output. The second section shows the relationship between access to energy and culture change, and thirdly are the results of a simulation experiment with farmers showing the relationship between access to energy and environment sustainability. This will be followed by chapter six, the conclusion where the results are discussed.

2 Case study background and Zimbabwean culture overview

2.1 Introduction

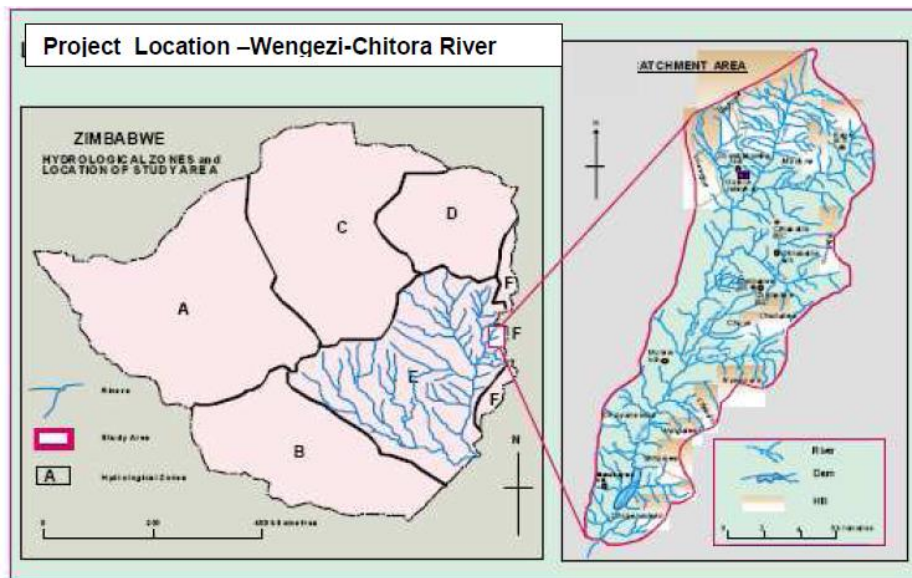
This chapter outlines the background information of Chipendeke Community case study as well as detailing the culture of Zimbabwe in the broad context of Southern African region where the country is located. Furthermore, the energy situation in the country is discussed so as to shed light on the progress being made towards renewable energy technologies such as ethanol, biodiesel, and micro hydro power plants to make them a bigger component of the energy mix for the country. Regarding culture, the country has its own unique culture which is a reflection of different tribes inhabiting the land. A summation of cultural attributes of each tribe is the flagship of the country's culture. From this flagship, five major attributes of culture will be examined and these include; music, dressing, love relationships, crime and language usage. Music as an attribute of the Zimbabwean culture, in this study is classified into three categories; foreign, traditional and contemporary music. Furthermore, courtship and love relationships is an interesting aspect of the Zimbabwean culture are mainly the preoccupation of the youth who are seeking for companionship. Some love relationships lead to marriage while others end before they even start. Expressing explicit romantic love feelings in public spheres is a taboo according to the culture. This is confined only to private settings. The overall goal of courtship, according to the Zimbabwean culture is for the process to lead to marriage. Thus, this chapter endeavours to explain the different types of marriage unions which exist within the country's cultural settings.

2.2 Background information on Chipendeke community

Chipendeke rural community is located in the eastern highlands region of Zimbabwe, near the border with Mozambique. The region is mountainous and it is one of the areas with the greatest hydro potential in the country owing to its high altitude. The community is situated along Wengezi River, a tributary of Chitora River, in Save River Catchment area. One of the notable features in the community is the gravity feed sprinkler irrigation which tapes water from the perennial Wengezi-Chitora river. The community is largely engaged in cash crop farming. Major crops produced and sold are wheat, maize, sugar beans, Cassava, potatoes, tomatoes, and small grains. A Non-Governmental Organization called Practical Action Southern Africa is involved on a project called "Catalyzing modern energy service delivery to marginalized communities in Southern Africa" covering Zimbabwe, Mozambique and Malawi. The goal of

the project is to increase uptake of renewable energy technologies in poor rural communities of Southern Africa. Chipendeke rural community is one of the beneficiary community of this project. Figure 6 below show its location along Wengezi-Chitora River in Zimbabwe

Figure 6: MHP project location in Zimbabwe



Source: (Practical Action Southern Africa, 2008).

The demographics of Chipendeke are composed of a total population of 7 284 with an average household size of 5.2 as shown in the Table 3 below.

Table 3: demographics of Chipendeke community

Males	Females	Total Population	Number of households	Average household size
3 562	3 722	7 284	1 390	5.2

Source: (Practical Action Southern Africa, 2008).

2.2.1 Assessment of Micro Hydro Power in Chipendeke

The feasibility assessment for a Micro Hydro Power generation was conducted from the 13th to the 17th of January 2009 by a team which comprised of engineers from Practical Action Southern Africa, Ministry of Energy and Power Development and Zimbabwe National Water Authority. The purpose of the hydro assessment was to investigate if there was adequate water to sustain hydro-power generation for a long period. During the hydrological assessments, the local leadership which was also part of the assessment team stated that the stream was flowing at its lowest level as compared to other times of the year. A thorough assessment of

the site was conducted and it involved an investigation of the source of water, the potential site of the turbine and potential energy demand centres. A final report of the assessment findings was produced by the Ministry of Energy with details on the technical hydro potential of Wengezi Chitora River. A noted advantage was that the geology of the area which is mainly of granite rock offers scope for strong foundation to anchor the abstraction system (Practical Action Southern Africa, 2008). The hydrological measurements conducted at the abstraction site showed that the river discharge was 25 liters per second. There is a significant drop in head of about 200 meters. Head refers to the difference in altitude of weir location point and the point where the turbine is located, this gives the height or gradient at which the water flows to the turbine (Dan, 2005). The greater the head, the faster the velocity at which the water flows and gravity of 9, 81 was measured on the head. The formula below shows how the current potential power output was calculated using an average head of 120metres.

$$\text{Power} = 9.81 \times 120 \times 0.025$$

$$= 30\text{kilowatts-hour (kWh)}$$

The calculations above conducted by the Ministry of Energy showed that the site can generate power of 30kWh despite the abstraction of water for irrigation and also there was high potential to generate more than these kWh, (Practical Action Southern Africa, 2008). Given this situation where the head is good coupled with the fact that water for the hydropower is residual from irrigation and other upstream activities a 3 Jet Pelton turbine was recommended. The Pelton turbine is very efficient and can operate even with small heads, Figure 7 shows the turbine with community workers manually opening two jets.

Figure 7: Three Jet Pelton Turbine with power house workers opening the jets



This picture was taken by the research team. As shown in the photograph, the jets which divert water into the turbines can be adjusted and if all the jets are fully opened maximum power equivalent of 30kWh, is produced by the turbines. After water has entered into the turbines, it is re-channelled back to join the mainstream of the river. Energy produced through this micro hydro technology is environmentally friendly (clean), no greenhouse gases are emitted. Moreover, this technology does not consume water, but it just harnesses the energy in it and diverts it back to join the mainstream Wengezi- Chitora River.

Figure 8 below shows the mouth of the penstock where water from the river is diverted to generate power.

Figure 8: Mouth of the Penstock



Source: (Practical Action Southern Africa, 2008)

Shown above Figure 8 is part of Wengezi-Chitora River where the mouth of the penstock (pipes) is situated. Seen visibly is the civil construction work which was part of the community sweat equity contribution to the project. They conducted the construction works under the supervision of an engineers from Practical Action Southern Africa. This photograph was taken by Practical Action in 2014, it was a good year, with no drought and this is evidenced by the visible high volume of water flowing in the river course. Furthermore, Figure 9 below shows some of the workers in Chipendeke actively involved in the construction works as part of their sweaty equity contribution.

Figure 9: Chipendeke Community members during sweat equity contribution



Source: (Practical Action Southern Africa, 2008).

Sweat equity contribution in the form of heavy construction manual work was male dominated as can be seen in Figure 9. Females were mainly involved in gathering locally available materials such as quarry stones, pit sand, bricks, and river sand and ensure that they were available at the construction site.

Figure 10: Civil construction work diverging water from the mouth of penstock



Figure 10 above show part of the outcomes of civil construction works build by the community. This trench is diverting water from the mouth of the penstock to the turbines. The photography was taken by the research team in January 2016. This period was the peak of El- Niño induced drought affecting Southern Africa region as can be noted by very little amount of water in the river course contrary to Figure 8, which is the same spot on the river, the mouth of the penstock which was taken in 2014 when there was no drought. Nevertheless, during this drought stricken period, researchers noted that the community was still able to generate electricity by opening only one jet of the Pelton turbine.

Figure 11: The penstock, (head) caring water to the turbine house



Source: (Practical Action Southern Africa, 2008).

The head refers to the vertical distance between the mouth of penstock (obstruction pipe) and the turbine location. In this picture, the head has a significant drop of about 200 metres where the water is being diverted from the river downhill to the 3 jets pelton turbine location. This high head increases the velocity of the water and results in more power being generated.

Figure 12: Turbine house, towards completion phase



Source: (Practical Action Southern Africa 2008).

This picture, figure12 was taken by the project implementing partner (Practical Action) at a phase when the construction works of the Micro Hydro Power plant was almost complete.

Figure 13: Turbine house after completion



Figure 13 is a photograph showing the current status of the turbine house. It was taken by the research team in January 2016. The house is securely locked to protect the turbines and other equipment inside.

Figure 14: Power house worker observing meter readings



Figure 14 is another photograph taken by the research team in January 2016. It show one of the community power house worker observing power output from the meter readings as the turbines are running.

Figure 15: Donors involved in funding the project

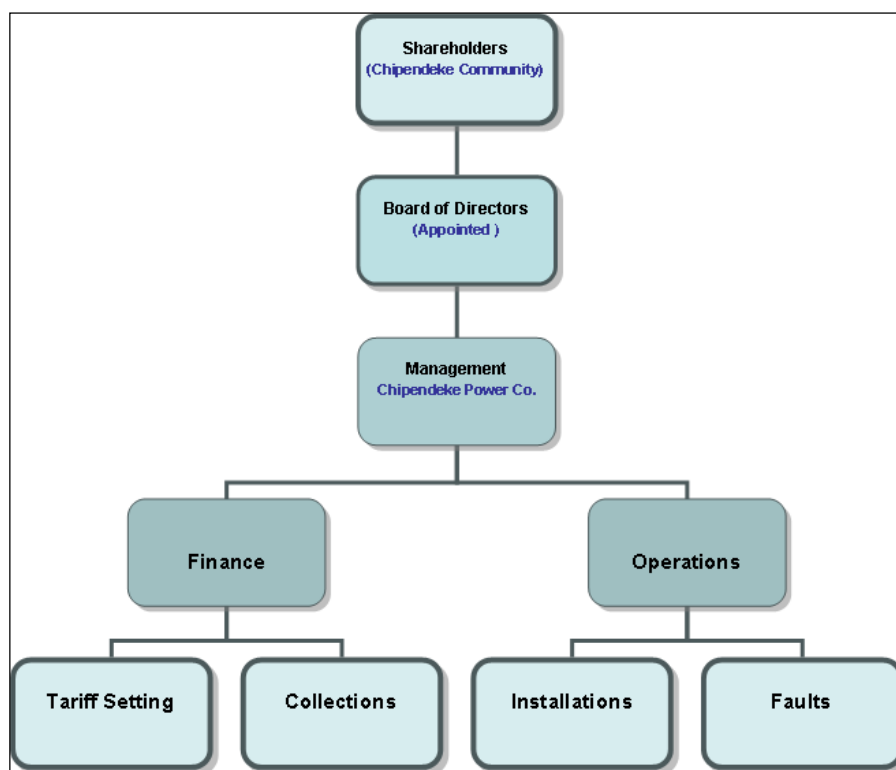


Figure 15 photographed by the research team. It show the donors of the projects who are European Union Energy Facility and Practical Action. It also shows the date 27 June 2012 when the project was commissioned to the community by the resident Minister of Manicaland province which the community belongs to.

2.2.2 Chipendeke Power Company, (Pvt Ltd)

The Micro Hydro Power project is being operated as a community owned private company called Chipendeke Power Company, (Pvt Ltd). Figure 16 show the company management structure. A business model or shares for dividends model which promotes sustainability through community investment in the form of sweat equity contribution is being used. Sweaty equity contribution refers to all labour and locally available materials including sand, quarry stones, excavation of trenches, building and general labour of carrying water for building, cement and pipes which was done by the community. This contribution from the community was valued based on the prevailing market worth of the task and came to a total of €18 340.00 (Practical Action Southern Africa, 2008). This amount became the dividends shares or the sweat equity contribution of the community in the company.

Figure 16: Chipendeke Power Company management structure

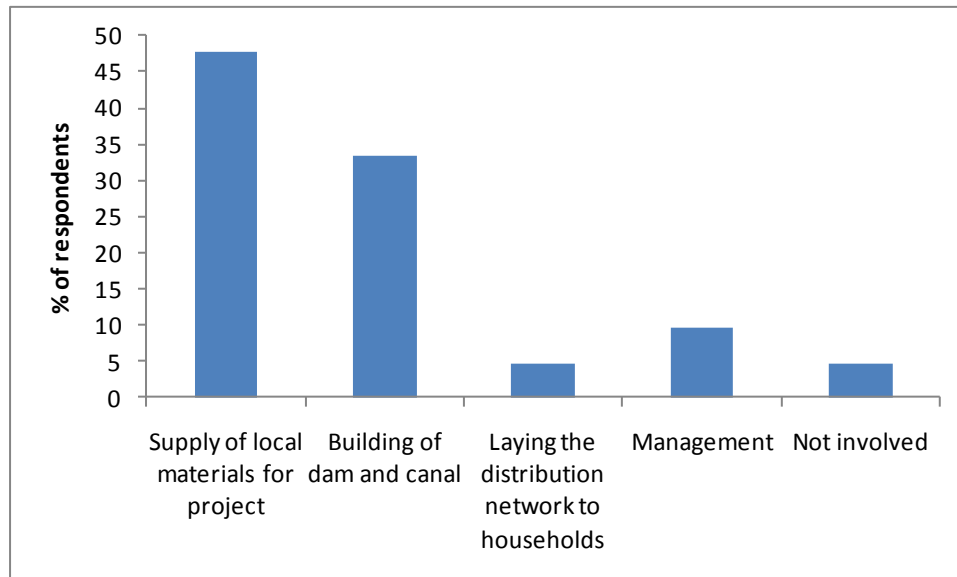


Source: Practical Action Southern Africa, 2008

Chipendeke Power Company scheme is a grant that was co-funded by European Commission (EC) Energy facility and Practical Action to a total of €68 903.00 and 25% of this amount was sweat equity contribution by the Chipendeke community. The life span of the project was estimated to be about twenty years after which the installed turbine would have undergone

enough wear and tear, thus need to be replaced (Practical Action 2008). Figure 17 show the various activities which constituted community sweaty equity contribution during micro hydro power station construction phase.

Figure 17: Various activities contributed by the community.



Source: (Zinamwe et al., 2010).

The graph show that supply of locally available materials used for the civil construction work of the power plant is the greatest community contribution. This is followed by the technical expertise required to build the canal which was done by local builders under the supervision of engineers from Practical Action. Laying of power transmitting poles to connect households, the clinic, local school and the business centre is in the middle of the graph. In terms of management the community was also involved though their contribution was small. Lastly, there were some highly technical tasks such as surveying and choosing an appropriate turbine that the community was not involved in as indicated by the extreme right bar on the graph. During the time of research, 38 households were already connected and the power station had potential to connect a maximum of 100. Researchers also observed that to avoid penalties for late payment of energy bills, a pre-paid system (household pay for energy before consuming it) was used by Chipendeke Power Company. A tariff structure has been designed which shows a break even tariff of US\$0.04 cents in the first year. Thereafter, inflation adjusted by 1.5% annual inflation rate.

2.2.3 Chipendeke Power Company, stakeholder analysis

A wide spectrum of stakeholders were involved since the inception of the micro hydro-power plant. Table 4 show the different stakeholders at local, district, provincial, national and internal level who were involved. The last Column outlines the role played by each stakeholder.

Table 4: Stakeholders for Chipendeke Micro Hydro Power Company

	Name of stakeholder	Classification	Stakeholder responsibility
1	Local community	Local	Day to day management of Chipendeke Power Company
2	Traditional leadership	Local	These include the Chief of the area and his village heads in different villages. They are consulted on any new development projects to be started in their community and give approval or disapproval.
3	Mutare Rural District Council, (MRDC)	District	They own the land in the district and provides planning for various land use activities. It approves the construction of the power plant at Chipendeke area.
4	District Administrator	District	Is the Government representative who gives approval to development initiatives at district level.
5	Zimbabwe National Water Authority, (ZINWA)	National	Provide policy and technical expertise on various use of water such as for energy generation and irrigation purposes.
6	Rural Electrification Authority, (REA).	National	Responsible for all the electricity generated and/or supplied to rural areas.
7	Ministry of Energy and Power Development. (MOEPD)	National	Provide advice and policy recommendations of renewable energy implementations.
8	Ministry of Agriculture	National	Ensures that productive and environmentally friendly farming methods are practised at community level.
9	Practical Action Southern Africa	International	The organisation handled the finance which was co-funded to the project. It was also

			responsible for implementation of the project at community level.
10	European Commission Energy facility.	International	Co-funded the project by providing a grant which financed major expenses of this project.

2.2.4 Envisage benefits of the project to the community

2.2.4.1 Chipendeke Primary school

Advent of electricity is envisaged to bring positive education outcomes such as high pass rates for students at the local primary school. This is because electrification of the school will attract and retain qualified teachers, enable students to have long reading hours among other things.

2.2.4.2 The clinic

The rural health center is one of the most important institutions in the community which is supposed to improve its services because of electricity. Due to electric lighting, the clinic will be operating on 24/7 bases. Maternity surgical operations will be conducted even at night with adequate lighting instead of using candles and kerosene lamps. Also, sterilization of medical equipment and keeping vaccines under the required refrigeration conditions will be possible.

2.2.4.3 The community

The advent of electricity is envisaged to save time especially for the females who are the main source of farming labor, but at the same time spend some of their time in forests looking for firewood which is the major source of cooking fuel. In addition, they also travel long distances to the nearest diesel-powered grinding mill to convert maize into maize meal (Practical action, 2009).

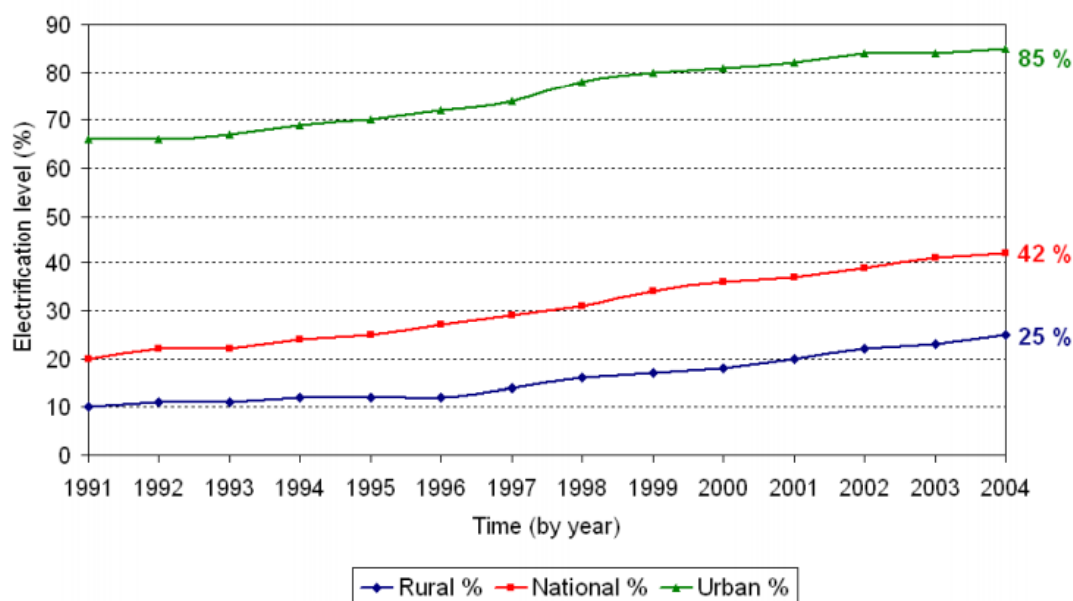
2.2.4.4 The business Centre

Long opening hours for shops at the business centre is likely to be enjoyed by shop owners. Currently, shops are only operating using day light. Candle light, though at times used during the evening, is not reliable. Long opening hours will increase profit for the business and they diversify the products to include those which require refrigeration.

2.3 Energy Situation in Zimbabwe

The main sources of energy used in Zimbabwe is hydro-electric power which is complemented by fossil fuels mainly coal, biomass and imported crude oil. Huge coal reserves are estimated to be around 12 billion metric tonnes with good quality calorific value ranging from 20 to 32 Mega joules per kilogram (MJ/Kg) exists in the country. However, despite the existence of massive energy resources in the country, per capita energy consumption is only 24.7 Giga joules (GJ) compared to an average of 200 GJ for the developed countries (Zimbabwe National Energy Policy, 2008). This low per capita energy consumption can be traced to the non-inclusive colonial development pattern alluded to in the introduction of this thesis. This development pattern resulted in electricity infrastructure covering raw material or resource extraction centres and urban areas while the population outside these centres remain with no access to electricity. Access to electricity as indicated by Figure 18 below is 40% at national level, 85% in urban areas and as low as 25% in rural areas (Zimbabwe Electricity Supply Authority, 2005) cited by (Tinarwo, 2011). The red line is for national level of electrification, green line is urban electrification and blue line is the trend for rural electrification. Since 1991, the rate of electrification at all three levels were gradually increasing until 2004. Data from 2004 onwards is not captured in the graph but the trend is likely to maintain a gradual increase.

Figure 18: Rural, National and Urban Levels of Electrification in Zimbabwe



Source: (Tinarwo, 2011).

In Zimbabwe, biomass energy provides the bulk of total energy supply accounting to 53%, followed by coal which accounts for 20%, liquid fuels accounts for 14%, and hydroelectricity power 13%. The energy share of the population in rural communities throughout the country is between 80 – 90% and this high percentage of energy consumption is met by biomass, mainly wood fuel. In urban settings, about 15 – 30% of households rely on biomass energy for cooking, coal, charcoal, and LPG is used by less than 1% of the households (Central Statistical Office Report, 2002).

The fact that major energy consumption is met by biomass indicates that the overall energy consumption pattern is not sustainable as the use of wood fuel exceeds the natural yields of forest. Furthermore, coal and petroleum which provide a large percentage of industrial energy are non-renewable sources of energy which has the disadvantage of polluting the environment and faces the risk of extinction in the near future. This points to the urgent need for the country to switch to renewable sources of energy as a huge component of its energy mix. Renewable sources of energy are flow (or rate) limited while non-renewable resources are stock limited. Stock limited resources such as oil and fossil fuels get depleted without being replenished on practical time scale as they take millions of years to form and accumulate. How long oil reserves last depends on the ability to explore and the rate it will be used as well as the monetary aspects associated with the exploration. The volume of oil stocks is independent of natural rate of replenishment since it is slow. On the other hand, flow-limited or renewable resources are virtually inexhaustible over time because their use does not diminish the production of the next unit (Gleich et al., 2009). For this reason, Zimbabwe needs to exploit ways which encourage the use of flow limited or renewable resources which are sustainable compared to total reliance on non-renewable sources of energy.

In addition to these challenges associated with reliance on non-renewable sources of energy, the country is also facing a shortage of electrical energy due to power generation shortfalls at Hwange Thermal Power Station and Kariba Hydroelectric Power Station, the two largest electric generation centres in the country. Importation of more than 35% of electricity requirements from neighbouring states such as South Africa, Mozambique, Zambia and Democratic Republic of Congo have been implemented to solve power shortage problems (Zimbabwe National Energy Policy, 2008). The country has realised that the future is bleak if it maintains total dependency on fossils, hence has made the following milestones to make renewables as part of the energy mix:

- (a) Zimbabwe has embarked on a project of green fuel production by extracting ethanol from sugar cane. Most of the ethanol is sold in a petrol blend of 10% ethanol and 90% fossil petrol and is called E10 petrol. The project is fully compliant with the European Commission Sustainability Scheme for Biofuels and Bio-liquid guideline published on 10th June 2010 (Project Management Institute of Zimbabwe, 2011). The ethanol plant in the country is the largest in Africa as well as the first project to offer home grown solutions to energy independence. The fuel has good performance on the market because the ethanol has less than 0.04 water content (Voice of America, 2011). To extract ethanol from sugar cane, the process provides 67% as an average net gain in energy in respect to energy used in production, hence this low energy input is one of the justifications to embark in this venture (U.S Department of Energy, 2008).
- (b) Policy shift in the country is now in favour of private sector participation in the energy sector. This has led to the advent of Independent Power Producers (IPPs) which are producing electricity through renewable energy technology. Notable IPPs includes Rusitu Power Corporation, Hippo Valley Estates and Triangle Limited which have installed capacity of about 70MW (SADC Renewable Energy and Energy Efficiency, Status Report, 2015).
- (c) There have been reforms at Zimbabwe Electricity Supply Authority, (ZESA) which is a state organ responsible for electricity supply in the country, to ensure efficiency of operations and to promote the use of sustainable energy sources. These reforms have led to the unbundling of ZESA and creation of two other stand-alone entities which are Rural Electrification Agency (REA) and the Zimbabwe Electricity Regulatory Commission (ZERC) which regulates electricity for the industry (Zimbabwe Energy policy, 2008). REA is therefore faced with a lot of responsibilities of ensuring that rural population has access to modern energy. This is a mammoth task to be accomplished considering that about two thirds (65%) of Zimbabwe's estimated population of 12 million live in rural areas (Zimbabwe Central statistical Office census report, 2002).

2.4 The Zimbabwean Culture

Zimbabwe is located in Southern Africa, it shares political boundaries with South Africa, Botswana, Mozambique, Malawi and Zambia. The country has a distinct culture in the region though some cultural traits are similar to neighbouring countries. Below, Figure 19 show the Map of Zimbabwe and the 10 provinces inside. Harare province which is the capital city of the country and Manicaland province, both located in the North East of the country are the target on the section of this study which focuses on of culture and development.

Figure 19: Map of Zimbabwe showing the 10 Provinces



Source: (Maps of the World, 2012).

The Sub Saharan Africa region was initially inhabited by the Bantu people who shared the same values and culture, but during the colonial era, political boundaries were inserted resulting in the creation of different countries thereby separating, the Bantu people. This political demarcation into separate countries did not consider the relations which existed among the people, hence the Bantu tradition was seriously threatened. In the process, sometimes the Africans were forced to adopt the colonial master's culture (the Europeans) who invaded the region and introduced Western education and ideas. The ultimate outcome was that African

cultural heritage was slowly diluted and to a certain extent side-lined (Ifenyinwa & Mbakogu, 2004). According to Gbtotokuma (1996, p. 21) “the colonialist categorically denied the existence of African cultural values and worse still, taught the Africans themselves to despise them”.

However, the process of colonisation can be interpreted by some as modernisation of Africa, but it was done at the expense of the rich African culture that had sustained the Bantu people for centuries. Osagie (1985) highlighted that in modernisation theory, a state of development can be reached through a transfer of technological ideas, institutions, values and cultures of the West to the countries in the South. This theory relies on the free trade opinion that transfer of modern attitudes reduces the presence of absurd traditional attitudes and fosters an atmosphere for growth in Western nations. Nevertheless, it must be noted that free trade being visualised here is one sided osmotic relationship, where the western values are transferred to developing countries whereas the Western countries do not partake any of the cultural values of the countries which they colonise (Osagie, 1985).

According to Olutayo (1985) the concept of “Europeanisation” is the implication of this free trade opinion whereby, Europe is perceived to have a higher culture which is mandatory for countries in the South to develop. If this higher culture is rightly adopted, then underdeveloped nations will ultimately become developed. This idea corresponds with concept of acculturation which states that, when a person moves from one culture to another, there is a gradual superimposition of lifestyle of the second culture on top of the first. In other words, the person is still a member to his or her culture by birth, but in many ways, he has become a member of the host culture. Nonetheless, there is no full explanation as to whether there is a limit to acculturation or what may be called the better brew of culture thus, raising the following question, What if more of the alien culture is consumed and almost nothing of the host culture is left? (Dabagan, 1970). To sum up, the concepts of Europeanization and acculturation are essential in the study of culture change in Zimbabwe. Colonisation of Zimbabwe resulted in the dilution of the indigenous Zimbabwean culture as the society adopted some Western practices.

2.4.1 Main Attributes of the Zimbabwean Culture

Zimbabwe has a rich and diverse cultural heritage which is transmitted inter and intra generationally. Main modes of culture transmission includes oral and written. The country's culture is comprised of many aspects, but for the purpose of this study, a consensus has been reached through participatory discussion forums between the research team and community leaders focus on five major attributes of the culture. As highlighted earlier own, these attributes are music, dressing, love relationships, crime and language usage. This section of the study analyses each attribute and its sub-categories in detail.

2.4.2 Music as an attribute of Zimbabwe Culture

Music and dance constitute a major source of entertainment in the country. For the purpose of this study, traditional, contemporary and foreign music is discussed.

2.4.2.1 Traditional Music

These are songs transferred inter-generationally by members of a specific tribe. In Zimbabwe, each tribe have unique songs and dancing style, hence traditional music is just as varied as the ethnic groups inhabiting the country. The Shona tribal groups which constitute 82% of the population in the country are identified with the following music and dance, "Jerusarema", "Shangara", and "Mbakumba". The Ndebele tribe which is the second largest group constituting 14% of the population is associated with "Amantshomane", "Isitshikitsha", and "Amabhiza" traditional music and dance which is used during their rain-making ceremonies (Asante, 2000). Even though the Shona and Ndebele tribes are the majority, some small ethnic groups also practice their traditional music and dance. For instance; the "Shangwe" tribe have "Jichi", the "Kalanga" tribe have "Amabhiza" and the "Ndau" tribe identify itself with "Muchongoyo" music and dance. Furthermore, these music and dances have a relationship with the religious and spiritual life of their people such as the practice of "mhande" by the "Karanga" tribe during the "mutoro", a rain-making ritual. In the "Ndebele" tribal group, their rain making ceremony is promulgated by the dance called "iHosana. The practice of "isitshikitsha seZangoma" by the Ndebele tribe is a sacred traditional music meant for traditional healers and their apprentices (Nyathi, 2001). Moreover, Thramm (2002) highlighted the therapeutic role played by "dandanda" traditional music and dance, which originates from the "Korekore" tribal group.

2.4.2.2 Traditional music and contemporary social-political issues

Traditional songs in Zimbabwe are intertwined with religious rituals, social life activities such as lullabies, children game songs, and war songs. In short, the music mimics the human being life cycle from conception until death (Nyathi, 2001). Some of the traditional music speaks against contemporary socio-political challenges. There are also established and non-established community based traditional music and dance groups in different villages in the country. These groups use their music as a vehicle for tackling social and political problems which the country is facing and also to sanction certain deviants in the community to reform and adopt to society. Moreover, the musicians have managed to negotiate the temper of government authorities which in most cases has proved to be intolerant to voices of dissent and criticism.

2.4.2.3 Influence on popular music on traditional music

Though traditional music is popular, contemporary and foreign music has divided most of its audience. Despite the competition, it is facing, it is the taproot where contemporary and other types of music in the country are derived from. Traditional music influence on pop and other types of music in Zimbabwe is highly visible, for example, one of the prominent young pop musician called Jah Prayzah incorporates “mbira” and “marimba” which are instruments from traditional music. One of his best-selling track called “Machembere” from his album Tsviriyo released in 2013 is played using “mbira” and “marimba” and this was welcomed by the consumers of his music (Mutero, 2015). Moreover, Zimbabwe’s internationally acclaimed musician called Oliver Mutukudzi has most his tracks linked to traditional music. For instance, one of his most popular tracks called ‘Tozeza baba’ is based on traditional music called “chinyambera” and “dinhe”. Hope Masike and the late Chiwoniso Maraire are some of most popular Zimbabwean musicians who relies on “mbira” and “marimba” among other traditional instruments in their songs. The same applies to “Mawungira eNharira” and “Mbira DzeNharira” which are traditional music groups that have persisted in performing “mbira” music. Despite the fact that early missionaries despised and demonised the incursion of traditional music in church, nowadays, traditional music instruments are the core in most church songs. For example, Protestant and Catholic Churches make use of horn “hwamanda” and the whistle “pembe” drum, “ngoma”, shakers “hosho”, to enhance their music (Asante, 2000).

2.4.3 Contemporary music

Contemporary music in Zimbabwe is also known as “Zim Dance Hall music”. It is sung in vernacular language by a group of urban youth called Urban Grooves. They imitate western rhythms, accents and culture, a factor that has seen their music in conflict with some morals enshrined in the indigenous culture of Zimbabwe (Bere, 2008). One of the Urban Grooves artist called Maskiri, celebrates sex and drugs in his music in a similar fashion to African-American hip-hop artists such as Snoop Dogg. One of Maskiri’s albums, entitled *Blue Movie* 2005, begins with a call to his audience to enter into his world of free sex, pornography, hard liquor, and fun. In another song entitled “Madam Mombeshora” he sings about his childhood sexual fantasies of having a sexual relationship with his primary school teacher and the list of such lyrics goes on (Manase, 2009). The rise of Urban Grooves music was due to the Zimbabwe African National Union Patriotic Front (ZANU-PF) led government’s nationalist music project whose intention was to counter the West (U.K and U.S.A.) criticism of the social, political and economic crisis affecting the country. These events include government’s approval of violent seizures of white-owned commercial farms and the harassment of opposition political and civic activists.

The government music project launched in the post 2000 period resulted in the introduction of 75% local content in broadcasting, which was later pushed to 100%. This implied banning playing of music in foreign languages on radio and television (Bere, 2008). Other outcomes of the anti-Western music project by the government was that ministers and other government officials composed anti-western songs. For example, Professor Moyo who was the Minister of Information assembled a music band called PaxAfro, which composed and produced 26 songs on the album called *Back2Black* 2004 (Bere, 2008). Furthermore, Elliot Manyika was the Minister of National Affairs composed and sang all songs on his album called *Zimbabwe 2005* (Sibanda, 2005). In this music project, Professor Moyo assembled a group of Urban Groups or westernised youth working for the service of the state. They sang lyrics focused on local experiences and celebrated issues such as the war of liberation that is associated with the government’s anti-imperialist rhetoric. The meanings generated their performances was instrumental in assisting the government to disseminate their anti-Western propaganda in Zimbabwe.

However, contemporary music produced by Urban Grooves who were not working under Professor Jonathan Moyo’s state music project continued to tap into the same pool of

international hip-hop, R&B and soul music, and the global social and political consciousness which the Zimbabwean government was heavily censoring. Hence, these urban grooves made political protest to the Zimbabwean government's cultural and ideological control by imitating international hip-hop rhythms and culture and especially when they equate political issues such as violent invasion of white owned commercial farms and repression of opposition political parties with global issues such as the war in Iraq and the genocide in Rwanda (Bere, 2008). Despite this visible subversion from the Urban Grooves musicians, the fact that they produced music in vernacular languages qualified them into this state music project led by Professor Jonathan Moyo. They filled the gap left by the banning foreign music on local radio through the introduction of 100% local content in broadcasting.

2.4.4 Foreign Music

Foreign music in the context of Zimbabwe refers to types of music which do not originate from the country. It has many categories such as Reggae, Heavy metal, Rock, R&B, Hip-hop, just to mention a few. It is also broadly classified as international music.

2.4.5 Dressing as an attribute of Zimbabwe Culture

Dress is a mode of communication, hence attention must be paid to message sent by a particular dress code (Chimhundu, 2010). Zimbabwe's culture and values are reflected in the language of dress. People across gender and age are expected to dress modestly. Dress codes mimicked by all different tribal groups in the country represents the dressing culture of the nation. Each tribal group defines the expectation of men and women dressing. Women are discouraged to dress in a way which exposes their body parts. Zimbabwe's political leaders have repeatedly castigated dressing in see through, miniskirts, and tight dressing. In the same manner, youth subculture of dressing which expose the midriff and upper chest has been denounced. It is a taboo as prescribed by the indigenous Zimbabwean culture. Modesty in dressing is highly valued, thus women are not supposed to move around exposing their body parts (Berns, 2007). In addition, Women dressing must be practical, comfortable, and easy to wear. It has to place minimum emphasis on attracting the opposite sex. Exposing a women's body by wearing clothes which are sleeveless, too tight or too small is viewed as a breach of norms (Manwa & Ndamba, 2011).

2.4.6 Courtship and marriage unions as attributes of the Zimbabwean culture

According to Meekers (1993), African Marriage Act of 1950 requires that all traditional marriages be registered in the District Court. This registration is a requirement before civil or religious marriages can be contracted. In practice, district court registration, civil marriage, ceremonies and religious marriage ceremonies are all considered incidental to traditional procedures. To this effect, if church and state marriages are conducted without the traditional customary bride price “Roora” payment, they are considered as inferior marriages similar to living with a concubine. In Zimbabwean indigenous culture, the payment of bride price “Roora” is the basis of marriage and official grounds of conjugal rights to partners. Despite the continuing emphasis on bride price payments or “Roora”, ethnographic literature shows several types of unions exist that deviate from the normative bride price payment marriage. There is an increase in these deviate types of marriage unions, but not so much is known about their prevalence and specific changes in marriage practices that shape up (Meekers, 1993).

In many societies in Africa, decline of traditional types of marriage and the rise of informal types have been observed specifically among some educated segments of urban dwellers. Theories attribute the decline in traditional marriages to gradual collapse of men influence due to economic factors where some women are becoming breadwinners. Therefore, the option to avoiding formal or traditional marriage is mainly associated with professionals, better educated, and wealthy women with sufficient resources. Instead of contracting formal marriage unions these women opt for cohabitation or lovers who do not live with them as this allows them more degrees of freedom. Despite these developments, the Zimbabwean indigenous culture considers bride price payment “roora” as a noble custom which functions as a safeguard against marital dissolution because bride price generally needs to be paid back upon divorce (Bere-Chikara, 1970 : May, 1983). Bride price payment or “roora” gives man the custody of children resulting from the union and rights in genetrixem and uxorem (Goody, 1973).

2.4.7 Forms of marriage unions in Zimbabwe

2.4.7.1 Normative ‘Roora’ or Bride wealth marriage

Normative “Roora” or bride wealth marriage is the culturally approved form of marriage union for couples in Zimbabwe. This traditional Shona marriage is a contract between two families rather than a personal arrangement between two individuals. Nowadays, the social control of the lineages has diminished substantially and often relatives have little say in the choices of spouses especially in urban areas where informal courtship has become a private engagement

through exchange of love tokens (Bourdillon, 1987 : Aschwanden, 1982). The boy gives a girl a token of their intimacy such as a small coin. The girl usually gives him a personal gift that she has worn or kept on her person such as a handkerchief or beads. By doing so she consents to marrying him. Although this engagement is fairly informal, if the engagement is broken without a good reason the other part may sue for damages in a traditional court. Engagement becomes formal and public when the suitor approaches the girl's family to announce his intention to marry by asking a mediator "munyai" who will take a herd of cattle to the women's parents as part of bride wealth payment. The negotiation and payment of bride wealth is the central part of Shona marriage procedures. Bride wealth payments, made by the prospective groom to the bride's father are negotiated by the heads of the two families.

2.4.7.2 Bride Wealth Payment, "Rutsambo"

In Zimbabwe, bride's wealth payment consist of two parts, called "Rutsambo" and "Roora". "Rutsambo" payment gives the husband sexual rights to the woman and one is not considered to have been married if at least part of the "Rutsambo" package has been paid. Traditionally, "Rutsambo" payments consisted of some utility article, such as a goat or an iron hoe, but nowadays it turns to be a substantial cash payment. If the girl has a child with another man before marriage "Rutsambo" payments may be substantially diminished. In the past, "Rutsambo" was to be paid only when the girl was virgin and in cases where the groom might have slept with the girl, the groom was to pay substantial amount of money for damaging the virginity and there after he had to pay "Rutsambo" as well.

2.4.7.3 "Roora" or Bride wealth marriage

The second part of bride's wealth payment is called "roora". This gives the man rights over the children born to the woman. "Roora" is perceived as a gift to the girl's parents to thank them for raising her well. "Roora" used to be paid in cattle, but it is increasingly paid in cash (Bourdillon, 1987 : Tsodzo, 1970). "Roora" payments are made over a long period of time and specific events in marriage procedures generally call for payment of part of the bride's wealth. For example, when the girl moves to the husband's home, the groom's parents slaughter a beast to welcome the bride. Before the couple meets sexually for the first time, the bride is also given a beast which is hers to keep (Makamure, 1970). Payment for the mother of the bride (a cow, or its equivalent in cash) is very important symbolically and cannot be omitted. "Roora" is an

essential part of the marriage procedures, and marriage without “Roora” is inconceivable (Gelfand, 1985).

2.4.7.4 Elopement Marriage

In order to shorten the procedures for the negotiation and the payment of the bride wealth, couples often engage in elopement marriages called “Kutizisa”, or “Kutizira”, (Holleman, 1969). Elopement marriages are common and are not to be confused with elopements or flight marriages which are described below. In an elopement marriage, the girl leaves her home with her prospective spouse or with one of his relatives without permission from her own family (Burdillon, 1987), Gelfand (1985). It is a staged abduction in which the girl is accompanied to her lover’s village by one of his relatives. Usually the girl will not consent to an elopement until she has discussed the issue with her aunt, who will inform her parents. Elopement marriages may occur because of the following reason; the young couple wants to avoid long negotiations of bride wealth, the father in law opposes the marriage or the girl may want to avoid an undesirable match. Furthermore, if a man has slept with the girl before paying the bride wealth, he is sometimes expected to elope with the girl and pay “Roora” after paying damages for having spoiled or deflowered the girl. A man who has eloped with a girl is expected to negotiate a recognised form of marriage soon afterwards, for if he does not he could be considered an abductor (Meekers, 1993). In most cases, the families concerned accept these elopement marriages and negotiate the bride’s wealth payments. An elopement marriage allows a young couple to bypass some of the elaborate marriage formalities and eliminates parental control of the marriage. The marriage negotiations in an elopement marriage resemble those of a regular marriage, but are conducted much faster. There are no indications that the amount of bride wealth payment in the form of “Rutsambo” and “Roora” is different for elopement marriage than for other marriages (Bourdillon, 1987).

2.4.7.5 Elopement or flight marriages “Kutizira mukumbo”

Elopement marriages are distinguished from elopements or flight marriages “Kutizira Mukumbo”, which is a situation where a girl runs away from her home without being accompanied by her lover or relatives. It is unilateral action of the girl, without prior knowledge of her suitor, which the intention is to force families to start marriage negotiations. Holleman, (1969), asserts that “Kutizira mukumbo” is usually an act of desperation hence, is sometimes called flight marriage. A girl elopes because she wants to avoid an arranged marriage with a

man she strongly dislikes or because she got pregnant and failed to make arrangements for elopement marriages. Moreover, high amounts of “Roora” demanded is sometimes a cause for elopements. In recent times, bride wealth payment “Roora” has increased so much that a prospective groom may not raise it (Gelfand, 1985). In such cases, a young woman may oppose her fathers “Roora” demands and elope. When the girl arrives in her lover’s village, she offers herself as his prospective bride. His family may either accept her or start marriage negotiations or they may send her back to her family. It should be noted that elopement marriages “kutizisa” are prearranged with the girl’s lover while flight marriages “kutizira mukumbo” are not. The former leads to a regular marriage. Nonetheless, flight marriages “kutizira mukumbo” normally turn public sentiment in the girls favour with the result that the host family usually accepts her as a bride. If so, marriage negotiations will be conducted in the same manner as for elopement marriages.

2.4.7.6 Cohabitation unions “Kubika Mapoto”

Cohabitation or “Kubika Mapoto” marriage unions are characterised by couples forming a consensual contract/union which is not registered and for which no bride wealth has been paid (Mittlebeeler, 1976) stated that these marriage unions are common in urban areas where custom has been badly battered such that a couple will live together without attempting to legalise their marriage. In the Zimbabwean society, cohabitation or “kubika mapoto” marriage unions are frowned upon such that in rural areas man’s relatives would not allow him to bring a woman to his home without paying bride wealth payment (Gaidzanwa, 1985). Women living in consensual unions in urban areas are sometimes labelled as prostitutes because they behave in an unconventional manner. Nonetheless, cohabitation “Mapoto” unions resemble regular marriages in many respects. They are often stable unions that last many years. The partners regard each other as husband and wife, the man is responsible for providing for the woman and her children and the woman is expected to be faithful to her partner (Bourdillon, 1987) Sometimes a girl’s family may try to break up her “Mapoto” union or try to get her husband pay the bride wealth.

2.4.8 Language use and proxemics as an attribute of culture

Proxemics and type of language used in communication categorised as formal, informal mixed, and colloquial are important in the manner communication is conducted. When communicating, the distance between our bodies or interpersonal distance send messages and

the study of this is called proxemics. It is about space or how far people stand away from each other when communicating. The nearer two people stand, the more the amount of non-verbal cues detected and the greater the distance the less the amount of cues detected (Hall, 1966). Zimbabwean culture has some prescribed and approved distances to be maintained in communication based primarily on the relationship between people engaged in communicating. Maginnis (1995) stated that how far apart people stand from one another in a conversation and the decision to choose some seats over others is not a random decision, but people have highly integrated subtle codes on issues regarding personal space and territorial integrity. Though they do not actually use a ruler to measure exact distance, they instinctively know that it is the appropriate distance. Appreciating how to use your personal space and how others keep theirs is important to create the right connections and leaving the right impression. Making mistakes in this situation can be a grave insult to someone, and the worst part is that the other person do not probably even say anything. Hogg & Vaughan (2011) noted that the great message to take home from proxemics is to treat personal space as somebody's property. Respecting it earns you their favour, and by invading it you will lose their approval points. Hall (1966) research on hidden dimensions identified four interpersonal distance or zones which are applied. They range from high to low intimacy as indicated in Table 5 below:

Table 5: How close is comfort, Space Zones in social interaction

	Zone	Distance	Description
1	Distance of Intimacy	Up to 0,5m	In this situation, physical contact takes place and cues comes from sight, smelling, body temperature through body contact and place of breathing.
2	Personal Distance	0.5-1,25m	This distance is the normal for interaction with acquaintances and friends. Contact by touching is still possible, though many cues are still available. There is a high reduction on the effect of smelling, breathing and body temperature.
3	Social Distance	1,25-4m	In this situation a lot of cues are lost but verbal contact is maintained. It is typical in situations

			like business environments. For example, in offices this is achieved by furniture arrangements. A desk is usually about 75cm deep allowing the space of a chair. Interaction of people across a desk is just over a meter and a bigger desk can be a signal of a rank.
4	Public Distance	4-8m	In this situation communication cues have lost impact. It is common distance for celebrities, lectures and public speakers. For instance, in a lecture hall, lecterns are normally placed around 3.5m from the first row of seats. In the same manner courtrooms employ this space criterion to avoid physical exchanges with the judges. The principle here is that interaction is prohibited.

Source, Hall 1966

When one has feelings of intimacy for somebody, closest possible distance is kept, but if one feels a different status he or she keeps physically away (Hayduk, 1983). To further demonstrate proxemics, the following two studies examples of liking and status drive the point home; An example on liking, as given in a study by Rosenfield, (1965) show female students talking with a female confederate such as a collaborator of an experimenter, with the goal of either appearing friendly or avoiding the appearance of friendliness. The friendly ones placed their chairs on average 1.5 metres from the confederate while those who did not want to appear friendly placed their chairs 2.25 metres away. The second example on status is shown by Navy personnel who maintained greater interpersonal distance when interacting with someone of a different rank than with someone of the same rank. The effect was stronger as the difference in rank increased (Dean, Willis & Hweitt 1975).

3 Literature review

3.1 Introduction

The literature reviewed in this thesis is based on previous studies conducted in the field of access to energy and rural development as well the impact of development on culture, where the focus will be on the five main attributes of the indigenous Zimbabwean culture. The theory of sustainable agriculture intensification and psychological theories of heuristics, terror management, and generativity theories underpin this study; thus, literature on these theories will be reviewed. Literature on music will be reviewed at length because of its virtue of being one of the most important attributes of Zimbabwean culture. Review of music literature shows how the world's popular cultures have spread to developing countries. On traditional music, the case study of Kenya will be cited as it shows how traditional music managed to colonise the cities' entertainment spaces through the invention of ethnic nights dedicated to different tribal groups.

3.2 Theoretical frameworks

3.2.1 The theory of sustainable agriculture intensification

The main form of economic activity in Chipendeke community is farming; hence, the community's agriculture output will be assessed in this research. The theory of sustainable agriculture intensification is the reference point. A study entitled, "Food security; the challenge of feeding 9 billion people" conducted by Godfray et al., (2010) elucidates that global growth in land for crop cultivation is outpaced by population growth. The study points that in the 1961 to 2007 period (total agricultural area has expanded by 11% from 4.51 to 4.93 billion hectares and arable land by 9% from 1.27 to 1.41 billion hectares). Over the same period, the human population grew at a faster rate than increase in agriculture land. It grew from 3 billion to 6.7 billion which is an increase of 123%. By 2050 the world population is projected to reach 9 billion. Fitter (2005) asserts that these trajectories point to food crisis due to shortages of land to grow food crops. This land shortage is also being exacerbated by other factors such as climate change, urbanization, desertification, soil erosion, and other consequences of unsustainable land management (Fitter, 2005). Pressure on land for food crop cultivation is increasing due to recent policy decisions to produce bio fuels from plants such as Sugarcane and *Jatropha* seed which require good quality agricultural land. China, for example, has successfully acquired the rights to grow palm oil on 2.8 million hectares of Congolese land

(Food and Agriculture Organisation, 2000) as cited by The Royal Society (2009). Furthermore, recent studies have projected that the world will need 70-100% more food by 2050. Thus the challenging question emerging is, “How can more food be produced sustainably?” (Montgomery, 2007). In the past, the primary solution to produce more food was simply to bring more land into production or to exploit new fish stocks. This is no longer feasible due to land scarcity and over-fishing. Therefore, a practical approach to this inevitable food crisis to feed the projected 9 billion people by the year 2050 is sustainable agricultural intensification (Godfray et al., 2010).

Sustainable agricultural intensification is defined by Godfray et al., (2010) as producing more crop harvest output from the same area of land while reducing the negative environmental impacts and at the same time increasing contributions to natural capital and the flow of environmental services. This is one solution to the impending food crisis to feed the projected 9 billion people by the year 2050. There is urgent need for the global agriculture system to be modelled under sustainable agriculture intensification, where yields are increased with neither adverse environmental impact nor bringing more land to crop cultivation (Royal Society, 2009). The projected world population of 9 billion by 2050 is certain, but expanding agricultural land to contain the imminent food crisis is infeasible. Sustainable agriculture intensification is a viable option for the world to mitigate the food crisis in the face of critical shortage of farming land and a ballooning population. An additional advantage of sustainable agriculture intensification is that it closes the yield gap, which is the difference between realized and achieved yields per hectare versus the highest quantity of yield which can be achieved from the same hectare if genetic engineering and other technologies are properly applied (Godfray et al., 2010).

Currently, huge yield gaps exist; for example, it has been estimated that in some parts of South East Asia where irrigation is available, average maximum climate adjusted rice yields are 8.5 metric tons per hectare, yet the average actually achieved is 60% of this figure. Similar yield gaps are found in rain fed wheat and other cereals in Brazil and Argentina (Godfray et al, 2010). Technologies which facilitate closing the yield gap are necessary as a means to abort the food crisis by closing the yield gap. If technology such as crop genetic engineering improve production without adverse ecological consequences, then it is likely to contribute to the agriculture system’s sustainability. In line with the theory of sustainable agriculture intensification, the Chipendeke community case study shows renewable energy technologies

are a component of energy mix in agriculture production, which is environmentally friendly. The energy produced is clean; no greenhouse gases are emitted. Placed at centre of this research is the Chipendeke community access to energy and the aim is to establish whether access to energy increases food crop production and is without damage to the environment, as predicted by the theory of sustainable agriculture intensification.

3.3 Literature review on collective action simulation experiment; Terror Management and Generativity theories

3.3.1.1 Terror Management Theory

The crux of terror management theory is that individuals face an inherent existential dilemma whereby they desire life, but are aware that their death is inevitable. To defend themselves from this dilemma, they create and stick to cultural world views which confer symbolic immortality through religious and social institutions that offer them an afterlife. This makes them feel connected to something powerful, and more permanent than themselves (Pyszczynski et al., 1999). Furthermore, people defend themselves from existential anxiety through self-protective responses, such as linking with groups sharing the same world views and expressing hostility to those with conflicting world views. Studies that focus on manipulating death awareness using situation cues such as answering questions on what will happen while dying, after death, writing about own death or walking past a cemetery support these theoretical propositions (Grant & Wade-Benzoni, 2009). To sum this up, terror management theory states that death awareness strengthens self-protective behaviour, which is a desire to defend one's identity and image (Ashforth et al., 2003).

3.3.1.2 Generativity Theory

Contrary to terror management theory, a prominent development psychologist Erikson (1982) offers a contradictory perspective on death awareness by stating that death awareness increases pro-social behaviour. He asserted, people go through eight psychosocial stages in life, and each stage involves a developmental crisis. It is at the final stage where one becomes highly aware of death and at the same time gets dominated by a crisis between ego-integrity and despair. Overcoming this crisis enables one to experience ego integrity, having coherence and meaning in life and accepting death, but if one succumbs to this crisis, despair is experienced and one continues to fear death. Furthermore, prior to reaching this stage, people undergo a mid-life

crisis centred on generativity and stagnation, or to contribute to the next generation, versus ceasing to be a productive member of society. Those who prevail over this crisis become generative by performing socially valuable work and mentoring younger generations. On the other hand, those who fall victim to this crisis become stagnant, withdrawing from socially valuable work and mentoring activities (Erikson, 1982).

These propositions by Erick Erikson (1982) received overwhelming support from other researchers who confirmed that death awareness results in people taking personal responsibility to promote the welfare of other people. They do this by seeking careers in the helping professions, such as working as teachers, mentors, leaders, organizers, and inventors (MacAdams et al., 1993). In particular, Byron & Peterson (2002) and Salgado (2002) note that the tragedies of the September 11th terrorist attacks resulted in crippling anxiety in some employees, leading to stress and absenteeism from work, but for others these attacks inspired them to reflect about their death and the meaning of life thereby motivating them to contribute to other people and society at large. Wrzesniewski (2002) states that after the attacks, an influx of applications for helping professions was recorded as many people sought to change their careers so as to make a huge impact in their communities. For instance, in just over a month after the heart breaking events, teaching applications in America tripled and most of the applicants attributed their decision to switch to teaching as emanating from September 11 (Goodnough, 2002). Other professions such as fire fighting and health care witnessed the same trends. For example, the actress Amy Ting who narrowly escaped from the World Trade Centre had some time to reflect on death and her purpose in life. Due to her deep self-introspection, she switched from her successful film career to join the U.S. Air Force Medical Services and is quoted as saying:

“After September 11, my perspective on life changed. I have always wanted to help people, so I decided to go back to pursuing the medical field”
(Wrzesniewski, 2002 p. 231 cited by Grant & Wade-Benzoni, 2009 p. 600).

In a nutshell, from a generativity theory perspective, as postulated by Erikson (1982) and subsequent studies such as MacAdams et al., (1993), Byron & Peterson (2002), and Salgado (2002), death awareness results in people displaying pro-social behaviour in society.

3.3.2 Differentiating death anxiety and reflection, the “hot” and “cool” of death awareness

Thus far, generativity and terror management theories offer conflicting predictions about how people respond to death awareness. From a generativity point of view, death awareness strengthens pro-social behaviour in a person but, from a terror management point of view, it strengthens self-protective behaviour. Grant & Wade-Benzoni (2009) reconciled these two theoretical perspectives by drawing attention to two different forms of death awareness. According to Cozzolino et al., (2004), a huge limitation of both generativity and terror management theories is that they fail to make a distinction between the two main forms of death awareness. Hence, Grant & Wade-Benzoni (2009) integrated original research on death awareness by Cozzolino et al., (2004) and Lykins et al., (2007) with the theory and research on information processing systems by Metcalfe & Mischel (1999). In doing so, they differentiate two separate psychological pathways through which people are aware of mortality. Basically, the distinction is underscored by the fact that death anxiety is an emotional state while death reflection is a cognitive state, as explained below.

3.3.2.1 Death Anxiety

Death anxiety is an emotional state of death awareness where people go through immense fear and panic as they dread their mortality (Russac et al., 2007). It is psychologically processed in what is called the “hot,” or experiential system, characterized by immediate, emotional, intuitive, and impulsive reactions based on the process of heuristics (Metcalfe & Mischel, 1999). These “hot” psychological processes form the basis of the self-protective reactions depicted in terror management theory. Terror management responses take place in a “hot” experiential system, such that when people are reminded of their mortality and instructed to express their natural emotional reaction, they depict very strong self-protective behaviour. They deny that they are vulnerable by asserting their good health and that death is far away (Simon et al., 1997). Then they avoid the terror that death awareness provokes by seeking to protect themselves and affiliating with value congruent groups while criticizing value incongruent groups (Greenberg et al., 1997). Such evidence points to the fact that, death anxiety is processed in the “hot” experiential system aimed to protect the self; thus death is thought to be affect driven Weiss & Cropanzano (1996), or a reactive state in which instinctive emotional responses fuel processing of mortality cues (Grant & Ashford, 2008).

3.3.2.2 Death reflection

Death reflection is a cognitive state of death awareness where people put their lives in context, contemplate their meaning and purpose, and review how others will look upon them after their death (Cozzolino et al., (2004) : (Ring, 1984). Death reflection is psychologically processed in what is called the “cool” or cognitive system, characterized by deliberate, analytical, rational reactions based on systematic processing subject to intentional control (Metcalf & Mischel, 1999) : (Haidt, 2001). These “cool” psychological processes are the basis of the self-transcendent reactions portrayed by generativity theory. Simon et al., (1997) underscored that when people are told to contemplate their own death in an analytical and rational manner, they do not display any aspects of self-protective reactions. Moreover, Grand & Wade-Benzoni, 2009) elucidate that when people are instructed to engage in death reflection, they show pro-social, self-transcendent behaviour, such as sharing raffle tickets and gift certificates. In support to these findings, near-death experience studies show that when people reflect on death, they become highly motivated towards helping others to the extent that they change their professions, such as an accountant becoming a nurse (Ring and Valarino, 1998). This evidence suggests that people process death reflection in the “cool” cognitive system which they intentionally control so as to find means of contributing to others in the society and have a lasting impact. Therefore, death reflection can be labelled as a cognition-driven process (Weiss & Cropanzano, 1996) or proactive state where thoughts and anticipatory future plans fuel responses to mortality cues (Grant & Ashford, 2008).

3.3.3 Collective action and public goods

Collective action strategy offers an alternative to preserve common pool resources or public goods from suffering the tragedy of the commons. According to Ostrom et al., (1994), common pool resources are defined as natural resources which provide a finite flow of social and economic benefits. It is expensive to exclude beneficiaries while a single person’s consumption reduces benefits available to the whole community. Findings from empirical field research are that when the users of a common pool resources organise themselves to establish a code of conduct with set of rules guiding resource utilisation, they are capable of managing local resources in a more sustainable way compared to a situation when rules are externally imposed to them (Tang, 1992). The dilemma faced by users of common pool resources is that each person prefers that others control their use while each is able to use the resource freely (Wade,

1994). In relation to common pool resources, “Zero contribution theory” states that unless the individuals in a group are small or some form of coercion is used to make individuals act in their common interests, rational or self-interested individuals will not act to achieve group interests (Osmon, 1965). This notion that rational individuals in a group are unlikely to cooperate in some situations though cooperation is to their mutual benefit has been evident in the composition of an “n” person prisoner’s dilemma game (Hardin, 1982). All social dilemma games, including the prisoner’s dilemma, are regarded as the canonical representation of collective action problems (Lichbach & Irving, 1996). Nonetheless, contrary to zero contribution theory, extensive field work has established that communities spread across the globe voluntarily organise to attain benefits of trade for mutual protection against risk and to establish and enforce rules which guide utilisation of natural resources. Moreover, there is overwhelming evidence that government policy rather frustrates instead of facilitating private provision of public goods (Montgomery et al., 1999). However, evidence from research confirms the temptation for free riding on collective benefits is a universal problem. Thus, for self-organised natural resources governance regimes which existed for generations, community participants invested their energy in monitoring and sanctioning actions of other members in order to reduce the free riding tendency (Ostrom, 1990). These research findings indeed, contradict the Zero contribution theory by stating that individuals in a community act to achieve common interest to preserve resources.

3.3.4 Linear public goods experiments

A broad range of economic experiments establish that a rational egoist’s assumption works well when predicting auction outcomes as well as in competitive market situations (Kagel & Roth, 1995). However, results are different in linear public goods laboratory experiments on collective action situations aimed to examine the willingness of individuals to overcome collective action. In such experiments, individuals are placed in groups and then given fixed assets to which they must decide how many they must contribute for the benefits of public good. For instance, when an individual contributes, say, ten units to public good, all group participants including the contributor receive benefits of, say, five units per piece. Under this situation, the optimal outcome for the group participants is for everyone to contribute all his or her endowments for the provision of public good. For example, in a group of ten participants, when each contributes ten units, a social pay off of 50 is realised. When a public good game is played for finite rounds, the predicted equilibrium for every round is zero. Free-riders, or

rational egoists reason that zero contribution is the equilibrium last round, and since their expectation is for everyone to contribute zero in the second to last, and ultimately through backward induction they work their way and decide not to make a contribution to public good (Ostrom et al., 1994).

3.4 Heuristics theory; how community leaders in Zimbabwe view the causes of culture change

Culture change is a disturbing issue in many conservative communities in Zimbabwe. Before conducting this study, the research team conducted focus group discussions with community leaders comprised of Village Heads, Chiefs, Ward Councillors, and Heads of Schools. The purpose of the discussions was to gather views on the causes of culture change from the perspective of the community leaders. The outcome was they explained cultural changes they were witnessing in their communities based on representative heuristics. Qualitative analyses of views they gave resulted in the following major theme; developments associated with access to electricity and exposure to various electrical gadgets (Mobile phones, Computers, Radio, and Television) among the youth is the root cause of culture change. To arrive at this decision, community leaders used experiences of other communities elsewhere, where development initiatives triggered culture change. Therefore, this study is guided by the heuristics theory to analyse the relationship between access to electricity and culture change in Zimbabwe. The use of heuristics to solve problems is important for quick solutions, but for some complex topics, such as the interaction of development and culture, empirical research provides more accurate answers than relying on heuristics. Heuristics are defined as efficient thinking strategies, mental shortcuts, or rule of thumb processed in our mind to help us make decisions without spending time researching and analyzing information (Tversky & Kahneman, 1974). They are strategies that ignore part of the information, with the goal of making accurate, quick decisions without using more complex methods (Gigerenzer & Gaissmaier, 2011). "...heuristics are methods for arriving at satisfactory solutions with modest amounts of computation, suggesting that people seek to reduce the effort associated with decision processes." (Simon, 1990, p.11 cited by Shah & Oppenheimer 2008, p. 207). However, most of the time, heuristics are extremely helpful, but they can lead to systematic biases or errors in judgment (Gigerenzer & Gaissmaier, 2011). Elaborated below are examples of representative and availability heuristics.

3.4.1 Representative Heuristics

Representative heuristics focus on making a decision that an object or a person belongs to a given category because the appearance is typical or representative of that category while ignoring base rate information. For example, if someone is to describe an older woman as warm and caring with a great love of children, most persons would assume that the older woman is a grandmother. She fits a typical person's mental representation of a grandmother, so he or she automatically classifies her into that category (Tversky & Kahneman, 1974). Moreover, a representative heuristics is a decision-making shortcut which employs use of past experiences to guide the decision-making process. It compares information to our mental prototype before coming up with a decision. The word "representativeness" refers to the notion that when people are confronted with a new experience in which they need to make a decision, then our brains automatically rely on past experience "prototypes" and mental representations seemingly similar to the new situation so as to guide decision making (Tversky & Kahneman, 1974). Naturally, relying on past experiences can be beneficial and allow for quick conclusions, alternatively, the cost of being able to make quick decisions is oftentimes being inaccurate. Inaccuracy arises due to the fact that the mental representation which is compared to the new situation exists in a person's memory and it might not have any bearing on how likely it occurs in reality (Hogg & Vaughan, 2011).

Many examples of the representative heuristic involve succumbing to stereotypes. For example, people might assume that someone who loves skateboarding is always getting into trouble or that a child dislikes healthy food. Furthermore, Tversky & Kahneman, (1983) researched on conjunction fallacy, which is the mistaken belief that a conjunction or combination of two events (A and B) is more likely than one event (A or B) on its own. Conjunction fallacy research provides overwhelming evidence that people use representative heuristics in decision making as highlighted by the following example:

"Linda is 31, she is single, has an extrovert personality and very intelligent. She specialised in philosophy. As a student she was highly concerned with discrimination and social justice issues, and also she actively participated in anti-nuclear demonstrations"

(Tversky & Kahneman, 1983 cited by Lu, 2016, p.508)

The following question can be raised from the above description: "What is the most likely status of Linda? Is it more likely that she is a bank teller or she is a bank teller active in the

feminist movement?” To answer these questions, many people posit that Linda is a feminist bank teller, rather than simply a bank teller. They seem to rely on representative heuristics. The description sounds more like that of a feminist bank teller than of a bank teller (Tversky & Kahneman, 1983). This is a conjunction fallacy: all feminist bank tellers belong to the larger category of bank tellers. Many people misinterpret the statement, “Linda is a bank teller” as implying that she is not active in the feminist movement. However, the conjunction fallacy is still found even when almost everything possible is done to ensure participants interpreted the problem correctly (Manktelow, 2012).

3.4.2 Availability heuristics

These are a types of heuristics where the frequencies of events can be estimated on the basis of how easy or hard it is to subjectively retrieve them from our long term memory. The following two questions illustrate the availability heuristics in practice,

- Question 1: During the year 2011, what percentages of crimes involved violence?

Most people are likely to guess a high percentage because all the violent crimes such as murder, rape, robbery, and assault are highlighted on the news, yet the FBI reported that violent crimes made up less than 12% of all crimes in the United States in 2011 (Hogg & Vaughan, 2011).

- Question 2: Between aeroplane accidents and road traffic accidents, what causes more deaths per year?

When answering this question most people point to aeroplane accidents as the cause of more deaths per year because when they happen, they receive more media coverage, yet flying is the safest mode of transport when compared to the road, as statistics show more people die on the road than on plane crashes (Manktelow, 2012).

In addition, Hogg & Vaughan (2011) cite a study conducted by Lichtenstein et al., (1978), where people were asked to judge the relative likelihood of different causes of death. Murder, which attracts more publicity, was judged to be the most likely when compared to those that do not attract equal publicity, such as suicide, even when the opposite was the case. The problem with the availability heuristic is that people assume that if several examples are readily available to their minds, the event or subject matter is commonplace.

3.5 Linking heuristics theory with culture and development

In light of the discussion about availability and representative heuristics, it should be noted that the impact of community development on indigenous culture is a sensitive subject where heuristics, if improperly applied, can lead to systematic bias and serious error in judgement. For instance, modernisation theory postulates that development of Third World countries is reached through the transfer of technological ideas, institutions, values, and cultures of the Western nations to the countries in the South (Apter, 1965). Assumptions made by this theory might be based on heuristics by implying that for countries of the South to develop like the Western nations, they must abandon their own culture adopt the Western values. This process is called the “Europeanization” of countries in the South. It is a situation in which Europe is perceived as having a higher culture and countries in the South have a lower culture. Hence, for countries in the South to develop, it is necessary for them to adopt Western culture and despise their own as inferior. If this higher culture is rightly adopted then underdeveloped nations will ultimately develop. In essence, the modernisation theory argues that the countries in the South need to adopt a higher culture of the West to develop (Olutayo, 1985). Therefore, in assessing the relationship between access to electricity related community development and culture change, heuristics had to be applied with caution because the idea that development affects culture as enshrined in the modernisation theory can be a classic example of heuristics. Though such heuristics might be true, the theory needs to be applied with due care since some scenarios exist, especially in the communist world countries like Russia and Cuba, developed in the absence of a higher Western culture, but within the context of their particular culture. This evidence led to a new thesis of modernisation which takes into account the Chinese and East Asia Experience: the new thesis concurs with the definition of modernisation as a transition of a traditional society to a modern society, but argues this transition indeed is neither one direction nor is it confined to the Western route, but is attained by multiple paths, including the Chinese and East Asia Experience (Peng, 2009). For this reason, where societies can be modernised through the Chinese and East Asia culture, heuristics enshrined in the modernisation theory may not always be accurate when they imply that adoption of a higher Western culture is the pre-condition for modernisation of Third World countries. Hence, this study, instead of being based merely on heuristics, it employs qualitative and quantitative methodologies to investigate the relationship between access to electricity and culture change.

3.6 Literature review of studies on access to electricity and rural development

A study on the impact of access to electricity on rural development was triangulated in rural parts of Bolivia, Tanzania, and Vietnam. In Vang (Vietnam), the study pointed to massive changes in income levels, where 172 out of 182 representing 92% of the households attributed their increase in income to the use of electric tea drying machines instead of manual machines, Annemarije et al., (2009). The positive change in income was due to realised efficiency which led to more time spent in picking tea leaves in the season when rampant labour shortages were experienced. A testimony from one owner of an electric tea drier from Nho (Vietnam) highlighted his annual income of US\$494 was almost double that of other farming households, which was around US\$250. This huge income gap was due to the use of electric tea drying machines which he also rented to other farmers for income when he was not using it. In the same manner, grain millers in Tanzania witnessed income growth increase as a result of the shift from diesel-powered grinding mills to electric grinding mills which were faster and hence, able to serve more customers despite some power cut-offs which were experienced. In addition, the study shows that women benefited from modern energy in their enterprises because starting electric engines was much easier compared to diesel engines which required much physical power (masculinity). This benefit was felt mainly in Vietnam, where the bulk of farmers are women who also own rice mills (Annemarije et al., 2009).

Turning to Kenya, a case study of the impact of access to electricity at Mpeketoni rural community was conducted by Kirubi et al., (2008). The study elaborates that before electrification, farmers relied on traditional hand tools such as the axe, hoe, and panga (machete) to clear land and plough because tractors were limited and very expensive. Also due to their high demand, farmers made reservations and payment for tractors a year in advance. Yet within a few months of commissioning the Mpeketoni mini electricity grid in 1994, over a dozen tractors were available for hire. Thus, the net effect of access to electricity was increased access to tractors leading to improved agricultural productivity, which had a positive effect on the local economy through agriculture production. One of the interviewed farmers explained that, without access to electricity at Mpeketoni, entrepreneurs were not willing to bring their tractors. This unwillingness was because in the case of a breakdown, repairing and welding services were only available in Witu and Mombasa, which are respectively 100 km and 450 km from Mpeketoni. The advent of welding and repairing services of other farming tools which

are powered by electricity was the main mechanism which resulted in the full exploitation of the agricultural potential of the community (Kirubi et al., 2008).

In South Korea, accession to power by General Park Chung Hee in 1961 through a coup led to electricity shortage being addressed by funding from USAID towards new energy generating facilities (Amsden, 1989) : (Kim, 2011). A study by Terry Van Gevelt (2014) on rural electrification for the 1965 to 1979 period shows positive economic and quality of life outcomes. Access to electricity in rural areas led to a dramatic increase in household income from an annual income of US\$249 in 1970 to US\$2 172 in 1979. The late 1960s saw introduction of new high-yield varieties of rice and barley, the strengthening of extension services, land reclamation, and reforestation to improve soil fertility. Electricity contributed to a significant increase in agriculture productivity as it powered water pumps and drainage pumps, which were used to irrigate rice fields. This enabled cultivation of rice and barley, among other crops, in periods of drought (Van Gevelt, 2014). Electricity made investment in livestock profitable for many rural households. For example, feed pulverisers enabled households to engage in larger scale ranch management, and electric milking machines helped to improve milk production. Electrified chicken farms also recorded a significant increase in egg production (Park, 1997) : (Yim et al., 2012). Furthermore, electricity helped rural households capitalize on high market demand from an increasingly urban population and government guarantees of relatively high purchase prices for staple crops. It enabled crops to be processed and appropriately stored before being transported (Brandt, 1979). This reduced crop losses from the point of harvest to consumption. Moreover, increased information on market structure and conditions through the television helped improve the bargaining power of rural households with middlemen and traders Yim et al., (2012) : (Van Gevelt, 2014). Further economic benefits were felt throughout the macro economy with government estimates suggesting that investment in rural electrification and other rural infrastructure offered a threefold return on investment (Kim, 2004). For example, Brandt (1979) reports that as of 1979, more than 80% of children from rural areas were being sent to junior high school through private expense and the number of students continuing to senior high school, vocational schools, and university was approximately four times higher than that in 1970. Additionally, increased rural incomes created a new market for urban producers of consumable goods who consequently established rural distribution channels (Park, 1997).

However, anecdotal evidence from these success stories presented by Brandt (1979) underscored that the benefits of electrification in South Korea were not captured by the poorest 25% of the rural population who could not afford agriculture loans. This is supported by a study of 209 households from 28 villages in seven provinces, which establishes that 22.9% of respondent households did not benefit economically with 17.4% recording no change in income and 5.4% a decrease in income (Han, 1987). This study also found a strong correlation between capital assets and increased income. Furthermore, given land reform and the dissolution of the more divisive class and clan barriers in the 1950s and 1960s, electrification helped create a new class division of the haves and have-nots, particularly with respect to household appliance ownership (Turner et al., 1993).

Furthermore, household debt increased significantly for both poorer and wealthier households. For poorer households, this was due to the loans taken out to finance internal wiring costs. For wealthier households, this was due to loans taken out to pay for electric appliances, such as televisions (Baek et al., 2012). Han's (1987) analysis of savings behaviour of households suggests that increased household debt became particularly burdensome on poorer households who lacked the assets to make economically productive use of electricity and increase their income. Taken together, this suggests that rural electrification disproportionately benefited more wealthy households at the expense of poorer households. This increase in income inequality was additionally solidified through the creation of a divisive class structure defined by ownership of electric household appliances.

Lastly, despite improvements in income and quality of life, rural–urban migration accelerated during this period and into the 1980s, especially among wealthier households. According to Park (1997), it was the television and the glamorous depiction of urban life that accelerated the migration of younger villages. Many of the wealthier, older villagers who did not migrate, effectively indirectly migrated through having encouraged their children to migrate to cities (Chang, 2010). A survey of the literature on rural–urban migration in South Korea suggests that the key driver for the migration of the younger members of wealthier households was education. A good tertiary education was seen, and continues to be seen, as the most important determinant for 'a good life' (Turner et al., 1993) : (Soresen, 1994). Combined with the agglomeration of elite high schools and universities in urban centres, particularly Seoul, it seems that the improvements in rural living standards were not sufficient to stem rural–urban

migration, but rather the increase in income accrued by wealthier households allowed for an increase in rural-urban migration.

3.7 Literature review on music and culture change

3.7.1 Impact of global popular culture through music

Accumulation of products of culture like music, film, art, fashion, and dance that are consumed by society's wider population is called popular culture. It is characterised by mass appeal and accessibility. Tomlinson (1999) asserted that literature focusing on the effect of global popular culture on music among youth is scant, but there is plenty of literature on the effect of the Western foreign media on youth in developing countries. A lot of scholars examined the imbalance of cultural products information flow from the developed countries to Third World countries. Ssewakiryanga (2004) is among the scant literature on the impact of global popular culture on youth music. It shows how youth in Uganda redefined global music to suit their local context. Contrary to the 1960s where Western music was consumed in its original form but now, technological advances have led to redefining of Western music. The youth are no longer passive recipients but they modify music to suit their own local desires (Ssewakiryanga 2004).

Furthermore, Lanuza (2009) conducted research on cultural values in Philippines and underscored that, though foreign media, such as Music Television (MTV) has enormous influence on youth cultures, the youth are not helpless victims but are sophisticated readers of mass media messages in society. Moreover, a report by Geary et al., (2002) on the use of global media to reach the youth acknowledges the existence of a popular global culture which youth are embracing through technology. It states:

“Youth are a natural target in the globalization of media because they are at the cutting edge of innovation in technology and ideas. They have less experience with the old way of doing things — that is, less to unlearn — and change is easier for them. They are quicker than their parents in learning to use new products such as cell phones with text messaging. This difference in the comfort level with new technology creates a gap between parents and children and leads to exposure to different kinds of content, which creates greater gaps” (Geary et al., 2002, p. 4).

Although the report does not necessarily reflect much on the impact of global popular culture on youth music culture, it gives useful insights on the interaction between global popular culture and youth from diverse cultures in developing countries.

3.7.2 Contemporary music in Zimbabwe

Contemporary music in Zimbabwe, popularly known as “Zim Dance Hall,” is literally the music of the moment. It is sung in vernacular language by young urban grooves artists. The origin of this music is rooted in the seventy five percent (75%) local content policy introduced by the government of Zimbabwe in 2001 and the subsequent radical shift in radio and television programming. This policy was enshrined in the 2001 broadcasting services, which sought to provide a new regulatory framework to the broadcasting sector, after nullifying some sections of the 1957 Broadcasting Act, which guarantees monopoly to Zimbabwe Broadcasting Cooperation (ZBC). The modified version of ZBC Act of 2001 (Chapter 2.06, section 11) stipulates that all broadcasters should ensure that at least seventy-five percent of their programming is local content, but it was later pushed to 100% as the anti-Western imperialism agenda gathered momentum from 2002 onwards (Manase, 2009 and Chari, 2009). This policy was received with mixed feelings from the public. Citizens who were against it argued that it would make it impossible to liberate the air waves. The arts sector, which generally was in favour of the policy pointed out it would unleash unlimited opportunities for the industry.

As a result, the government’s high appetite for local content in broadcasting and its intentional effort to play music for hegemonic reasons witnessed the emergence of young musicians known in Zimbabwe as “Urban Grooves” and their type of music is dubbed as “Zim Dance Hall”. This music genre is comprised of albums such as “Vanhu Vakuru,” translated as “Big Men,” sung by the artist called Winky D. The song describes various experiences occurring in Zimbabwe since the beginning of the crisis in 2000. These mushrooming young Urban Grooves musicians were nourished by foreign music for a long time: hence, they emulated Western musical icons such as Eminem, Tupac, Shakur, Snoop Dogg, and Michael Jackson (Bere, 2008). Therefore, in response to the 75% local content policy, young musicians composed lyrics blended with western hip-hop rhythms, reggae beats with local flavours, and sung in indigenous language and slang.

The rise of Urban Grooves music caused controversy in the society, those opposed to them stated that they lack creativity, as seen in their imitation of music icons from the West, produce poor quality productions, vulgarity, and lack of norms. Those in favour posit that they breathed a new life into the musical industry and broke the monotony and standardisation of music entrenched by an oligopolistic ownership structure in the music industry. Moreover, some felt that Urban Grooves music was an effort to preserve an authentic Zimbabwean cultural identity

through the 75% local content policy. This sentiment was echoed in a letter to the state weekly newspaper, Sunday Mail, which read:

“It is not debatable that urban grooves imitate their western idols, I have no problem with that but, I would have been happier if they were original. These youngsters should be more discerning in what they imitate. It is not advisable to copy everything. The Urban Groovers should know that most of the western idols lack morals. In our culture we do not worship sex as these western people do. They sing explicitly about their subject. In our culture we don’t use obscene language publicly, but hear what Maskiri sings...They should always remember that they are role models for innocent youths. The 75% local content should be translated to mean 75% local culture”
(Zimbabwe Sunday Mail Newspaper, 2006-07-23 cited by Chari, 2009, p.171).

Established artists in the country, such as Thomas Mapfumo and Oliver Mutukudzi, were strongly convinced that Urban Grooves musicians lack identity and cultural consciousness. They criticised them for lack of originality and imitating Western popular artists. Thomas Mapfumo, in one of his interviews, asserted that he does not tolerate a Zimbabwean artist singing hip-hop: it is not their culture and rap is not Zimbabwean (Bere, 2008). Moreover, radio disc jockey Musavengana Nyasha in 2006 once publicly proclaimed that young Urban Grooves artists are not following Zimbabweans’ culture: neither does singing Western music in a native language qualify it to be local, nor the fact that it is a Zimbabwean singing Western music in vernacular make it local (Mateveke, 2013). Despite these critics, defender of Urban Grooves, producer and co-director of Phathood Entertainment Jackson Ngoro stated that Urban Grooves music is the future of the music industry, and it will be the biggest music genre in Zimbabwe even 20 years from now. In addition, a journalist and music critic named Wonder Guchu stated that the Urban Grooves genre is still evolving and the artists are still struggling with identity: thus, they must be given a chance to master their talent and stabilise financially (Guchu, 2005).

3.8 Traditional music and the innovation of ethnic nights of Kenya

Traditional music in Kenya is clearly identified on a tribal basis, as each tribe has a unique music and dancing style. It is notable specifically in rural areas where tribes are rooted and geographically demarcated countrywide. It is less pronounced in urban areas which hub different tribes in a limited space. Ogude (2012) asserted that, in the last two decades, the invention of Ethnic Nights in Nairobi and other Kenyan urban areas indicates a significant return to “ethnic” music in entertainment sites such as night clubs. Ethnic nights are nights

dedicated to music of specific ethnic tribes. They were held in Kenyan cities and became the fashionable thing to do in Nairobi night clubs. Ethnic Nights were differentiated and identified by their unique dancing styles and names which reflected ethnic affiliation. For instance, “Mugiithi” night stood for the “Kikuyu” tribe, “Mulembe” night stood for the “Luhya” tribe, “Kilimbi” night stood for the “Kamba” tribe, “Ramogi” night stood for the “Luo” tribe, and “Kitwek” night stood for the “Kalenjin” tribal group, just to mention a few. These ethnic nights were a major source of entertainment and they attracted big audiences of different classes and ethnic backgrounds. Something notable was the Ethnic Cuisines, they were promoted and served at the performances (Katanha, 2010). The rolling out of Ethnic Nights was done in 1987 when artists realised that Western foreign music dominated night life in Mombasa and other urban areas in the country. Hence, to mitigate this situation, a day was set weekly, dedicated to perform popular traditional Kenyan music, especially from the coastal regions of Kenya (Mbembe & Nuttall, 2004). These African nights were later rebranded as Ethnic Nights or Coastal Nights, and they featured a huge variety of traditional musical genres such as “Chakacha”, a coastal dancing style comprised of sexually seductive hip rotation movements similar to belly dancing. Ogude (2012) elucidates that all Ethnic Nights were incomplete without a “chakacha” dance competition from ladies of different body shapes taking the floor in a bid to win the competition. They seductively and sexually wind their waist according to the melodious “Chakacha” rhythm being played. At some point, echoes from ecstatic audience were heard in virtually all Kenyan night clubs with the following refrain:

Kata kata, Shake it shake it
Kata mwanangu kata, Shake it my daughter / baby shake it
Kata usiogope, Shake it do not be shy
Kata chako mwenyewe, Shake what you’ve got
Wala hu- kuazima, You did not borrow it
Hebu leo jitolee, Give it your best today
Ebu leo jionyese, Show it to us today
Hebu leo tingishe, Shake it today
(Ogude, 2012, p. 148-149).

Traditional music in Kenya went through a process of rural urban migration as indicated by the invention of ethnic nights. In the urban areas, access to electricity enabled the music to be embraced by a wider audience as it was played in many night clubs and other places of entertainment. Moreover, the music was played detached from its rituals and official settings in rural areas, a move which led many people to appreciate the culture mimicked by the music

(Simatei, 2010). On the other hand, in rural areas (origin of traditional music) there is no access to electricity. This restricted the music to be spread to a wider audience, it was produced by the villages for the purpose of officialdom; that is, use in official events such as weddings, funerals, circumcision, formal political celebrations, and school drama festivals. Thus, it was consumed mainly by audience who attend and participate in these events (Barber, 1997).

The advent of traditional music into the urban settings was a huge step forward for the genre to be freed from the seemingly unending, perpetual prison of officialdom and its political code as a historical cultural heritage. Furthermore, the genre was also freed from being a symbol of pure, indigenous tradition seldom retrieved during public celebrations at national holidays and entertaining tourists and other foreign visitors (Ogude, 2012). Nonetheless, some conservative folks posited the migration of traditional music and its related dance styles into urban spaces was an act of transgression. This movement, according to critics, was an open celebration of taboo subjects like sex and sexuality across gender, classes, and age groups found in cities.

Despite critics of this movement, by breaking the boundaries of officialdom and travelling into urban spaces, traditional music has succeeded in opening up for willing new audiences. The city space provided moments of freedom, where all people could participate regardless of age and gender. These moments of freedom are best captured in the exciting manner in which dance styles link to certain rituals when performed free of their social contexts and related taboos (Fabian, 1998). To embrace it all, gender, class, age, and, ethnicity boundaries collapse when traditional music is performed in the city, everyone is free to partake, thus providing a space in which even socially and economically depressed Kibera slum dwellers in Nairobi can go thorough ‘a short lived sojourn outside the self’ while embracing the joy created by traditional music (Mbembe & Nuttall, 2004).

3.9 Literature review on dressing and culture

3.9.1 Impact of dress as a non-verbal communicator

Dressing is an effective tool of socialisation where culture transmission can be achieved through the dress code because children model their parents and others in the community through dressing (McLveen & Gross, 2004). Studies conducted by Burk & Speed, (1995) Berns, (2007) at the “Dzimbabwe” sub cultural group of Great Zimbabwe indicated that, the language of dress had both positive and negative effects on the people’s culture. Members of the community interviewed showed consensus on the fact that the way of dressing had a

positive effect since it acted as a catalyst in transmitting culture norms and values to children. During the research with the “Dzimbabwe” people, one participant is quoted to have said:

“isu madzimbabwe tinokoshesa tsika nemagariro edu epasichigare saka vana vedu tinovapa dzidziso yazvo kuitira ramangwana, translated as, we the Zimbabwe people value our culture hence, we need to transmit it to generations to come”
(Manwa & Ndamba 2011, p. 440).

These findings indicate that the Zimbabwe community is not ashamed but rather proud of their culture for some participants were seen wearing head gear made from animal skins as a result of intermarriages, which was a cause of concern for some community members who were not happy about acculturation and intermarriages, as this was attributed to be responsible for destroying their cultural fabric (Manwa & Ndamba, 2011). Roach-Higgins & Eicher (1995) stated that media had bombarded people with new forms of dressing that, in most cases were difficult to resist. This sentiment was echoed by one participant who said the following:

“Zvipfeko zvemazuvano ndezve kuona mumadzangaradzimu anouyisa zvipfeko zvakafumuka, translated as, the media has brought different forms of dress codes which is culturally unacceptable”. (Manwa & Ndamba 2011, p. 440).

During the research, body modification like tattoos were seen on some Zimbabwe people and such up-and-coming dress code was foreign to the culture of this community. Furthermore, some people interviewed during the research expressed frustration and stated that the young generation is weak, cannot resist alien cultures, and has already adopted other unacceptable and strange dress codes into our culture (Manwa & Ndamba, 2011). In addition, there was deep- rooted concern, mainly from the elderly and conservative community members, about the slowly diminishing culture identity. They stated that their cultural attires are now mainly confined to official ritual ceremonies and some specific family occasions.

3.9.2 Language of dress and shared meanings

Brown (1990) used symbolic interaction theory to underscore the importance of shared meaning in dress codes through the construction of dress cues as symbols. Informed by this theory, people pass comments based on what they see and hear. The comments are shaped by what is acceptable in their culture. In line with the symbolic interaction theory, the case study of the “Dzimbabwe” sub cultural group at Great Zimbabwe discussed above depicts the language of dressing as a mirror of their culture, as a tool to transmit their cultural values to the next generation. Moreover, Kaiser (1994) states that shared dress cues mean common

understanding among people who shared the same culture. For example, in South Africa, hundreds of people marched in Johannesburg to protest over the assault of on two women at rank of mini-bus taxis. They were attacked by waiting drivers because they were dressed in miniskirts. The demonstrators wore miniskirts and carried placards which read, 'We love and adore our minis' (Zimuto & Chikodza, 2013). Looking at this incident, the reason why these women were attacked was because of the shared meaning which the waiting drivers had of dressing in miniskirts. To them miniskirts are associated with prostitutes, whose intent is to entice men. In addition, Spencer (2005) asserts that, in a community, people share values, beliefs, and taboos. This common understanding is also portrayed in dressing, especially when they come across a dress code which is alien to their culture. For example, in conservative Zimbabwean communities, people usually jeer at women wearing miniskirts or pass negative comments on men wearing earrings and plaited hair. This is because of shared meanings attached to such dressing. Clothes such as miniskirts and other dressing which exposes body parts are also viewed with negative connotations which are highly linked with the intent to attract the opposite sex thus, dressing in this manner contradicts the prevailing good moral standards. Castrol (1992) alluded to the fact that women use clothes to attract men and communicate sexual availability or as non-verbal invitation for sexual advances. Thus, this observation further reinforces the shared meaning of dressing being discussed in this discourse where people tend to pass comments and react towards a specific dress code.

3.10 Conclusion

Studies reviewed in this chapter pointed to how communities in Kenya, South Korea, Bolivia, Tanzania and Vietnam were transformed due to positive economic and social outcomes attained. Moreover, heuristics and terror management theories in the field of psychology, coupled with the theory of sustainable agriculture intensification, provided the basis for conducting this thesis research. Studies cited show the interplay of culture and development and traditional music, which was reserved for the purpose of officialdom, and slowly dying on the internment arena, had a booming revival in Kenyan cities through the innovation of Ethnic Nights. Contrary to Kenya, the case of Uganda pointed to foreign music as a catalyst in spreading global popular cultures among the youth, resulting in the young generation preferring foreign music at the expense of their traditional music. In addition, Zimbabwe's young musicians, called Urban Grooves, who sing contemporary music, are also redefining foreign music to suit the local context. Regarding dress, studies of the subcultural group of Zimbabwe,

which is called the “Dzimbabwe” people, highlighted that dressing in a modest way is recommended and this subcultural group is identified by the language expressed by their dress code.

4 Methodology

4.1 Introduction

To achieve objectives of this research, three methodologies, comprised of Difference in Difference hereinafter, referred to as DID is used to establish the relationship between access to renewable energy and crop harvest output. Survey methodology where questionnaires are administered to youth in Manicaland and Harare province is used to investigate the relationship between access to energy and culture change. Lastly, a simulation experiment methodology is used to investigate the relationship between access to energy and collective action towards environmentally sustainable farming practice. From the use of these methodologies, anticipated validity threats to results as well precautionary measures to counteract the threats will be discussed.

4.2 The Difference in Difference methodology

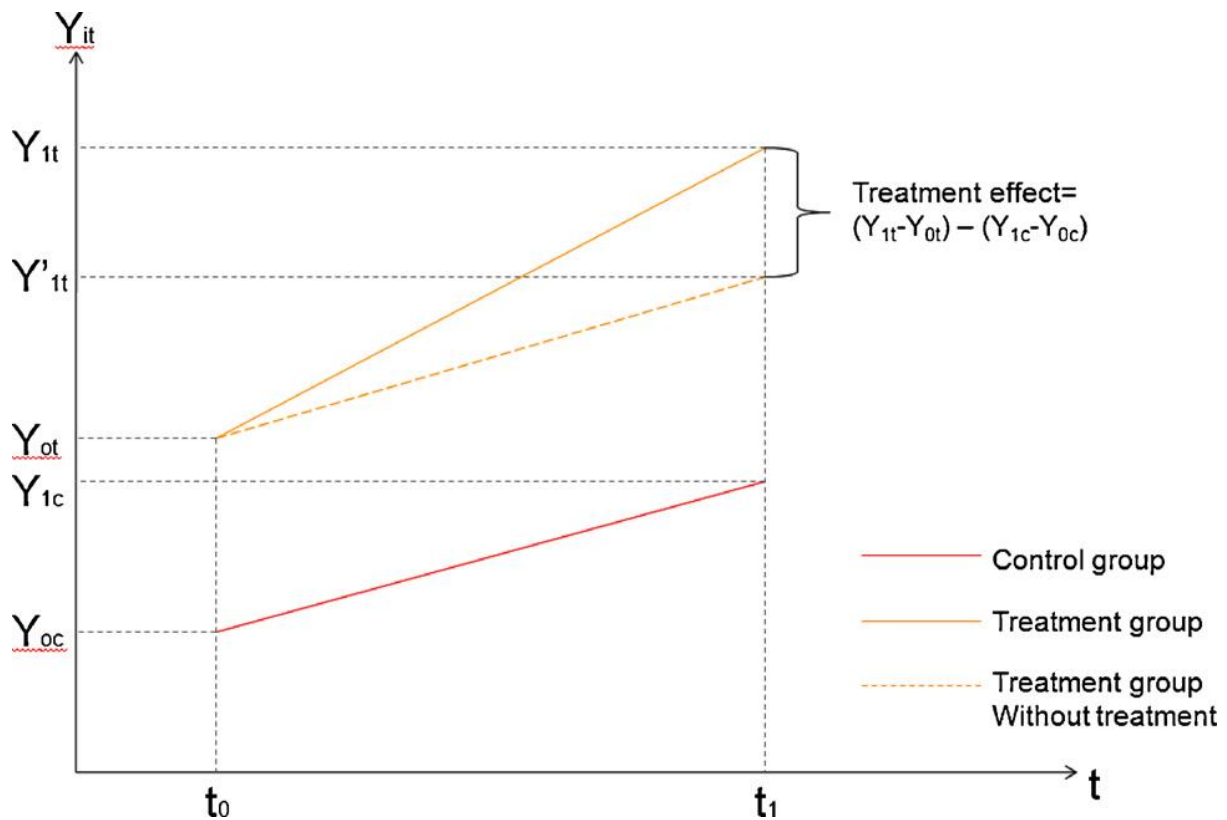
To assess the impact of access to renewable energy on crop harvest output, the DID methodology is used. This method is appropriate for this study because it has been used by previous studies on economic evaluation which analyses the impact by comparing time points before and after an intervention. This is also the focus of this research. For example, Card and Krueger (1994) used the methodology to estimate the impact of increase in minimum wage on employment in fast food restaurants in New Jersey. Finkelstein (2002) used it to investigate how the evolution of a tax subsidy to employer-provided health insurance affects coverage by such insurance. In California, the methodology was used to estimate the impact of the tobacco control programme (Abadie et al., 2012). In these cited studies the DID methodology was able to control effects due to the general time trend and other confounders. Therefore, the technique is appropriate to analyse the impact of access to renewable energy on crop harvest output in Chipendeke rural community found in Zimbabwe. In the study at Chipendeke, observations on crop harvest are made for two time periods, 2010 and 2015. Furthermore, access to energy in the community catered for 38 farming households while the rest of households have no access. These 38 households constituted the treatment group, and a random sample of 77 farming households with no access to energy constituted the control group.

As can be noted, there is a big difference in the sample size of the treatment and control group 38 versus 77. Despite the small sample size of the treatment group when compared to the

control group, the DID methodology works well because the treatment effect in the study is very strong (having access to energy and no access to energy). Moreover, the methodology strongly relies on parallel trend assumption to provide an unbiased consistent estimate, and crop harvest output being observed among the two groups constitutes a parallel trend, thus making the methodology appropriate for the study. The parallel trend assumption states that average outcomes of the treatment and control groups follow the same trend over time in the absence of treatment, as graphically illustrated in Figure 20 below. To apply the DID in this study, a new variable called TAP which is a product of variable Access (being access to energy) and the variable Time (being the year 2010 and 2015) is generated from the primary dataset gathered at Chipendeke community by the research team. In analysing maize, wheat, beans, and tomato crop harvest output, the P values of variable TAP in the models indicate the treatment effect.

The basic idea embedded in the DID methodology is that observations are collected for two groups for two time periods. One group being the treatment group, is exposed to treatment in one time period. The other, being the control group, is free from treatment in both time periods. In case of the same units within a group being observed in each time period, average gain over time in the non-exposed or control group is extracted from the gain over time in the exposed or treatment group. This double differencing is called “difference-in-difference.” It removes bias between the groups in the second comparison time period such that results obtained are based on permanent differences between the groups. In addition, the methodology removes bias from comparison over time in the treatment group that could be the result of time trends unrelated to the treatment (Abadie, 2005): (Finkelstein, 2002): (Card & Krueger, 1994).

Figure 20: Graphic Illustration of DID Methodology



Source: (Li, Graham, & Majumdar, 2012).

- To grasp how this DID methodology works, practical interpretation of the above graph is applied to Chipendeke case study. In the Chipendeke community, 115 farming households were observed in two time periods, $t = 0, 1$ where 0 indicates the pre-treatment phase, the period 2010 and backwards when there was no electricity in the community or put simply, before farming households in the treatment group had access to electricity. 1 is the post-treatment phase, which is a time period after farming households in the treatment group had access to electricity. Put simply, this is from the year 2010 onwards.
- Every group is indexed by the letter $i = T, C$ where T indicates the treatment group which is farmers with access to electricity, and C indicates the control group which is farmers without access to electricity.
- Let Y_{0T} and Y_{1T} be the outcome for the treatment group before and after treatment respectively, and let Y_{0C} and Y_{1C} be the corresponding outcome for the control group.

According to Card & Kruger (1994), under the basic DID approach, the outcome Y_{it} which in Chipendeke case study is the crop harvest output for farmers in the treatment group is modelled by the following equation:

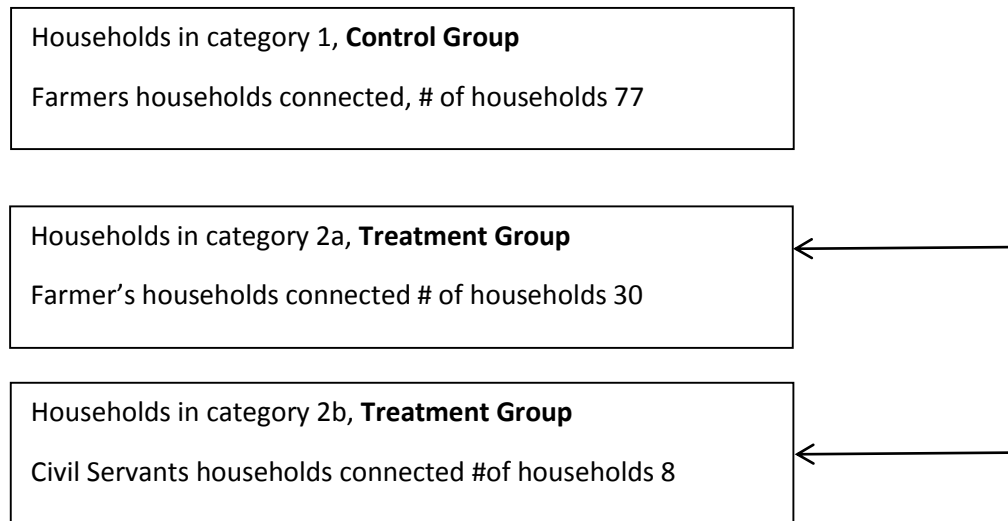
$$Y_{it} = \alpha + \beta T_{it} + \gamma G_{it} + \delta(T_{it} \cdot G_{it}) + \pi X_{it} + \varepsilon_{it} \quad \text{whereby,}$$

- α is the constant term
- β is the time trend
- γ is the specific group effect
- δ is the treatment effect we are interested in
- ε_{it} is a random, unobserved term which contains the error caused by omitted covariates
- X_{it} is the vector of covariates uncorrelated with ε_{it}
- π is the vector of coefficients
- T_{it} is the time-specific component, which takes the value 1, if Y_{it} is observed in the post-treatment period and 0 otherwise
- G_{it} is a group-specific component, which is 1, if Y_{it} is an observation from the treatment group and 0 otherwise
- $T_{it} \cdot G_{it}$ is an interaction term which indicates a treated individual after the intervention

4.2.1 Research design for the DID estimator

Table 6 shows the research design of how households are sampled to constitute the treatment and control groups in the Chipendeke rural community. 38 households from three villages which are accessing electricity are purposefully sampled as the treatment group, while 77 farming households with no access to electricity are randomly selected to constitute the control group. Observation on the harvest output have been made for two time periods, which are the years 2010 and 2015 as shown in the study research below.

Table 6: Research Design



This design above shows that the Chipendeke community will be divided into two categories; households category one, which is the control group composed of 77 households which are not connected to electricity and household category two, which is the treatment group composed of 38 households which are connected to electricity. Currently, 38 households, a rural health centre, a primary school, a business centre with three shops, and a grinding mill are also connected to electricity.

4.2.2 Data collection and analysis

The study area of the Chipendeke community falls under Ward 31 of Mutare Rural District Council (MRDC). The area has a total population of 7 284 and 1 390 households which are sparsely populated (Practical Action, 2008). Data collection was conducted by a team of six enumerators during the month of December 2015. Due to the size of the area, a random sampling of 77 households in the control group was conducted followed by a purposeful sampling of 38 households for the control group. Before the final research was conducted, a structured questionnaire as a pilot survey was conducted with data of 20 farming households randomly sampled and the results were analyzed on Stata Version 12 Software. Based on the results of the pilot survey, adjustments to the questions were done that they address real issues in the community. Then from the 5th to the 9th of January 2016, the actual survey was conducted using the adjusted survey questionnaire. The set target was to interview a sample of 200 households but due to some challenges experienced in the field, 115 were interviewed instead. This led to 230 observations across 22 variables being made since each household was

interviewed for two time points, the years 2010 and 2015. Two major challenges which contributed to the failure to attain the set target of households during the two days of the survey are as follows:

- Erratic rainfalls were experienced every day and researchers were at times forced to stop because the questionnaires could be spoiled by the showers hence making it difficult to read during the data leaning and analysis process.
- Households in the Chipendeke community, especially those in the control group, are sparsely populated and sometimes distance from one household to another can be 500 meters. Researchers ended up with fatigue as they moved from one household to another following the random sampling strategy.

4.2.3 Data collection tools

This research was conducted in a participatory manner using mixed research methodology which comprised of qualitative and quantitative approaches. The following data collection tools were used:

4.2.4 Survey questionnaire

During the survey a questionnaire with thirty-four open and closed ended questions was administered to 115 households in Chipendeke. The households were selected randomly out of the total of 1 390 households in the area. The questionnaire collected information which assessed the impact of access to renewable energy on maize, wheat, beans and tomato crop harvest output for the two time periods: the year 2010 and the year 2015.

4.2.5 Focus group discussions

To complement the data gathered by the survey questionnaires, focus group discussion was conducted with the management committees of Chipendeke Power Company. The intention was to get more details of how the company started, benefits they are deriving from the project, the challenges they are facing, and their plans for future sustainability of the project. During the discussion the researchers made a request to voice record their answers on a mobile phone and permission was granted by the management committee.

4.2.6 In-depth interviews

Before the actual interview was conducted in Chipendeke, a visit to stakeholders to the project was made where some in-depth interviews were done. The aim of these interviews was to understand more information about the project from each stakeholder's perspective. Five stakeholders which include Practical Action Southern Africa, Ministry of Energy and Power Development, Rural Electrification Agency, Zimbabwe National Water Authority, and Mutare Rural District Council were interviewed.

4.2.7 Descriptive information of variables in DID methodology

Table 7 below shows the names and descriptions of variables used to collect data to explore the effect of access to energy on maize, wheat, beans and tomato crop harvest quantities in the Chipendeke community.

Table 7: Descriptions of Variables in the Research

#	Variable Name	Description of the variable
1	Labor	Number of people providing farming labor per farming household
2	Education	Highest level of education attained by the head of farming household
3	Irrigation	A binary variable which shows if a farmer has access to irrigation facilities or no access
4	Family size	Shows the number of people in the each farmer house household
5	Time	A binary variable which shows the time periods in which the farmer was engaged in farming. The dummy 0 shows the time for the year 2010 and the dummy 1 shows time for the year 2015
6	Access	A binary variable which shows if a household had access to electricity or no access
7	TAP	This is the product of variables Time and Access. It shows the treatment effect on the treatment group
8	Gender	A binary variable which shows the gender of each farmer.
9	Purpose of farming	This variable shows the purpose of the farming activities of each farmer for the year 2010 and 2015. The dummy 0

		shows farming for family consumption, and the dummy 1 shows farming purpose for business
10	Age	Shows the age of each farmer
11	Income level	The amount of annual income in US\$ obtained by a farmer through the farming activities
12	Soil type	The type of soil where the farmer is planting crops. The dummy 0 represents sand loam and the dummy 1 represents sand soils
13	Extension	Indicates whether a farmer had access to extension services from qualified agriculture extension officers
14	Maize Harvest	The quantity of maize harvest output obtained by each farmer at the end of a farming season
15	Wheat Harvest	The quantity of wheat harvest output obtained by each farmer at the end of a farming season
16	Beans Harvest	The quantity of beans harvest output obtained by each farmer at the end of a farming season
17	Tomato Harvest	The quantity of tomato harvest output obtained by each farmer at the end of a farming season
18	Maize Acreage	The size of acreage which a farmer planted maize crop in a farming season.
19	Wheat Acreage	The size of acreage which a farmer planted wheat crop in a farming season.
20	Beans Acreage	The size of acreage which a farmer planted beans crop in a farming season.
21	Tomato Acreage	The size of acreage which a farmer planted tomatoes in a farming season.

4.2.8 Ex-ante analysis of variables

Households in Chipendeke are clustered in the same geographical location; hence, sharing the same culture, language, and farming technics. Nevertheless, households' micro differences exist in some characterises as shown in Table 8 which is an ex-ante analysis based on the following traits: education, labour, irrigation, acreage, age, soil type, purpose of farming, income level, and agriculture extension services. The analysis compares 38 households in the treatment group and 77 in the control group in the year 2010, before access to renewable energy in the community. The basis of comparison is the mean and standard deviation of each characteristic.

Table 8: Exe-ante Analysis of Households in the Chipendeke Community

	Characteristic	Treatment Group	Control Group
1	Size of acreage	Mean = 5.289474 Standard deviation = 0.983867 Each farming household owns an average of 2 acres arable land	Mean = 4.592105 Standard deviation = 1.179578 Each farming household owns an average of 2 acres arable land
2	Purpose of farming	Mean = 0.289474 Standard deviation = 0.459606 Subsistence farming is the main purpose of households farming activities	Mean = 0.298701 Standard deviation = 0.46069 Subsistence farming is the main purpose of households farming activities
3	Harvest quantities	Mean = 3.394737 Standard deviation = 0.88652 An average crop harvest output falls in the range of 1000 - 1 500 kilogrammes per farming household in a cropping season. This crop harvest output is inclusive of maize, wheat, beans, and tomatoes	Mean = 2.753247 Standard deviation = 0.905478 An average crop harvest output falls in the range of 1000 - 1 500 kilogrammes per farming household in a cropping season. This crop harvest output is inclusive of maize, wheat, beans, and tomatoes

4	Income level	Mean = 2.657895 Standard deviation = 1.020766 The average income of each farming household were in the range US\$ 1000 - 1 300 per annum	Mean = 3.025974 Standard deviation = 1.423247 The average income of each farming household were in the range US\$ 1000 - 1 300 per annum.
5	Labour	Mean = 5.289474 Standard deviation = 1.52294 An average of 5 people per household provides farming labour. This includes mainly family members	Mean = 4.116883 Standard deviation = 1.630095 An average 4 people per household provides farming labour. This includes mainly family members
6	Age	Mean = 3.184211 Standard deviation = 1.248897 The average age of the head of a farming household falls in the range 31- 40 years	Mean = 2.948052 Standard deviation = 1.630095 The average age of the head of a farming household falls in the range 31- 40 years
7	Education	Mean = 1.815789 Standard deviation = 0.65162 The average level of education for the household head is secondary level	Mean = 1.974026 Standard deviation = 0.76434 The average level of education for the household head is secondary level
8	Gender of the Household Head	Mean = 0.394737 Standard deviation = 0.495355 The average gender of households head was male.	Mean = 0.454545 Standard deviation = 0.501195 The average gender of households head was male.

9	Agriculture Extension Services	All farming households had access to an expert agriculture extension worker	All farming households had access to an expert agriculture extension worker
10	Soil type	Farming plots had predominantly sandy with some small portions of sand-loam soils	Farming plots had predominantly sandy with some small portions of sand-loam soils

The outcome of the ex-ante analysis show that the two groups have very small variations because their mean values falls in the same range and the standard deviations are low.

4.3 Collective action simulation experiment method-engaging farmers in death reflection

A collective action simulation experiment methodology is used to assess the relationship between access to energy and environmentally sustainable farming practice. The simulation experiment is done by engaging farmers in a process of death reflection. Cozzolino et al., (2004) and Ring (1984) defined death reflection as a cognitive state of death awareness where people put their lives in context, contemplate their meaning, and review how others will look upon them after their death. The process of death reflection leads to individuals displaying pro-social or helping behaviour. Furthermore, Metcalfe & Mischel (1999) and Haidt (2001) allude to death reflection to be psychologically processed in the “cool” or cognitive system, characterized by deliberate, analytical, rational reactions based on systematic processing subject to intentional control. These “cool” psychological processes are the basis of self-transcendent reactions shown when people reflect their death in an analytical manner. In addition, research on near-death experiences shows when people reflect death, they develop intrinsic motivation to help others. For example, a mother describes how she witnessed her child narrowly survive being hit by a car. The incident led her into a process of death reflection which ultimately compelled her to becoming an emergency medical technician so as to help others survive similar road accidents.

“I felt sure he was dying, and I didn’t know of anything I could do to help him or to preserve his life. . . . [it] was a real turning point. . . . I served an ambulance service for 10 years and have saved more than one life” (MacAdams & de St. Aubin 1992 p. 228) cited by Grant and Wade-Benzoni (2009, p. 605-606).

In the Chipendeke Community farmers need to be given a choice to decide the mode of farming they need to implement. Engaging farmers in death reflection will help them to do self-introspection and come up with a farming mode of their choice. Data for this experiment will be collected from recording the outcome of each round from the 18 rounds that will be conducted during the simulation exercise. Data collection will be followed by analyzing the behavior of farmers in all rounds. The simulation experiment method is used in this research because of its valid and reliable method. It is suitable for this study because it has been used in similar studies where collective action dynamics under external rewards were investigated in the Andean farming communities (Drucker et al., 2012).

4.3.1 Collective action simulation experiment design

Death reflection situation cues were induced to randomly sampled thirty farmers in a classroom setting at the local Chipendeke Primary School. Researchers split the farmers into six groups. Five research assistants had been allocated to be in charge of groups where they monitored participants' discussion between rounds. The lead researcher was in charge of the 6th group. Each group composed of five participants endowed with four cards as tokens. These tokens represented the number of land units which they were farming. In the process of farming, participants trade off farming with organic fertilizers against farming with chemical fertilizers. This situation represents a public good dilemma, as farming with chemical fertilizers results in further deterioration of environment for the whole community, yet it increases profits of the individual farmer who used this method. Consistent with public goods experimental design, environmental benefits accrued from farming with organic fertilizers are non-excludable, shared equally to all farmers regardless of who contributed. Individual farmers therefore get more environmental benefits if everyone contributes to the public good by farming with organic fertilizers but, each farmer had a chance to free ride. In each group of five people, if everybody contributes all the endowments, the social payoff would be 20. For this experiment a total of 18 rounds were played per group. Theoretically, a round represents a farming season and investing or the act of giving tokens in a round represents willingness of a farmer to conduct organic farming on the units of land represented by tokens, instead of farming with chemical fertilizers.

4.3.2 Detailed instructions to participants in the experiment

To ensure that participants understood the experiment, detailed instructions were given beforehand. After the instructions participants were given an opportunity to ask for clarification for parts of the experiment which they did not understand.

- (1) You are participating in this exercise as part of a group of five participants. The exercise is about making a decision to continue with your current practise of using chemical fertilizers in farming because this is an easier option for you. Application of chemical fertilizers also has the benefit of attaining a quick bumper harvest because chemical fertilizers enhance the yield and growth of crops. Alternatively, you can make a decision to protect the environment by choosing to apply organic manure in farming as a substitute for chemical fertilizers. Repeated application of chemical fertilizers weakens soil fertility and there is risk of eutrophication through run off water into the Wengezi-Chitora River, which is the source for your electricity generation.
- (2) There is a market based incentive offered if you opt to use organic fertilizers. Your farm produce are sold at the niche market for organic products. In this market, your produce is uniquely identified with an eco-label which shows that it is produced in an environmentally sustainable manner.
- (3) The simulation exercise you are about to start is composed of 18 rounds. We give each participant four tokens/cards at the beginning of each round. The tokens represent the number of land units or hectares that you are farming and each round represents a farming season. You may decide to drop or keep the tokens in the box in front of your group at the end of each round. Dropping tokens in the box represents the number of land units you are willing to farm with organic fertilizers in a farming season. Keeping your tokens in a round represents a decision to farm those land units with chemical fertilizers.
- (4) Your groups will be formed by randomly assigning a person to four other participants in this class room.
- (5) Now can you seriously engage yourself in death reflection situation cues? Each one of you, imagine you are going to die in the next five years. Think deeply about your family, the community in which you stay and how farming, being the main form of livelihood, will look like in the future when you are dead. For the next ten minutes, think about your coming death and the mode of farming that you plan to implement before you die. During this process you must answer the following question: are you willing to substitute chemical fertilizers with organic fertilizers in your farming activities?

- (6) In each round, you must decide how many land units (acreage) you are going to cultivate with organic and chemical fertilizers.
- (7) Based on the combined contribution of applying organic manure from all five participants in your group in each round, your group will be protecting the environment by enhancing soil fertility and reducing the risk of eutrophication. The amount of tokens not contributed to the group represents a combined effort by the group to farm with chemical fertilizers. This decision leads to a bumper harvest since chemical fertilizers makes crops grow faster when compared to organic fertilizer.
- (8) Before each round of the experiment you will chat for one minute with other participants in your group. You can discuss any aspect of the exercise with two exceptions: (1) You are not allowed to promise the other participant side payments or to threaten them of any consequences after the experiment, (2) You are not allowed to reveal your identity if you do not know each other.
- (9) We will be monitoring the conversations and if we detect any violations of these rules, we will have to remove from the experiment all members of the group where the violation has occurred.
- (10) We will start the practice round to help in illustrating the experiment.

4.3.3 How the rounds will be structured

4.3.3.1 For example, round 1, participants start charting

You may now start chatting for two minutes with the other members of your group. You may discuss any aspect of the experiment, including your coming death, and how the future in terms of food security for your family may look like when the land soil fertility continues to decline, but don't discuss two important exceptions alluded to above as it will be a violation of the experiment. We will be monitoring and listening to the chats. Where the violation of the rules occurs, we will have to remove all the group members from the experiment.

4.3.3.2 Stop chatting

Proceed with the farming season by making a decision on the tokens that you want invest.

4.3.3.3 Recording tokens

After investing the tokens the number of tokens invested in each group will be recorded but you will not be informed of the outcome.

4.3.3.4 Allocations of tokens

After the total number of tokens invested in a group per round have been recorded, every group participant will be given the same amount of tokens (4) and then the next round will proceed. Similar instructions will be repeated in each round throughout the experiment until round 18, which is the last round.

4.4 Survey methodology on the relationship between access to energy and culture change

To explore the relationship between access to energy and culture change, household access to electricity is used as an indicator of development. While many studies on culture are mainly conducted qualitatively, this study approaches the subject with a mixed methodology. Qualitative analysis of various attributes of culture is complemented by quantitative analysis where frequency tables with statistics are produced to calculate the outcome of responses from interviewees. The use of mixed methodology is appropriated in this study because it taps the advantages of each approach, hence helping to produce valid and reliable results. In this research, an identical questionnaire, carrying the five main attributes of the indigenous Zimbabwean culture, is administered in two purposefully sampled provinces with contrasting levels of access to electricity. It involved face to face interviewing of 400 youth in high schools comprised of 195 males and 205 females whose age ranged between 16-20 years. Interviews were conducted in both English and vernacular language (Shona). The use of both languages was necessary because some themes in the survey instrument could lose meaning when translated to vernacular, (Shona) and hence, were maintained in English.

Permission to conduct this research was sought and granted by the Head Office for Ministry of Primary and Secondary Education at the national level with reference number C/426/3 Harare. At the district level, the District Education Officers (DEO) authorized the headmasters of selected schools to allow the research team to conduct the research. The research area constitutes two provinces of Zimbabwe, Manicaland and Harare Province. Harare Province is the capital city of the country and is relatively more developed than all the provinces in the country. In this province the following schools from Northern Central District were randomly selected; Queen Elizabeth Girls High School, Alan Wilson Boys High School, Prince Edward Boys High School, and St. John's High School from the Mabelreign District. In Manicaland Province, Buhera District was purposefully sampled as a representative of underdeveloped rural areas. In this district, schools and villages where students stay have no access to electricity.

The following schools took part in the survey; Hande Secondary School, St. John's Secondary School, and Gunde Secondary School.

4.4.1 Data collection tools

This research was conducted in a participatory manner. Voice recordings using mobile phones and face-to-face guided interviews were used to collect data from youth in high schools. Data collection was conducted by a team of six interviewers over a period of 14 days from 17-30 May 2015. The interviewing process took about 10-12 minutes per respondent. Before the survey instrument was administered in sampled schools, a pilot survey was conducted on two schools in Harare Province. Responses given during piloting led to the adjustment of the survey questionnaire in order to make all questions relevant to the context of the targeted schools. The adjusted survey questionnaire was used to collect data in all schools which participated in this research.

4.4.2 Data processing and analysis

After the survey was conducted at the participating schools, data cleaning on all questionnaires was done. Mistakes, outliers, and other missing information were noted and corrected. All open-ended questions were analyzed qualitatively by listening to voice recordings from mobile phone devices. Major themes coming from each question were extracted. Dominating major themes from each question were entered in a code book where every theme was coded differently. For example, on a question asking subjects on different types of dress they prefer to wear, emerging themes from interviewees, such as long skirts, miniskirts, trousers, and African attire, were entered in a code book where each theme has a different code. After coding responses from open ended questions, major themes were extracted and results of the themes were compared and contrasted between the provinces.

Furthermore, close-ended responses were analyzed quantitatively by entering responses on Stata version 12. A dataset called High Schools Survey on Culture 2015 with 17 variables and 400 observations was produced. The variables were as follow as; Traditional Music, Contemporary Music, Foreign Music, Love Relationships, Hugging, Kissing, Language Use with Elders, Language Use with Youth, Access, Age, Gender, Income Level, Family Size, Breadwinner, Head of the Household, Income Source, Income Level and Distance. On the other hand, open ended questions were analyzed qualitatively by listening to voice recordings and extracting main themes emerging on each question. Lastly, to draw conclusions from the

collected survey data, the research team used the norms or standards of culture conduct which the youth in schools are expected to be adhered to. These standards were obtained from the Ministry of Primary and Secondary Education. They were used as benchmarks where the survey results are compared with, and decide whether the youth in schools have deviated or are complying with the expected norms and subsequently to decide whether to reject or accept the working hypothesis.

4.4.3 Descriptive information of variables in collected data

Table 9 below shows 17 variables used in analyzing the relationship between access to energy and culture change. The variable name and descriptive information of each variable is given.

Table 9: Descriptive explanation of variables in the research

	Variable Name	Description of the variable
1	TradMusic	Indigenous music composed associated with the norms and values of Zimbabweans
2	ContMusic	Current music composed by upcoming young artists
3	ForeMusic	Music from the west or foreign music in Zimbabwe
4	Inrelation	Youth who are in a romantic love relationship
5	Hugging	Expressing love feelings by embracing each other
6	Kissing	Expressing love feeling by mouth to mouth contact, kissing
7	LanguageE	Type of language used by young people when communicating with elders
8	LanguageY	Type of language used by youth when communicating among themselves
9	Access	Households with access to electricity
10	Age	Age in years of the head of a household
11	Gender	Whether a respondent is male or female
12	Income Level	Amount of money earned per month by the household
13	Family Size	Number of people in a household
14	Breadwinner	Person who contributes most for the survival of the family

15	Head of the Household	Person who makes decisions in the household
16	Income	Main source of income for the family
17	Distance	Distance in kilometers walked by students from home to school

4.5 Validity and reliability of methodologies

The three methodologies used in this research have been selected because of their validity and reliability. They have been repeatedly used by different researchers working on similar thematic areas addressed in this thesis and had outcomes published in peer reviewed journals. The DID methodology is suitable to analyze the impact of an intervention before and after. It was used in analysing the effect of minimum wages and employment on a case study of the fast-food industry in New Jersey and Pennsylvania (Card & Krueger, 1994) . Furthermore, the technique was also used in a case study from Canada which was assessing the effect of tax subsidies to employers (Finkelstein, 2002). These studies are similar to the case study of the Chipendeke community in Zimbabwe where the impact of access to renewable energy on crop harvest output is explored by this thesis. The use of the DID is therefore suitable as it will produce valid and reliable results.

The simulation experimental methodology has also been used in studies on collective action dynamics under external rewards based on experimental insight from the Andean farming communities (Drucker et al., 2012). These simulation experiments are associated with consistent results and they provide solutions in solving collective action problems. Survey methodology will be used in analyzing the impact of access to energy on culture change in the community. This is a relevant technique because people need to be interviewed as individuals; a survey questionnaire will therefore be a guide to ensure that targeted people are asked the same questions.

4.5.1 Countering anticipated validity threats associated with the methodologies

Multiple regression analysis is applied to interpret results obtained by application of the difference in difference methodology. This techniques can be criticised for internal validity threat to results, which is the failure to fully account for causality. For example, models predicting crop harvest output may attribute obtained harvest output to access to energy, but

there could be other underlying causes which regression analysis cannot explain. For this reason, to reduce internal validity threat in this research, knowledge of all possible alternative explanations to the results was gathered in advance, before the research was conducted. To address weaknesses of regression analysis and fully account for causation, some statistical methods such as Structural Equation Modelling (SEM) have been used. They explore not only the relationships among variables, but the latent or hidden relationships which explain a dataset. They depend on possible factors hypothesised as causes to uncover latent relationships. Nevertheless, given the good design structure in SEM, they also have their own criticisms just as regression analysis has its own limits. Therefore, the limits of regression analysis due to the associated internal validity threat do not mean that the models are completely wrong. Regression analyses are highly useful in predicting different scenarios in social science research; for this reason, multiple regression analyses are used to predict crop harvest output in this research.

The second threat likely to affect the validity of results in this research pertains to statistical validity. To minimize this threat, a large sample in the targeted population would be interviewed as a precautionary measure because the larger the sample, the better the quality of results. Thus, 115 farming households from Chipendeke have been interviewed. Farmers in the Chipendeke community have no written records for harvest quantities produce in previous farming seasons. This means they have to rely on their memory when answering survey questions on crop harvest quantities obtained in the year 2010 and 201; hence reliance on memory is another validity threat for this research. Reliance on memory can pose some validity threat to the research given that a household head may forget important information or exact quantities of crop harvest. To combat this memory validity threat, household heads have not been interviewed alone, but other family members invited and allowed to contribute the interviews.

The last validity threat is on the collective action simulation experiment. In the simulation, researchers were aware that participants might manipulate results because simulating farmers to farm is different from farming in reality. To combat this, detailed instructions were carefully given to participants and no monetary rewards were promised to reinforce any decision a farmer chose. Monetary rewards were also avoided because payment with money would violate the nature of the public good experiment. Rather, a market based incentive, where farmers gain

access the lucrative market for organic produce on the condition that they used organic fertilizers instead of chemical fertilizers in crop cultivation, was promised.

5 Results

5.1 Introduction

To establish the impact of community ownership as an influencing factor on output, the survey data collected in the Chipendeke community was entered on a software Stata version 12 resulting in the production of the Chipendeke Energy Survey dataset, comprised of 115 observations across 22 variables whose results will be analyzed using the DID approach. It was structured in a way that observations for the first time period; the year 2010, were represented by the dummy variable 0 and for the second time period; the year 2015, when there was access to electricity, was represented by the dummy variable 1. Observations numbered 1-38 were households in the treatment group which had access to electricity while observations numbered 39-115 were households with no access to electricity, which forms the control group. A variable of interest named TAP was generated from the dataset. This variable is a product of the variables Time (which are the two time periods before and after electrification) and Access. This new variable TAP, according to the DID methodology, is the most important because it shows the treatment effect. Furthermore, to investigate the relationship between access to energy and culture change, the data obtained from survey conducted in the two provinces was entered on a software Stata version 12 which resulted in the production of the Zimbabwe High Schools Survey dataset with 23 variables across 400 observations. This information was analysed using quantitative and qualitative techniques followed by provincial comparisons on each attribute of culture. On the relationship between access to energy and collective action towards environmentally sustainable farming, the simulation experimental methodology using death awareness and death reflection situation cues was used. Results obtained from these three aspects of the research will be presented in this chapter.

5.2 Results on the relationship between access to renewable energy and crop harvest output

Table 10: Summary Statistics of Variables in the Chipendeke Energy Access Dataset

. summarize					
Variable	Obs	Mean	Std. Dev.	Min	Max
HHNumber	230	58.34783	33.45545	1	116
Labour	230	4.513043	.7803842	3	6
Education	230	1.86087	.8755481	1	4
Irrigation	230	.7217391	.44912	0	1
FamilySize	230	5.6	1.352985	4	9
Access	230	.326087	.469802	0	1
Time	230	.5	.5010905	0	1
Gender	230	.4434783	.4978785	0	1
Pfarming	230	.2217391	.4163226	0	1
Age	230	4.026087	.9930841	2	5
IncomeLevel	230	3.052174	1.245733	1	6
Soiltype	230	.3043478	.4611342	0	1
Extension	230	1	0	1	1
MaizeHarvest	230	5.956522	1.811614	2	9
WheatHarvest	230	4.247826	1.393801	1	8
BeansHarvest	230	3.26087	1.106448	1	8
TomatoHarv~t	230	2.304348	1.352171	1	7
MaizeAcreage	230	4.952174	1.338829	2	9
WheatAcreage	230	3.804348	1.01988	2	8
BeansAcreage	230	2.995652	.795719	1	6
TomatoAcre~e	230	2.247826	.9365782	1	4
V	0				
W	0				
TAP	230	.1608696	.3682119	0	1

Table 10 above is a summary of variables used to determine the impact of ownership as an influencing factor on output. It shows 22 variables across 230 observations, the standard deviation and mean. On the extreme left is the min and max which shows how the survey instrument was structured in collecting data on each variable.

5.2.1 Difference in difference outcome for each crop harvest output

The difference in difference methodology is used to calculate the average crop harvest output for maize, wheat beans and tomatoes and Ordinal Least Squares (OLS) are used as estimators in regression analysis of crop harvest output. For both years 2010 and 2015, the average harvest quantities of the sampled 115 is calculated and the quantified in kilograms. Tables 11-15 show the change within a group for the year 2010 to 2015, the difference of the two groups in 2010 and 2015 and the difference of the differences.

Table 11: Difference in Difference for Maize Crop Harvest Output

Year	Treatment Group	Control Group	Difference
2010	600	600	0
2015	1 000	600	400
Change	400	0	400

Table 12: Difference in Difference for Wheat Crop Harvest Output

Year	Treatment Group	Control Group	Difference
2010	500	600	-100
2015	900	700	200
Change	400	100	300

Table 13: Difference in Difference for Beans Crop Harvest Output

Year	Treatment Group	Control Group	Difference
2010	400	500	-100
2015	600	400	200
Change	200	-100	300

Table 14: Difference in Difference for Tomato Crop Harvest Output

Year	Treatment Group	Control Group	Difference
2010	300	300	0
2015	500	300	200
Change	-200	0	-200

5.2.2 Consolidated difference in difference.

From the sampled 115 farmers, average harvest output of maize, wheat, beans and tomatoes was calculated. Table below shows the outcome using the difference in difference approach. The difference of the difference in the treatment group and control group is 1000. This means that in the year 2015, every farmer in the treatment group, the average harvest output was 1000 kilograms more than a farmer in the control group. This is when the four crops are considered.

Table 15: Consolidated Difference in Difference

Year	Treatment Group	Control Group	Difference
2010	1 800	2 000	-200
2015	2 600	1 400	1 200
Change	800	-600	1 400

Figures were rounded off

5.3 Modelling crop harvest output using the Difference in Difference analysis

5.3.1 Theoretical predictions and relevant variables in the models

The Cobb Douglas production function provides an intuitive theoretical predictions on the relationship between access of energy and crop harvest output. In the Cobb Douglass production function, the formula $Y = F(K,L)$ governs the relationship between output Y, capital K, and labor L (Czech, 2009). In this study, the Cobb Douglass production function is modified to $Y = F(K,L,E)$ where E stands for access and use of electricity in farming. Predictions inferred by this theory in this study are as follow as; access and use of energy increases crop harvest output, electricity will be used for welding or to repair farm equipment, there will be enhanced use of Information and Communication Technology (ICT) or better flow of farming information through radio, television, and cell phones, enhanced agriculture planning and increase in farmers incomes. To ascertain above these theoretical inferences, four models; maize, wheat, beans, and tomato have been designed to predict crop harvest quantities. In the

equation of each model harvest output is the dependant variable and the following ten variables are used as predictors; Labour, Education, Family size, Purpose of farming, Gender, Age, Income level, Time, Access, and TAP. These predicting variables are relevant in the models because they explain the relationship between community ownership of the micro hydro power plant and crop harvest quantities. Community ownership of the power plant contributed to the sustainability of the project, and as long as the project is sustained, support to farming activities is assured.

5.3.1.1 Variables predicting crop harvest output

The variable TAP is the product of variables Access and Time. It shows the state of the treatment group (38 farming households with access to electricity) during the second time point of observation, the year 2015, and compares it to the control group (77 farming households with no access to electricity in both time periods, 2010 and 2015). The variable Access refers to the state of treatment group during the first time point which is the year 2010. Then the variable Time refers to the state of the control group in both time period, 2010 and 2015. Furthermore, the variable Acreage is where a given crop is planted, is relevant in the models because it has a bearing on the crop harvest quantities achieved. The variable Labour and Family size, which is the number of people in a farming household who provide workforce are also relevant in the models since they explain output. Education is important as it relates to literacy level of farmers. This is the ability of a farmer to read farming instructions and new trends in the field of agriculture which have a bearing on harvest output. Gender of the farmer, the purpose of his or her farming classified either as subsistence or commercial, his or her age and income level from farming proceeds are equally relevant variables included in the models.

Table 16: Maize Crop Harvest Model

Source	SS	df	MS	Number of obs = 230		
Model	262.698452	11	23.8816775	F(11, 218) = 10.65		
Residual	488.866765	218	2.2425081	Prob > F = 0.0000		
				R-squared = 0.3495		
				Adj R-squared = 0.3167		
				Root MSE = 1.4975		
Total	751.565217	229	3.28194418			

MaizeHarvest	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
WheatAcreage	-.2308542	.123878	-1.86	0.064	-.475006	.0132976
Labour	-.0769033	.1319866	-0.58	0.561	-.3370364	.1832297
Education	-.0557036	.1170126	-0.48	0.635	-.2863244	.1749172
FamilySize	.0143024	.0766013	0.19	0.852	-.1366717	.1652764
Access	-1.670568	.3728286	-4.48	0.000	-2.405378	-.9357575
Time	1.119696	.2550426	4.39	0.000	.6170308	1.622361
Gender	.0980134	.2103315	0.47	0.642	-.3165301	.5125569
Pfarming	.3294259	.3279152	1.00	0.316	-.3168641	.9757159
Age	-.0947654	.1050166	-0.90	0.368	-.3017432	.1122125
IncomeLevel	.2117931	.1101699	1.92	0.056	-.0053413	.4289275
TAP	1.340408	.4994399	2.68	0.008	.3560589	2.324757
_cons	6.593266	1.162779	5.67	0.000	4.301538	8.884994

Coefficient TAP in Maize crop model

Farmers' maize harvest is measured in kilogrammes. Hence, in the Maize harvest model in Table 16, the P value of 0,008 and coefficient 1.340408 for the variable TAP mean the treatment group had 1.3 tonnes more of Maize harvest quantity compared to the control group. The statistical significance of variable TAP in this regression is a confirmation of predictions made by the production function theory where an increase in maize harvest output for the treatment group is envisaged by farmers access and use of electricity. In the model, the variable Access, which represents the treatment group in 2010, has a coefficient of -1.670568 whereas TAP which shows the treatment group in 2015 has a coefficient of 1,340408. Comparison of these figures provides overwhelming evidence that the treatment group had more harvest quantities in 2015 than in 2010 and hence, based on the parallel trend assumption, a principle embedded in the difference in difference methodology, this means farmers in the treatment group had more maize harvest quantities than farmers in the control group.

Table 17: Wheat Crop Harvest Model

Source	SS	df	MS	Number of obs = 230		
Model	141.193302	11	12.8357547	F(11, 218) = 9.21		
Residual	303.680611	218	1.39303033	Prob > F = 0.0000		
Total	444.873913	229	1.94268084	R-squared = 0.3174		
				Adj R-squared = 0.2829		
				Root MSE = 1.1803		

WheatHarvest	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
WheatAcreage	.4187881	.0976354	4.29	0.000	.2263579	.6112183
Labour	-.109409	.1040263	-1.05	0.294	-.314435	.0956169
Education	-.0105483	.0922244	-0.11	0.909	-.1923139	.1712174
FamilySize	-.1126876	.060374	-1.87	0.063	-.231679	.0063038
Access	-.3890944	.2938479	-1.32	0.187	-.9682409	.190052
Time	.427086	.2010138	2.12	0.035	.0309067	.8232653
Gender	.0854638	.1657744	0.52	0.607	-.241262	.4121895
Pfarming	.5040945	.258449	1.95	0.052	-.0052841	1.013473
Age	-.2390083	.0827697	-2.89	0.004	-.4021396	-.0758771
IncomeLevel	-.0634851	.0868313	-0.73	0.465	-.2346213	.1076511
TAP	1.301018	.3936375	3.31	0.001	.5251953	2.07684
_cons	4.509456	.9164537	4.92	0.000	2.703212	6.3157

Coefficient for the variable TAP in Wheat crop model

Table 17 shows the model for Wheat harvest, which is measured in kilogrammes, where the P value 0.001 and coefficient 1.301018 for the variable TAP means that treatment group has 1,3 tons of Wheat harvest quantity more than the control group. In this model, again, the variable TAP is statistically significant, which is a confirmation of the theoretical predictions inferred by the production function where an increase in wheat harvest output is envisaged by the use of electricity by farmers in the treatment group. In the model, the variable Access has a coefficient of -3890944 whereas a trend similar to the maize model the variable TAP has 1.301018. Comparing these figure testifies that the treatment group had more wheat harvest quantities in 2015 than in 2010 hence, following the parallel trend assumption in the difference in difference analysis, the treatment group has more harvest output than the control group.

Table 18: Beans Crop Harvest Model

Source	SS	df	MS	Number of obs = 230		
Model	75.9802626	11	6.9072966	F(11, 218) = 7.37		
Residual	204.367564	218	.937465888	Prob > F = 0.0000		
Total	280.347826	229	1.22422631	R-squared = 0.2710		
				Adj R-squared = 0.2342		
				Root MSE = .96823		

BeansHarvest	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
BeansAcreage	.1868983	.0858797	2.18	0.031	.0176376	.3561591
Labour	.0747692	.0849219	0.88	0.380	-.092604	.2421423
Education	-.0553625	.0755084	-0.73	0.464	-.2041824	.0934574
FamilySize	-.0211658	.0500951	-0.42	0.673	-.1198985	.0775668
Access	.0080855	.209839	0.04	0.969	-.4054873	.4216584
Time	.7618596	.1629014	4.68	0.000	.4407963	1.082923
Gender	-.0417118	.1366585	-0.31	0.760	-.3110528	.2276292
Pfarming	.5169505	.2120349	2.44	0.016	.0990496	.9348513
Age	.0169769	.0677793	0.25	0.802	-.1166096	.1505635
IncomeLevel	-.1992091	.0711615	-2.80	0.006	-.3394616	-.0589566
TAP	.6818067	.3219719	2.12	0.035	.0472305	1.316383
_cons	2.535394	.6534577	3.88	0.000	1.247491	3.823297

Coefficient for the variable TAP in the Beans crop model

In the Beans crop harvest model, Table 18, the variable TAP has a P value 0,035 and coefficient 0,6818067. This mean that the treatment group has 0.68 tonnes of Bean harvest quantities more than the control group. This regression outcome again confirms the theoretical predictions made by the production function where crop harvest, including beans crop harvest output is envisaged for the treatment group through access and use of electricity in farming. In this model, the variable Access, has a coefficient of 0,0080855 whereas TAP has 0,6818067. A comparison of these figures attests to more harvest quantities in 2015 than in 2010.

Table 19: Tomato Crop Harvest Model

Source	SS	df	MS	Number of obs = 230		
Model	111.783686	11	10.1621533	F(11, 218) = 7.22		
Residual	306.911966	218	1.40785306	Prob > F = 0.0000		
				R-squared = 0.2670		
				Adj R-squared = 0.2300		
Total	418.695652	229	1.82836529	Root MSE = 1.1865		

TomatoHarvest	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
TomatoAcreage	.2190176	.0910751	2.40	0.017	.0395171	.398518
Labour	.0048541	.1051929	0.05	0.963	-.2024711	.2121793
Education	.0239606	.0934117	0.26	0.798	-.160145	.2080662
FamilySize	.0226094	.060682	0.37	0.710	-.0969891	.1422078
Access	-.0202342	.2506736	-0.08	0.936	-.5142881	.4738197
Time	1.422879	.1986133	7.16	0.000	1.031431	1.814327
Gender	-.0222227	.1671966	-0.13	0.894	-.3517515	.3073062
Pfarming	.2331256	.2597913	0.90	0.371	-.2788985	.7451497
Age	.0192775	.083233	0.23	0.817	-.1447669	.1833219
IncomeLevel	-.1316351	.0868194	-1.52	0.131	-.302748	.0394778
TAP	-.7483118	.3926257	-1.91	0.058	-1.52214	.0255165
_cons	1.31679	.7799872	1.69	0.093	-.2204912	2.854071

Coefficient variable TAP in the Tomato crop model.

In the tomato model, Table 19, the variable TAP has a P value of 0,058 and coefficient - 7483118. This mean that the control group has -0.75 less harvest quantities compared to the treatment group. Of particular importance in the outcome of this this regression model is the variable access which is not significant. This implies that access to energy has no effect on tomato crop harvest quantities, a result which is falsification of the theoretical predictions envisaged by the production function where access and use of electricity is predicted to increases harvest output. The plausible explanation to this outcome is linked to the dynamics of trade which the research team observed in the Chipendeke community whereby farmers enjoy comparative advantage in the production of maize and wheat than tomatoes.

5.3.2 Ordinal logit model of farmers income level

Table 20: Ordinal Logit Model for Farmer's Income Level

. ologit IncomeLevel Labour Education FamilySize Access Time Gender Pfarming Age MaizeHarvest WheatHarvest BeansHarvest TomatoHarvest TAP						
Ordered logistic regression			Number of obs		=	230
			LR chi2(12)		=	150.33
			Prob > chi2		=	0.0000
Log likelihood = -294.22192			Pseudo R2		=	0.2035
IncomeLevel	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Labour	.0393229	.161624	0.24	0.808	-.2774543	.3561002
Education	.161959	.1450616	1.12	0.264	-.1223565	.4462744
FamilySize	.1094288	.0966599	1.13	0.258	-.0800212	.2988788
Access	1.097251	.3853485	2.85	0.004	.341982	1.85252
Time	1.684746	.3579418	4.71	0.000	.9831932	2.386299
Gender	-.3523396	.2574957	-1.37	0.171	-.8570219	.1523428
Pfarming	.4740463	.4260483	1.11	0.266	-.360993	1.309085
Age	.1248418	.1314685	0.95	0.342	-.1328319	.3825154
WheatHarvest	.0124568	.1020928	0.12	0.903	-.1876415	.212555
BeansHarvest	-.3651222	.128205	-2.85	0.004	-.6163994	-.113845
TomatoHarvest	-.1703621	.1114758	-1.53	0.126	-.3888506	.0481264
TAP	2.982667	.7383962	4.04	0.000	1.535438	4.429897
/cut1	-1.323828	1.413771			-4.094769	1.447113
/cut2	.4847647	1.40955			-2.277902	3.247432
/cut3	2.315124	1.421385			-.4707402	5.100988
/cut4	4.850617	1.478642			1.952532	7.748703
/cut5	7.276786	1.541416			4.255667	10.29791

Income levels for farmers are ordered from the lowest income of less than 700 US\$ per annum to maximum of more than 2000 US\$ per annum. Due to this categorical ordering of incomes, ordered logistic regression provides refined interpretation as elaborated by Table 20, which is an ologit model of farmers' incomes. The variable TAP in the model shows the income levels of the treatment group in the year 2015 and compares it to the income of the control group. P value of 0,000 shows that TAP is significant and its coefficient of 2,982667 which means that the incomes of farmers in the treatment group were three times higher than incomes of farmers in the control group. With such a figure, it can be summed up that the treatment effect had significantly increased incomes from farming activities. The statistical significance of variable TAP in this regression is explained by the theoretical inferences made by the production function, where access and use of energy is visualized to improve crop harvest quantities and in turn increasing farmers income from trading their crops. In the model, the variable Access has a coefficient of 1.097251 while TAP has 2,982667. Comparing these figures, a trend similar

to maize, wheat, and beans models, where the treatment group had better incomes in 2015 than in 2010 is noticed. Applying parallel trend assumption, which is one of the principles of the difference in difference analysis, it entails that the treatment group had much better incomes than the control group.

5.3.3 Graphical Analysis of Treatment Effect “TAP” on Income Levels

Figure 21: Histogram Income Level if TAP==0

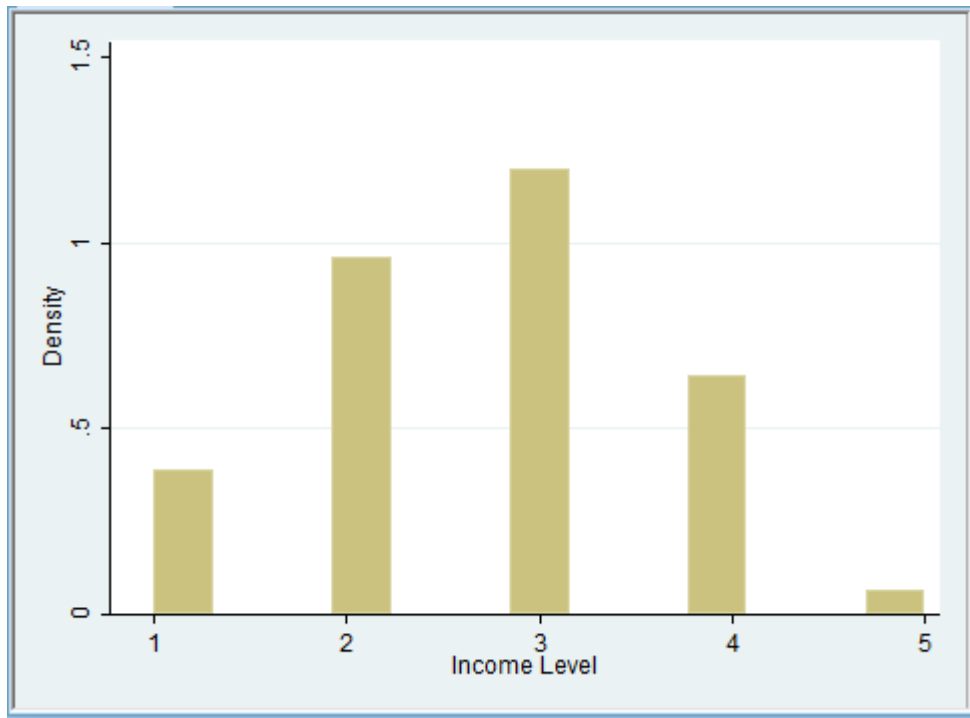
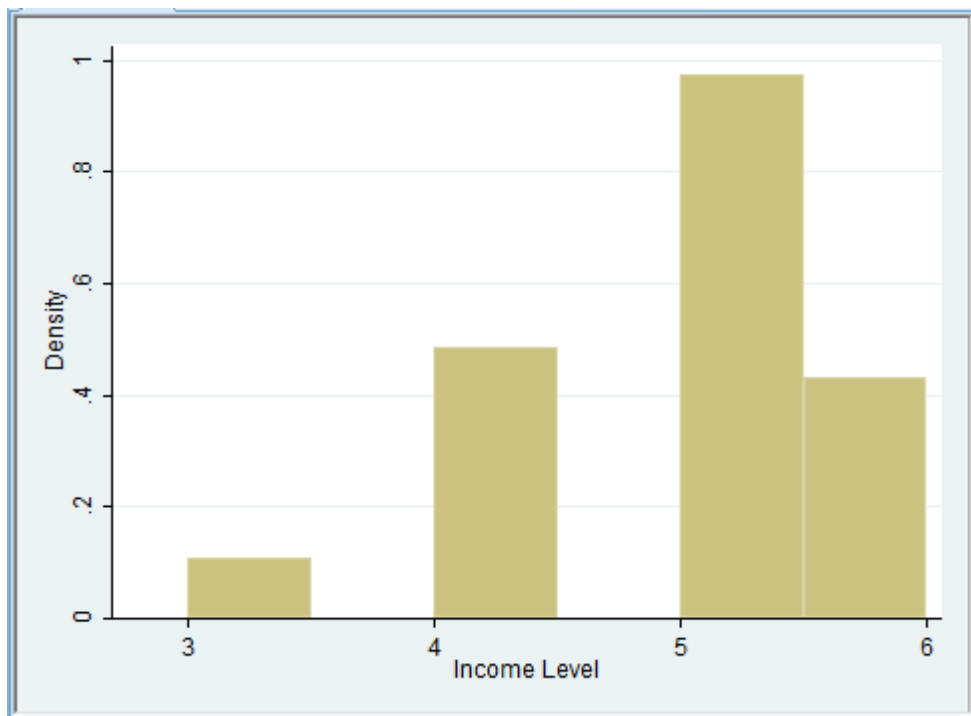


Figure 22: Histogram Income Level if TAP==1



The previous Histogram, Figure 22, shows farmers income levels before and after treatment. Before treatment, farmers income levels were inclined more in the range of 2 and 3 but after treatment Figure 23 illustrate that the incomes shifted more to the right, in the range 5 and 6.

5.3.4 Sample size and explained variance

Sample size and explained variance has a bearing on the outcome of results obtained by regression analysis. In this research, a sample of 115 households was carefully chosen with the knowledge that sample size affects the quality of results. A sample of 115 households, neither too small nor too large was deemed adequate to conduct the investigation. This implies that statistical significance of the variable TAP across the models reflects the real treatment effect on farmers in the treatment group. If the study was based on a small sample, misleading results would be obtained because small samples show effects of treatment while in reality there would be no effects. On the other hand, by basing the study on a very large sample, results again will be misleading because with large samples, even small effects become statistically significant. Thus, in this study, a sample of 115 households, observed over two time points, is the optimum sample for valid and reliable results.

Furthermore, in the table below, the column with r-squared shows the explained variance from the models which predicts crop harvest. Explained variance measures the proportion to which

the models account for the variation (dispersion) in the data set. Therefore, to resolve the problems related to sample size when measuring the strength of the treatment effect on farmers in the treatment group, the solution is to refer to the correlation coefficient or to the measure of explained variance or the measure of “cohens d” because they are systematically independent from sample size.

Table 21: R squared and adjusted R from models

	Crop Harvest Model	R Squared	Adjusted R
1	Maize	0.3495	0.3167
2	Wheat	0.3174	0.2829
3	Beans	0.2710	0.2342
4	Tomatoes	0.2670	0.2300

Thus, maize, wheat, beans and tomato crop harvest models explains the variance in crop harvest by 35%, 32%, 27% and 26% respectively. Though the percentages are low, they predicted crop harvest output because of the set of explanatory variables used. Lastly, outliers have potential to influence results especially in small samples. In this study the variables used have no outliers. This is confirmed by the ex-ante analysis Table 8, where the sampled 115 households which constitutes the treatment and control group have similar characteristics as highlighted by the mean values and standard deviations.

5.4 Results on the relationship between access to energy and culture change

The outcome of quantitative and qualitative analyses of responses given by interviewees in Harare and Manicaland province is presented in this section. Results of each attribute are compared between provinces. Furthermore, the standards or norms of expected cultural behaviour for children in schools obtained from the Ministry of Primary and Secondary Education are used as benchmarks to make a decision whether to reject or accept the research working hypothesis.

5.4.1 Statistical summary of survey dataset

Table 22: Statistical summary of the youth in high schools survey dataset

. summarize					
Variable	Obs	Mean	Std. Dev.	Min	Max
TradMusic	400	1.2975	.7213144	1	4
ContMusic	400	2.9575	1.085652	1	4
ForeMusic	400	2.76	1.170823	1	4
Dressing	400	3.35	1.051315	0	4
Inrelation	400	.4525	.498362	0	1
Hugging	400	.5175	.5003194	0	1
Kissing	400	.7925	.4060245	0	1
LanguageE	400	1.7325	.9397615	1	3
LanguageY	400	2.5	.686424	1	3
Robbery	400	2.135	.8476859	1	4
IndescentA	400	1.4725	.6365979	1	4
Murder	400	1.44	.657633	1	4
Drugs	400	2.42	1.047063	1	4
Access	400	.5025	.5006199	0	1
Age	400	2.995	.3468079	0	4
Gender	400	.5125	.5004697	0	1
IncomeLevel	400	2.42	1.136587	1	4
FamilySize	400	2.3075	.7677352	1	4
BreadWinner	400	1.525	.7353413	1	3
HHHead	400	1.535	.731514	1	3
IncomeS	400	2.9375	.9304613	1	6
Distance	400	2.995	1.721157	1	6
Province	400	.5025	.5006199	0	1

Table 22 above is a statistical summary of variables in the survey dataset. It shows the number of observations, mean, standard deviation, minimum, and maximum categories in each variable. For example, variable age have a mean of 2.995 and the standard deviation of

.3468079 means according to appendix 8, question 14, that the range of 16-20 years show the mean age of 2.995. Furthermore, the standard deviation of .3468079 is low, indicating that the age of all interviewees who took part in the survey is close to the mean. In terms of gender, it is a binary variable where 0 represents boys and 1 girls. The mean of 0.5125 on gender, when rounded up it becomes 1, meaning there are more girls than boys, accordingly, 400 interviewees comprised of 205 girls and 195 boys participated in the survey. In addition, the variable province is also binary, with 0 representing Harare province and 1 representing Manicaland province.

5.4.2 Total number of students who participated in the research

Table 23: Total number of students who participated in the research

. tab Province			
Province	Freq.	Percent	Cum.
0	200	50.00	50.00
1	200	50.00	100.00
Total	400	100.00	

Key

- 0 Represents Harare province
- 1 Represents Manicaland province

5.5 Culture changes related to access to energy

Access to electricity is a welcome development being embraced by societies across the globe as it improves the quality of life by facilitating better service delivery in areas such as the health care system, education, farming, and enterprise development. Furthermore, this phenomenon is occupying a central position regarding the dynamics in which societies express their culture. In Zimbabwe, access to electricity enabled communities to be exposed to globalisation through improved media access (radio and television) and mobile devices, where various issues associated with other cultures are circulated on social media platforms like Whatsapp and Facebook. Many people in Zimbabwe have access to social media which became fastest way to disseminate news on a wide range of topics. This undeniably affects the manner in which main attributes of culture such as love relationships, crime, language use, dressing, and music,

are expressed. To gain more insight on the relationship between energy access and culture change, interviewees in targeted high schools were asked the following question: What do you see as the main changes taking place to your indigenous culture due to developments associated with access to modern energy? Main themes appearing from analysing mobile voice recorded responses were as follows: access to energy had enabled indigenous communities to learn of cultures of the outside world, especially from media such as radio, television, and internet. Watching international events like Miss Universe beauty pageant contests and football games were cited as some events causing changes in their culture. Furthermore, technology was pinpointed to be replacing the role of community elders in providing entertainment and passing their culture to the younger generation through oral education. Radio and television was highlighted to have brought better forms of entertainment, replacing folk stories and other forms of entertainment enshrined in the indigenous culture. The last recurring major theme from the interviewees was that access to energy has brought more freedom in their culture, such as the ability to walk freely during the evening due to the presence of street lighting. Before the advent of modern energy, such freedom was confined during daylight only as evening was associated with some mysterious beliefs linked to witchcraft and the high probability of meeting ghosts.

One notable feature when this question was being asked is that students in Harare province were more articulate in answering while those in Manicaland province struggled to come up with answers. Interviewees in Manicaland could not relate to this question as the majority of them came from households with no electricity. Hence, they could not easily highlight the changes in their culture which are associated with access to electricity. As confirmation to lack of development linked to access to electricity, one of the interviewees in Manicaland province stated:

“I don’t see any developments in our community because we have no access to electricity, only when I visit relatives in other localities with electricity, especially in the city, do I witness some developments such as use of electric gadgets like cooking stove, refrigerators, radio, and television ”

Furthermore, a probing question related to major changes in their culture was asked: Are you willing to abandon your culture and adopt a foreign culture? Analysis of this follow up question shows respondents’ willingness to stick to their culture as a common theme in both provinces. However, flexibility to adopt some flavours from foreign cultures which add value to their quality of life was expressed.

5.6 Frequency tables and provincial comparisons of culture attributes

5.6.1 Love relationship attribute

Table 24: Harare Province, love relationships attribute

```
. tab Inrelation
```

Inrelation	Freq.	Percent	Cum.
0	219	54.75	54.75
1	181	45.25	100.00
Total	400	100.00	

```
. keep if Province==0  
(200 observations deleted)  
. tab Inrelation
```

Inrelation	Freq.	Percent	Cum.
0	101	50.50	50.50
1	99	49.50	100.00
Total	200	100.00	

Key

- 0 = Students not in love relationships
- 1 = Students in love relationships

Outcome

- 50.5% of students are not in love relationships
- 49.5% of students are in love relationships

Table 25, Manicaland Province, love relationship attributes

```
. tab Inrelation
```

Inrelation	Freq.	Percent	Cum.
0	219	54.75	54.75
1	181	45.25	100.00
Total	400	100.00	

```
. keep if Province==1  
(200 observations deleted)  
. tab Inrelation
```

Inrelation	Freq.	Percent	Cum.
0	118	59.00	59.00
1	82	41.00	100.00
Total	200	100.00	

Key

- 0 = Students not in love relationship
- 1 = Students in love relationship

Outcome

- 59% of students are not in love relationships
- 41% of students are in love relationships

5.6.2 Kissing attribute

Table 26: Harare province, kissing attribute

```
. tab Kissing
```

Kissing	Freq.	Percent	Cum.
0	83	20.75	20.75
1	317	79.25	100.00
Total	400	100.00	

```
. keep if Province==0  
(200 observations deleted)  
. tab Kissing
```

Kissing	Freq.	Percent	Cum.
0	75	37.50	37.50
1	125	62.50	100.00
Total	200	100.00	

Key

- 0 = Students who do not kiss their partners in public
- 1 = Students who kiss their partners in public

Outcome

- 37,5% of the students do not kiss their partners in public
- 62.5% of the students kiss their partners in public

Table 27: Manicaland province, kissing attribute

```
. tab Kissing
```

Kissing	Freq.	Percent	Cum.
0	83	20.75	20.75
1	317	79.25	100.00
Total	400	100.00	

```
. keep if Province==1  
(200 observations deleted)  
. tab Kissing
```

Kissing	Freq.	Percent	Cum.
0	8	4.00	4.00
1	192	96.00	100.00
Total	200	100.00	

```
.
```

Key

- 0 = Students who do not kiss their partners in public
- 1 = Students who kiss their partners in public

Outcome

- 4% of the students do not kiss their partners in public
- 96% of the students kiss their partners in public

5.6.3 Explanation of outcomes on love relationships and kissing

In terms of love relationships, Tables 24 and 25 show that Harare province has 49.5% of students in love relationship while Manicaland province has 41%. The plausible explanation for more youth in schools engaging in love relationships in Harare province is access to electricity which led to acquisition of DSTV by many households. This results in watching foreign channels with romantic movies by children. Repeated watching of these movies can be contagious; thus children are tempted to imitate what they see. The net effect of this surfaces in the high number of love relationships among youth in schools in Harare province.

Regarding kissing, Table 26 and 27 show that 62.5% students in Harare province kiss their partners in public places, and in Manicaland province, a much higher figure, 96% of the

students kiss their partners in public places. Given the high percentage of students in love relationships in Harare province, the expectation was to see them translating to high percentage of students who kissing their partners in public. However, the outcome turns to be in Manicaland province the majority of students in love relationship kiss their partners in public despite the practice being a culture taboo. The plausible explanation to this is linked to the following radical sentiments echoed by many students in Manicaland province during the interviews:

“Our culture and indeed our guardians prohibit us to have love relationships, yet it is the reality we cannot hide during our stage of development as adolescence. They should just leave us alone because their control is fostering a spirit of rebellion in us, the more they prohibit us, the more we desire to do it. Also, when one is in love, kissing just comes involuntary, it is like an inborn tendency which we do not need to learn from somewhere and it is fantastic”.

Kissing in public, in view of other people, especially among children in schools is prohibited by the standards of cultural conduct prescribed by the Ministry of Primary and Secondary Education in Zimbabwe. Furthermore, it is a taboo according to the prescriptions on indigenous Zimbabwe culture, it's immoral, shameful, and disrespectful for young, unmarried people to be seen hugging and kissing, especially in view of the public. Given this higher percentage of public kissing behaviour in the conservative Manicaland province, it symptomizes a major culture change in the society.

5.6.4 Music attribute

On music attribute, interviewees were asked the following question: From the various types of music in the country, list three types of music which constitute your main form of entertainment? Responses were entered in the code book where types of music were given different codes. This was followed by qualitative comparison of responses given in each province where traditional, contemporary, and foreign music appeared as dominant musical genres given by interviewees. Subjects did not go into detail to highlight their interest in subcategories contained in each theme. For example, interest in foreign music was not unpacked to show subsets such as Country music, R&B, Hip hop, Jazzy, Rock, and Hard rock music. After conducting qualitative analysis of the themes, results shows a remarkable lack of interest in traditional music in both provinces. In contrast, contemporary music featured as the most preferred music entertainment in both provinces. Furthermore, responses in favour of

contemporary music were much higher in Manicaland when compared to Harare province. On foreign music as a form of entertainment, the outcome shows that more subjects in Harare province listen to foreign music than in Manicaland province. To complement the qualitative analysis, a quantitative perspective of the three types of music is given below.

5.6.5 Traditional music

Traditional music are songs and dances transferred inter-generationally by members of a specific tribe. In Zimbabwe each tribe have a unique music and dancing style. Table below outlines the outcome on traditional music.

Table 28 : Harare province, traditional music attribute

```
. tab TradMusic
```

TradMusic	Freq.	Percent	Cum.
1	341	85.25	85.25
3	57	14.25	99.50
4	2	0.50	100.00
Total	400	100.00	

```
. keep if Province==0
(200 observations deleted)

. tab TradMusic
```

TradMusic	Freq.	Percent	Cum.
1	167	83.50	83.50
3	33	16.50	100.00
Total	200	100.00	

Key

- 1 represents 0% or no interest at all in listening to traditional music
- 3 represents 50%, or listening to this music half the time in their entertainment
- 4 represent 100% which is full time interest in listening to traditional music

Outcome

- 83.5% of the students do not listen to traditional music

- 16.5% of the students listen to this music half the time of their music entertainment leisure time

Table 29 : Manicaland province, traditional music

```
. tab TradMusic
```

TradMusic	Freq.	Percent	Cum.
1	341	85.25	85.25
3	57	14.25	99.50
4	2	0.50	100.00
Total	400	100.00	

```
. keep if Province==1
(200 observations deleted)

. tab TradMusic
```

TradMusic	Freq.	Percent	Cum.
1	174	87.00	87.00
3	24	12.00	99.00
4	2	1.00	100.00
Total	200	100.00	

Key

- 1 represents 0% or no interest at all in listening to traditional music
- 3 represents 50%, or listening to this music half the time in their entertainment
- 4 represents 100% which is full time interest in listening to traditional music

Outcome

- 87% of the students do not listen to traditional music
- 12% of the students listen to this music half the time of their leisure time with music
- 1% of students have full time interest to make traditional music their main form of entertainment

5.6.6 Explanation of outcomes on traditional music

According to Tables 28 and 29, 83.5% of the students in Harare province are not interested in traditional music. They have no interest at all in this type of music, and 16.5% listen to

traditional music up to half the time of their music entertainment, whereas 0% or none of the students expressed traditional music as their main form of entertainment. In Manicaland province, 87% of the students are not interested in listening to traditional music, 12% listen to it half the time during their music entertainment whereas only 1% expressed it as their main form of entertainment. Traditional music is mainly transmitted on radio, hence most students in Manicaland came from household which do not have access to electricity, and hence they do not own radios. The only places where they listen to music is at the shopping centres where shop owners play mainly contemporary music. Furthermore, traditional music in rural areas is partaken through participation by villagers in events such as rain-making ceremonies. Many of these events are a preserve for old men and women, youth is not allowed to participate. Such segregation of youth participation might have contributed to the lack of interest in traditional music manifested by results of this study.

Ultimately, these results show lack of interest in traditional music is common in both provinces. Hence, this genre faces an unhealthy future as most young people shun it in favour of contemporary music (Zim Dancehall) and foreign music. Such findings are worrying because traditional music is one of the means of transmitting cultural values to the young generation; if such means are lacking, possibly, the government and other stakeholders, have to do something to preserve the culture of the country through traditional music. Currently, little effort is being applied by the government and corporate world to safeguard traditional music. It's unfortunate that traditional dance, as fostered by the Ministry of Primary and Secondary Education, has been restricted largely to competitions (McLaren, 2001). The "Jikinya" dance festival, confined to primary schools, and the "Chibuku Neshamwari" traditional dance competition, open to anyone above 18 years old, are two notable traditional dancing competitions. The aim of the festivals is to encourage people to appreciate indigenous traditional dances. Although these competitions are the only two reliable platforms for traditional music, they remain isolated events with no other mechanisms set up to promote the music (McLaren, 2001). If more effort is not applied, this music genre lingers at the point of death where resuscitation, if not urgently implemented, might not yield any results (The Herald, 2016).

5.6.7 Contemporary Music or “Zim Dance Hall Music”

Contemporary music in Zimbabwe is also called “Zim Dance Hall Music” It is an imitation of R&B, Pop, and Hip Hop, but sung in local language by a group of young musicians who call themselves as Urban Grooves. Table below show survey outcomes on this genre.

Table 30 : Harare province, contemporary music

```
. tab ContMusic
```

ContMusic	Freq.	Percent	Cum.
1	81	20.25	20.25
3	173	43.25	63.50
4	146	36.50	100.00
Total	400	100.00	

```

. keep if Province==0
(200 observations deleted)

. tab ContMusic
```

ContMusic	Freq.	Percent	Cum.
1	70	35.00	35.00
3	113	56.50	91.50
4	17	8.50	100.00
Total	200	100.00	

Key

- 1 represents 0% or no interest at all in listening to contemporary music
- 3 represents 50%, or listening to this music half the time in their entertainment
- 4 represent 100% which is full time interest in listening to contemporary music

Outcome

- 35% of the students do not listen to contemporary music
- 56.5% of the students listen to this music half the time of their music entertainment
- 8.5% of students have full time interest to make contemporary music their main form of entertainment

Table 31 : Manicaland province, contemporary music

```
. tab ContMusic
```

ContMusic	Freq.	Percent	Cum.
1	81	20.25	20.25
3	173	43.25	63.50
4	146	36.50	100.00
Total	400	100.00	

```
. keep if Province==1  
(200 observations deleted)  
. tab ContMusic
```

ContMusic	Freq.	Percent	Cum.
1	11	5.50	5.50
3	60	30.00	35.50
4	129	64.50	100.00
Total	200	100.00	

Key

- 1 represents 0% or no interest at all in listening to contemporary music
- 3 represents 50% or listening to this music half the time in their music entertainment
- 4 represent 100% which is full time interest in listening to contemporary music

Outcome

- 5.5% of the students do not listen to contemporary music
- 30% of the students listen to this music half the time of their leisure time with music
- 64.5% of students have full time interest to make contemporary music their main form of entertainment

5.6.8 Explanation of outcomes on contemporary music

Considering contemporary music, Tables 30 and 31 show that in Harare province 35% of the students have no interest to listen to contemporary music, 56.5% listen to it half the time in their music entertainment time and while 8.5% make it their main form of entertainment. On the other hand, Manicaland province has 5.5% of the students who have no interest in

contemporary music, 30% listen to it half the time during their music entertainment hours and 64.5% make it their main form of entertainment. The reason is that on Zimbabwe radio stations contemporary is the most played genre, though Manicaland has no access to electricity, on weekends students together with other members of the community go to the shopping centres also known as business centres or growth points. At the shopping centres, shop owners play predominantly contemporary music from their radios which are powered by solar panels and petrol or diesel generators. The community cannot listen to music of their choice, but to what the shop owners chooses to play and in this case they mainly play contemporary music. In contrast, Harare province where there is access to electricity households own radio and television, this enables members of the household to switch to channels which play music of their choice. For this reason, contemporary is not popular as in Harare province as it is in Manicaland province.

When contemporary music started in the country, it created controversy on the entertainment scene because the artists comprised of the young generations, and their musical genre was alien to the culture of the country. Resistance mostly came from established artists and some conservative music addicts. However, despite the critics of the contemporary music, high statistics in favour of this genre, provided by this research have established that it is a genre that have more followers among the youth in urban and rural areas. For this reason, this can explain why Oliver Mutukudzi, a prominent and internationally recognised musician in Zimbabwe who was initially opposed to this genre, eventually appeared in public media to officially recognise contemporary music (Nehanda Radio, 2015).

5.6.9 Foreign Music

Table 32 : Harare province, foreign music

```
. tab ForeMusic
```

ForeMusic	Freq.	Percent	Cum.
1	111	27.75	27.75
3	163	40.75	68.50
4	126	31.50	100.00
Total	400	100.00	

```
. keep if Province==0
(200 observations deleted)

. tab ForeMusic
```

ForeMusic	Freq.	Percent	Cum.
1	15	7.50	7.50
3	72	36.00	43.50
4	113	56.50	100.00
Total	200	100.00	

Key

- 1 represents 0% or no interest at all in listening to foreign music
- 3 represents 50%, or listening to this music half the time in their entertainment.
- 4 represent 100% which is full time interest in listening to foreign music

Outcome

- 7.5% of the students do not listen to foreign music
- 36% of the students listen to this music half the time of their leisure time with music
- 56.5% of students have full time interest to make foreign music their main form of entertainment

Table 33 : Manicaland province, foreign music attribute

```
. tab ForeMusic
```

ForeMusic	Freq.	Percent	Cum.
1	111	27.75	27.75
3	163	40.75	68.50
4	126	31.50	100.00
Total	400	100.00	

```
. keep if Province==1
(200 observations deleted)

. tab ForeMusic
```

ForeMusic	Freq.	Percent	Cum.
1	96	48.00	48.00
3	91	45.50	93.50
4	13	6.50	100.00
Total	200	100.00	

Key

- 1 represents 0% or no interest at all in listening to foreign music
- 3 represents 50% or listening to this music half the time in their entertainment
- 4 represent 100% which is full time interest in listening to foreign music

Outcome

- 48% of the students do not listen to foreign music
- 45.5% of the students listen to this music half the time of their music entertainment
- 6.5% of students have full time interest to make foreign music their main form of entertainment

5.6.10 Explanation of outcomes on foreign music

According to Tables 32 and 33, in Harare province, 7.5% of the students do not listen to foreign music, 36% listen to it half the time of their music entertainment, and 56.5% make it their main form of entertainment. On the other hand, Manicaland province has 48% of the students who have no interest in foreign music, 45.5% listen to it half the time of their music entertainment,

and 6.5% make it their main form of entertainment. Given these statistics, it is evident that foreign music is more preferred in Harare province than Manicaland province. This is a signal of change in culture, as traditional music, which is supposed to be core of entertainment and a learning guide, has also been displaced by foreign music. In Manicaland province, interviewees did not state foreign music as part of their entertainment, they are rarely exposed to this genre because of the absence of electricity, which restricts the decision to purchase radio and television sets. As explained earlier, the villagers together with youth go to shopping centers where they listen mainly to contemporary music played by shop owners to lure clients. They cannot dictate other types of music which they may want to listen to, the end result is because of more exposure to contemporary than any other type of music, they end up developing interest in contemporary music. The ultimate result is lack of interest in foreign music in Manicaland province as manifested by these results.

5.6.10.1 How the choice of music is linked to access to electricity

Statistical analysis of responses from interviewees shows that, the choice of music, as explained by respondents, is linked to access to electricity. In Harare province, where there is improved access to electricity, interviewees expressed interest in contemporary and foreign music when asked about the type of music they prefer for their entertainment. In their answers, the role of Digital Satellite Television (DSTV) was underscored as the main contributing factor to their choice of music. DSTV is Sub-Saharan Africa largest TV service based in South Africa launched in 1995. Its subscribers enjoy a wide range of channels such as movies, music, lifestyle & culture, news & commerce, sport, and documentaries. To many interviewees, DSTV was a darling, one of the respondents stated:

“.....DSTV is broadcasted from abroad, it gave me an international flavour of music internment, unlike the local radio and television stations whose broadcast is restricted to repeated and boring music programmes from local artists. DSTV is wonderful, it’s awesome, and that is why almost every household had purchased DSTV as an alternative to the local television station”.

Furthermore, interviewees attribute their choice for foreign music to attending to live musical shows of international artists who come to perform in Harare. In contrast, in rural Manicaland province, interviewees showed no interest in foreign music. Tangible explanation for this is that there is no access to electricity in the province, hence very limited exposure to local radio and television channels nor DSTV. There is also no opportunity to attend to live musical shows by international artists which is a privilege to those in big cities. However, in Manicand province interviewees showed interest in contemporary music, a similar trend in Harare

province. This is because it is one of the most played music genres on the radio. The youth in rural areas usually gather at growth points or shopping centres where the shop owners use diesel powered generators or solar panels to play the music as a way of attracting clients.

5.6.11 Dressing Attribute

Table 34: Harare province, dressing attribute

```
. tab Dressing
```

Dressing	Freq.	Percent	Cum.
1	24	6.00	6.00
2	180	45.00	51.00
3	91	22.75	73.75
4	105	26.25	100.00
Total	400	100.00	

```
. keep if Province==0
(200 observations deleted)

. tab Dressing
```

Dressing	Freq.	Percent	Cum.
1	6	3.00	3.00
2	83	41.50	44.50
3	47	23.50	68.00
4	64	32.00	100.00
Total	200	100.00	

Key

- 1 = African attire, dressing for both males and females
- 2 = Long skirts, dressing for females only
- 3 = Miniskirts, dressing for females only
- 4 = Trousers, dressing for both males and female

Outcome

- 41.5% of female students wear long skirts
- 23.5% of female students wear mini skirts
- 3% wear African attire - this includes both male and female students

- 32% wear trousers - this includes both male and female students

Table 35: Manicaland province, dressing attribute

```
. tab Dressing
```

Dressing	Freq.	Percent	Cum.
1	24	6.00	6.00
2	180	45.00	51.00
3	91	22.75	73.75
4	105	26.25	100.00
Total	400	100.00	

```
. keep if Province==1
(200 observations deleted)

. tab Dressing
```

Dressing	Freq.	Percent	Cum.
1	18	9.00	9.00
2	97	48.50	57.50
3	44	22.00	79.50
4	41	20.50	100.00
Total	200	100.00	

Key

- 1 = African Attire, dressing for both males and females
- 2 = Long skirts, dressing for females only
- 3 = Miniskirts, dressing for females only
- 4 = Trousers, dressing for both males and female

Outcome

- 48.5% of female students wear long skirts
- 22% of female students wear mini skirts
- 9% wear African attire, this includes both male and female students
- 20.5% wear trousers, this includes both male and female students

5.6.12 Explanation of the outcomes on dressing

Prior to the commencement of the survey, community leaders raised the concern that female dressing is the most controversial issue they are facing. Hence, the survey instrument on dressing attribute was designed with a bias towards obtaining more information on female dressing. To gain more insights on dressing the following qualitative question was asked, when attending parties with friends, official events, and culture-related gatherings, what kind of attire would you wear? Responses given by interviewees were entered in a code book where each types of attire has a different code. This was followed by qualitative analysis of responses from the two provinces, where miniskirts, trousers, long skirts, and African attire emerged as major themes. A small number of female students in both provinces preferred wearing miniskirts when attending all listed events. Moreover, the number of female students wearing long skirts was significantly higher in Manicaland province than in Harare province. African attire is defined as the traditional dressing worn by Africans as way to celebrate their culture, heritage, and to commemorate the beauty of the motherland. During the survey, many interviewees from both provinces showed interest in wearing African attire especially when attending a traditional or culture-related event. Despite their desire to wear African attire, many interviewees stated that they cannot afford it as it is expensive compared to huge variety of cheap imported second hand clothes they buy on the flea markets.

Furthermore, to reinforce qualitative assessment, quantitative responses were analysed and frequency tables were produced. Tables 34 and 35 show that Harare province has 23% of female students who wear miniskirts and 41.5% wearing long skirts; 3% wear African attire and 32% wear trousers as their preferred casual attire. On the other hand, in Manicaland province, 22.5% wear miniskirts, 48.5% wear long skirts, 9% wear African attire, and 20.5% wear trousers as their preferred casual attire. The outcome points to a higher percentage of students in Manicaland province wearing long dress, portraying that the province is adhering to cultural norms of dressing which require long dress for women. Moreover, according to the norms, trousers are for boys and girls are not allowed to wear trousers. Analysis of the responses in Harare province shows 33 out of 103 interviewed girls wear trousers whereas in Manicaland province 22 out of 102 interviewed girls wear trousers. Though the number of female who wear trousers is low in both provinces, Manicaland have the lowest and this further outlines that many girls in Manicaland are adhering to expected norms of not wearing trousers. Regarding African attire, the outcome shows that very few students in both provinces (3% in Harare and 9% in Manicaland) wear African attire. Many interviewees expressed high interest

in wearing African attire as it indicates pride in their culture, but since it is more expensive than other forms of attire, many are restricted from wearing it.

Dressing in miniskirts is done by a small number of female students; it is an emerging trend common to both provinces, as seen by a statistic of 23% in each province. Though the percentage is small, it shows that something alien to the women's culture of dressing is beginning to infiltrate in the provinces; if this is not contained earlier, the end result might be a change in women's culture of dressing. The choice of dressing, particularly of female interviewees comes as a result of access to electricity, which enables them watch international television channels where some actors are dressed in bikinis, miniskirts, and shorter hemlines. They in turn imitate such dressing. At Queen Elizabeth High School in Harare province, one of the female students narrated:

“...without television and internet access my life will be miserable because my parents are too busy, they have no time for me. I spend the whole weekend at home watching fashion channels, the latest romantic and action movies. I learn a lot of things from television especially trending fashion in dressing and upgrade myself accordingly”

These sentiments from the interviewee show that the role of parents as educators of culture has been substituted by television. On television they learn other forms of dressing which are inappropriate to their culture. This is a possible explanation why some students are already dressing in miniskirts. Furthermore, for a rural community like Chipendeke, located Manicaland province is among the few beneficiaries of rural electrification, one of the effects of access to electricity in Chipendeke is improved trade between vendors from cities and farmers in the community. Vendors visit the community to trade maize and wheat with non-food items such as clothes and basic commodities required by the farmers. Some of the vendors come dressed in strange dress codes which the youth turn to imitate. Moreover, some interviewees in Chipendeke stated that access to electricity resulted in improved transportation, people are able to regularly visit relatives urban areas, and upon their return they import alien forms of dressing such as funny hair styles or tight trousers.

Zimbabwe culture defines a dress code for women which is compatible with the norms and values of African society. Accordingly, women are not expected to reveal body parts in their dressing as is the case when they wear miniskirts and trousers; they are expected to wear dresses, blouses, and skirts. The rise of hemlines, the wearing of tights and see-through clothing is becoming more common in Zimbabwe especially in Harare province as from the year 2011 (Zimuto & Chikodza, 2013). Miniskirts are seen worn over trousers and jeans or with leggings

that provide coverage of each leg from the knee, which is a practice incompatible with the culture, and hence a concern to some conservative members in communities. As a consequence, one prominent educationist called Mr. Kundiona recently proposed to ban the wearing of miniskirts by female students in schools, as this practice disturbs the male students and male teachers (Daily News Zimbabwe, 2016).

5.6.13 Language use when youth are communicating with elders

Table 36: Harare province, language use when communicating with elders

```
. tab LanguageE
```

LanguageE	Freq.	Percent	Cum.
1	244	61.00	61.00
2	19	4.75	65.75
3	137	34.25	100.00
Total	400	100.00	

```
. keep if Province==0
(200 observations deleted)

. tab LanguageE
```

LanguageE	Freq.	Percent	Cum.
1	88	44.00	44.00
2	12	6.00	50.00
3	100	50.00	100.00
Total	200	100.00	

Key

- 1 Use of formal language when youth are communicating with their elders
- 2 Use of colloquial language when youth are communicating with their elders
- 3 Use of mixed language when youth are communicating with their elders

Outcome

- 44% of students use formal language when communicating with their elders
- 6% of students use colloquial language when communicating with their elders
- 50% of students use mixed language when communicating with their elders

Table 37: Manicaland province, language use when communicating with elders

```
. tab LanguageE
```

LanguageE	Freq.	Percent	Cum.
1	244	61.00	61.00
2	19	4.75	65.75
3	137	34.25	100.00
Total	400	100.00	

```
. keep if Province==1  
(200 observations deleted)  
. tab LanguageE
```

LanguageE	Freq.	Percent	Cum.
1	156	78.00	78.00
2	7	3.50	81.50
3	37	18.50	100.00
Total	200	100.00	

Key

- 1 Use of formal language when youth are communicating with their elders
- 2 Use of colloquial language when youth are communicating with their elders
- 3 Use of mixed language when youth are communicating with their elders

Outcome

- 78% of students use formal language when communicating with their elders
- 3.5% of students use colloquial language when communicating with their elders
- 18.5% of students use mixed language when communicating with their elders

5.6.14 Explanation of outcomes on language use with elders

Tables 36 and 37 show that 44% of students in Harare province use formal language when communicating with their elders, 6% use colloquial language and 50% use mixed language. On the contrary, in Manicaland province 78% of students use formal language when communicating with their elders, 3.5% use colloquial language, and 18.5% use mixed language. The notable outcome in these figures is that youth in Manicaland province use

informal language when they are communicating among themselves but when communicating with adults they switch to strictly formal language, showing adherence to culture which requires respectful language when communicating with elders. This is contrary to Harare province, where youth use informal language indiscriminately to elders and with their peers.

5.6.15 Language use when youth communicate among themselves

Table 38: Harare province, language use when youth communicate among themselves

```
. tab LanguageY
```

LanguageY	Freq.	Percent	Cum.
1	44	11.00	11.00
2	112	28.00	39.00
3	244	61.00	100.00
Total	400	100.00	

```
. keep if Province==0
(200 observations deleted)

. tab LanguageY
```

LanguageY	Freq.	Percent	Cum.
1	7	3.50	3.50
2	44	22.00	25.50
3	149	74.50	100.00
Total	200	100.00	

Key

- 1 Use of formal language when youth are communicating among themselves
- 2 Use of colloquial language when youth are communicating among themselves
- 3 Use of mixed language when youth are communicating among themselves

Outcome

- 3.5% of students use formal language when communicating among themselves
- 22% of students use colloquial language when communicating among themselves
- 74.5% of students use mixed language when communicating among themselves

Table 39: Manicaland province, language use when youth are communicating

```
. tab LanguageY
```

LanguageY	Freq.	Percent	Cum.
1	44	11.00	11.00
2	112	28.00	39.00
3	244	61.00	100.00
Total	400	100.00	

```
. keep if Province==1  
(200 observations deleted)  
. tab LanguageY
```

LanguageY	Freq.	Percent	Cum.
1	37	18.50	18.50
2	68	34.00	52.50
3	95	47.50	100.00
Total	200	100.00	

Key

- 1 Use of formal language when youth are communicating among themselves
- 2 Use of colloquial language when youth are communicating among themselves
- 3 Use of mixed language when youth are communicating among themselves

Outcome

- 18.5% of students use formal language when communicating among themselves
- 34% of students use colloquial language when communicating among themselves
- 47.5% of students use mixed language when communicating among themselves

5.6.16 Explanation of outcomes on language use among youth

3.5% of students in Harare province, as indicated by Tables 38 and 39, use formal language when communicating with elders while 22% use colloquial language and 74.5% use mixed language. On the contrary, in Manicaland province 18.5% of students use formal language when communicating with elders, whereas 34% use colloquial language, and 47.5% use mixed language. From these results, use of colloquial language appears to be the fashionable thing

when youths are communicating among themselves. Given these statistics, the use of colloquial language appears to be the fashionable form of language among youth in both provinces. This purports culture change because use of formal language is enshrined in the indigenous Zimbabwean culture even in contexts when the youth are communicating among themselves.

5.6.17 Summary of survey outcomes from the two provinces

Table 40: Summary comparing survey outcomes from the two provinces

	Culture Attribute and ref table.	Students in Harare Province	Students in Manicaland Province
1	Love relationships, Table 24 & 25	49.5% of students are in love relationship	41% of students are in love relationship
2	Kissing, Table 26 & 27	62.5% of students kiss their partners in public	96% students kiss their partners in public
3	Traditional Music Table 28 & 29	✓ 83.5% of students had no interest in listening to traditional music ✓ 16.5% expressed interest in traditional music half the time of their music entertainment ✓ 0% make it their main form of entertainment.	✓ 87% of students had no interest in listening to traditional music ✓ 12% of the students expressed interest to listen to traditional music half the time of their music entertainment ✓ Only 1% takes this music as their main form of entertainment
4	Contemporary Music Table 30 & 31	✓ 35% of students had no interest in listening to contemporary music ✓ 56.5% expressed interest and listen to it half the time of their entertainment time ✓ 8.5% make it their main form of entertainment	✓ 5.5% of students had no interest in listening to contemporary music ✓ 30% expressed interest to listen to it half the time of their music entertainment

			✓ 64.5% are committed to it as their main form of entertainment
5	Foreign Music Table 32 & 33	✓ 7.5% of students had no interest in listening to foreign music, ✓ 36% listen to it half the time of their entertainment ✓ 56.5% make it their main form of internment during leisure time	✓ 48% of students had no interest in listening to foreign music ✓ 45.5% expressed interest in listening to it half the time of their entertainment ✓ 6.5% make it their main form of internment during leisure time
6	Dressing Table 34 & 35	Long dress, 41.5% of female students wear long dresses as preferred to casual dressing Miniskirts, 23% of female students wear miniskirts as preferred to casual dressing African attire, 3% of students wear African attire as preferred to casual dressing, this includes both male and female students Trousers, 32% of students, representing 33 out of 103 female interviewees state that they wear long trousers as preferred casual dressing	Long dress, 48.5% of female students wear long dresses as preferred to casual dressing Miniskirts, 22.5% of female students wear miniskirts as preferred to casual dressing African attire, 9% of students wear African Attire as preferred to casual dressing, this includes both male and female students. Trousers, 20.5% of students, representing 22 out of 102 female interviewees state that they wear long trousers as preferred to casual dressing
7	Youth Language usage with Elders	✓ Formal, 44% of students use formal language when communicating with elders,	✓ Formal, 78% of students use formal language when communicating with elders,

	Table 36 & 37	✓ Colloquial , 6% use colloquial language and ✓ Mixed , 50% use mixed language	✓ Colloquial , 3.5% use colloquial language and ✓ Mixed , 18.5% use mixed language
8	Youth Language usage among their peers, Table 38 & 39	✓ Formal , 3.5% of students use formal language when communicating with their peers, ✓ Colloquial , 22% use colloquial language and ✓ Mixed , 74.5% use mixed language	✓ Formal , 18.5% of students use formal language when communicating with peers, ✓ Colloquial , 34% use colloquial language and ✓ Mixed , 47.5% use mixed language

5.6.17.1 Summary of results from comparing outcomes from the provinces

Table 41 below show summarised results of comparing attributes of culture in the two provinces. This comparison is derived from statistical and qualitative analysis of responses given by respondents.

Table 41: Comparison of outcomes from provinces

	Attribute	Harare Province	Manicaland Province
1	Dressing Long dress Miniskirts	No longer wearing long dresses Small number begins to wear miniskirts	Still wearing long dresses Small number begins to wear miniskirts
2	Music Traditional Contemporary Foreign	No interest High interest High interest	No interest High interest Low interest
3	Language use Youth to Elders	Mixed language is used	Formal language is used

	Youth to Youth	Formal language is used	Informal language is used
5	Relationships In relations Kissing	More students in love High number of students kiss	Fewer students in love High number of students kiss

The comparison above shows that most changes in culture are taking place in Harare province; for example, ladies are abandoning long skirts, use informal language when youth are communicating with elders, and there is lack of interest in traditional music. In Manicaland province, culture change is also noticeable, for example, the intrusion of miniskirts among female dressing and dramatic lack of interest in traditional music. To a large extent, culture change in this Manicaland province is still low as the youth still adhere to most aspects of culture, for example; use of formal language when conversing with elders is highly valued and less students are in love relationships compared to Harare province.

5.7 The working hypothesis and its outcome

5.7.1 Theoretical predictions on access to electricity and culture change

Emerging trends of culture change among youth in high schools are a controversial issue in many conservative communities of Zimbabwe. This study therefore, applies the theory of heuristics to provide intuitive theoretical predictions on the relationship between access to electricity and culture change. Heuristics are efficient thinking strategies, mental shortcuts, or rule of thumb processed in our mind to help us make decisions without spending time researching and analyzing information (Tversky & Kahneman, 1974). For example, representative heuristics use past experience similar to new situations in order to guide decision. Accordingly, in Zimbabwe community leaders in places being affected by culture change use known examples of similar communities elsewhere where culture change was born from implementing development projects like tourism. For instance, examples are provided by culture erosion and the development crisis in Nigeria Yakubu (2002), the Okavango Delta community in Botswana Mbaiwa (2011), to mention a few. Therefore, in the context of this study, the theoretical predictions provided by heuristics infers that access to electricity triggers culture changes in all attributes of culture considered in this research; music, dressing, language usage, and love relationships.

5.7.1.1 Working hypothesis

The prime working hypothesis of this study is access to electricity triggers social and cultural changes in Zimbabwe indigenous culture. In order to evaluate if cultural change has occurred, benchmarks describing cultural standards developed by the Ministry of Primary and Secondary Education are applied. Survey results from each province are compared with the expected cultural standards for children in schools to search for deviations and compliance. Table 42 highlights the summary of expected cultural standards on each attribute of culture as required by the Ministry of Primary and Secondary Education.

Table 42: Summary of expected norms of culture conduct for youth in schools

	Attribute of culture	Expected standards of culture
1	Love relationships	Love relationships are not allowed for children in primary and secondary schools
2	Kissing in public	It is not allowed to be in relationships and kissing in public is a taboo
3	Dressing	Female dressing must be modesty. Wearing long skirts which does not reveal body parts is recommended.
4	Traditional music	Highly recommended since it links people with their identity
5	Contemporary music	Required just for variety in music, but not highly encouraged
6	Foreign music	Required just for variety in music, but not highly encouraged
7	Language use with elders	Formal language is recommended
8	Language with peers	Formal language is recommended

In this study, predictions on culture change are formed and tested on the basis of different theories or hypothesis and on the basis of data obtained for Harare and Manicaland province. In this context, Harare province is regarded as the treatment group characterised by having access to electricity and deviations from the expected standards of culture conduct for children in schools are predicted whereas Manicaland province is regarded as the control group and compliance with from expected standards of culture conduct is predicted. Given these

predictions the data obtained for control group (Manicaland province) are applied in order to make a decision regarding the rejection or acceptance of the working hypothesis. This decision is based on a comparison regarding the confirmation or falsification of the predictions regarding culture change of the control group. If the survey outcomes are in compliance with the norms, the study fails to reject the working hypothesis, but if the outcomes deviate from the norms, the working hypothesis is rejected. Furthermore, statistics obtained on each attribute of culture are used according to the following rule; if an attribute has a statistic of 50% and above, it is in compliance and if the score is less than 50%, it is regarded as deviating from the standards. Therefore, based on the conducted qualitative and quantitative analysis of interviewee's responses, Table 43 highlights the outcomes on the working hypothesis.

Table 43: The outcomes of the working hypothesis

	Culture attribute	Outcome of working hypothesis
1	Love relationships	Reject
2	Kissing in public	Reject
3	Dressing	Fails to reject
4	Traditional music	Reject
5	Contemporary music	Reject
6	Foreign music	Fails to reject
7	Language use with elders	Fails to reject
8	Language use among youth	Reject

Results in the table above show the study failed to reject the working hypothesis on dressing, foreign music, and language use when youth are communicating with elders. These attributes are in compliance with the expected norms of culture conduct for children in schools. Given that there is no access to electricity in Manicaland province, this outcome confirms theoretical predictions made by heuristics.

However, the working hypothesis is rejected on love relationships, traditional & contemporary music, and language use when youth are communicating among themselves because they all deviate from the expected norms. This outcome shows falsification of predictions made by heuristics theory. The plausible explanation for deviation from the expected norms on the love relationship attribute can be linked to what most interviewees alluded to during the interviews.

They stated that the tendency to be in love is natural, inborn, and reality associated with them as adolescence, therefore, they do not need to learn it elsewhere. Furthermore, high interest in contemporary music dominates the province because it is the most played music at the main entertainment arenas (business centres). In addition, the use of informal language when youth communicate with their peers can be explained as the need to cement their friendship. They feel much closer to each other when they use language which does not command much respect.

5.7.2 Conclusion

The survey results show confirmation of predictions from heuristics theory on dressing, foreign music and language use when youth are communication with elders whereas falsification of prediction are on the following attributes; love relationships, traditional music, contemporary music and language use when youth are communicating among themselves. Therefore, the use of heuristics can be helpful, but on complex subjects such as to assess the relationship between access to electricity and culture change, there can be errors in predictions, hence the use of heuristics need to be complimented with empirical research to reach binding conclusions.

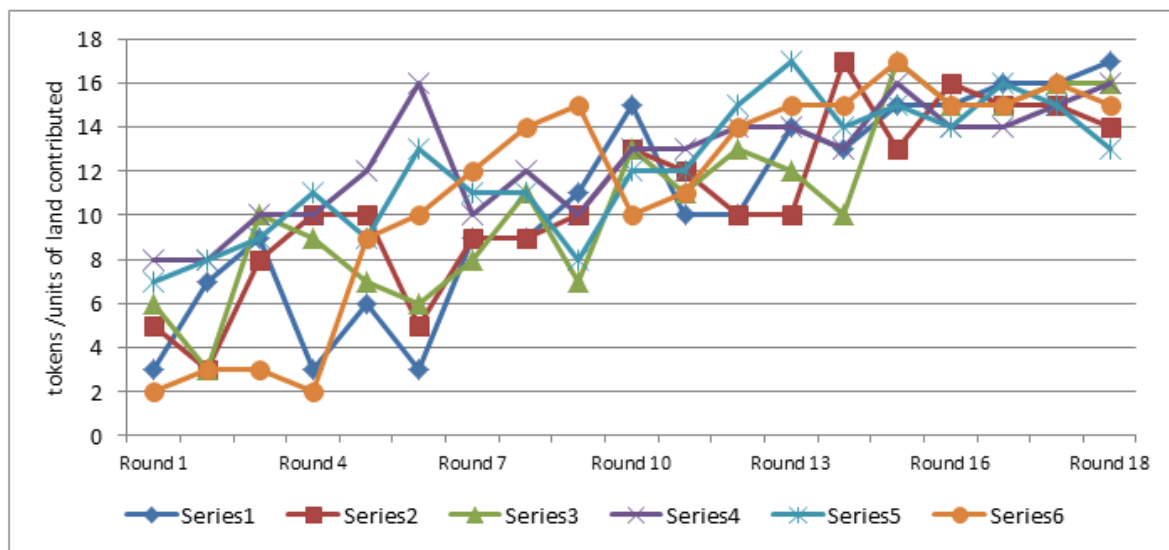
5.8 Results on the simulation experiment towards environmentally sustainable farming

Six groups comprising of five people per group were subjects in the collective action simulation experiment. During the experiment they were induced with death reflection situation cues for ten minutes. Thereafter, 18 rounds of the simulation experiment were conducted. Table 44 shows the outcome of each round for farmers willingness to conduct environmentally sustainable farming by substituting chemical fertilizers with organic fertilizers.

Table 44: Outcome per round for farming with organic fertilizer.

Group		1	2	3	4	5	6
Round	1	3	5	6	8	7	2
Round	2	7	3	3	8	8	3
Round	3	9	9	7	10	9	3
Round	4	3	10	9	10	11	2
Round	5	6	10	7	12	9	9
Round	6	3	8	6	16	13	10
Round	7	9	9	8	10	11	12
Round	8	9	9	11	12	11	14
Round	9	11	10	7	10	8	15
Round	10	15	13	13	13	12	10
Round	11	10	12	11	13	12	11
Round	12	10	10	13	14	15	14
Round	13	14	10	12	14	17	15
Round	14	13	17	10	13	14	15
Round	15	15	13	17	16	15	17
Round	16	15	16	15	14	14	15
Round	17	16	15	15	14	16	15
Round	18	16	15	16	15	15	16

Figure 23: Graphical representation of outcome of simulation experiment



The visible trend portrayed by these results is that during the initial rounds, farmers were less willing to contribute to the public good through pro-social farming methods. Nevertheless, as more rounds were played, farmers were willing to invest or contribute their endowed tokens to cultivating crops with organic manure farming.

In general, the tipping point of this experiment is seen from Round 9 to the last round, where the farmers' behavior changed towards a pro-social motivation to protect the public good in question. In these rounds even free riders, who in the initial rounds were not participating, changed their attitude and behavior towards pro-social farming method. As an exceptional case, farmers in group 4 (Series 4) displayed a unique behavior where from the initial rounds to the last round, their contribution to the public good is less when compared to other groups. However, though the pro-social motivation spirit is evident from farmers who participated in this experiment, in the played 18 rounds, none of the members in the six groups contributed all the tokens in conducting the pro-social farming method. Instead of 20, the maximum number of tokens contributed by groups 2, 3, 5 and 6 is 17. Conclusively, the outcome of this experiment is in tandem with the prediction of terror management theory coupled with death awareness and death reflection situation cues used in this experiment.

6 Conclusion

6.1 Introduction

Based on the results presented in chapter five, this chapter focuses on the discussion of the outcomes. The discussion is centred on impact of access to energy on crop harvest output, culture change, and environmental sustainability, which are the three aspects of economic development addressed in this thesis. This discussion is followed by the conclusion of the entire thesis research.

6.1.1 Discussion on the relationship between access to energy and crop harvest output

6.1.1.1 Theoretical explanation to results on crop harvest regression models

The Cobb Douglas production function provides an intuitive theoretical explanation to results obtain by regression analysis which predicts the crop harvest. The theory infers that access and use of electricity culminates in increased harvest output, better flow of farming information, and high income for farmers among other things. In the four regression models; income level, maize, wheat, and beans crop harvest, the treatment group have higher income and crop harvest in 2015 compared to 2010. This outcome, according to the parallel trend assumption which is a principle in the difference in difference analysis, mean that the treatment group have higher crop harvest quantities and income than the control group. Furthermore, the variable TAP in these regressions models is statistically significant, this is explained by the inference made by the production functions theory where higher incomes and crop harvest output is predicted by farmers access and use of electricity.

However, tomato crop harvest model, Table 19 shows unique regression result where the model is not significant. This outcome implies that access to energy does not increase the tomato production thus, defying the theoretical predictions inferred by the production function. The question arising from this result is, why does tomato production not increase with access to electricity like other crops? The answer to this is, indeed, tomato harvest output improves with access to electricity, but the research team noted the decline in tomato harvest output to be attributed to two factors: the effects of the El Niño drought and trade dynamics, which lead to a comparative advantage of farmers.

6.1.1.2 The effects of El Niño and dynamics of trade in Chipendeke community

For three consecutive years since 2013, the whole of southern Africa region, including Zimbabwe, was affected by El Niño weather pattern, which saw severe drought affecting the landscape. As a result prices of main staple foods (maize and wheat) skyrocketed as demand increase (Cane et al., 1994) : (United Nations Office for the Coordinations of Humanitarian Affairs, 2017). To farmers at Chipendeke community, the effect of El Niño induced drought was a blessing in disguise since the price increase in maize and wheat affected the dynamics of bilateral trade in their favor. Vendors from the nearby City of Mutare come to Chipendeke to exchange (barter trade) maize and wheat with basic goods such as; green bar soap, sugar, cooking oil, and second hand clothes which the community cannot produce. Thus, the following trade model exists, two areas trading are Chipendeke and vendors in the City of Mutare. Both of these areas produce maize, wheat, tomatoes and basic goods; green bar soap, sugar cooking oil, and second hand clothes. Ricardo's theory of comparative advantage posit that two parties involved in international trade, each have to specialize (Donaldson & Costinot, 2012). In consensus with this theory, farmers in Chipendeke have specialized in maize and wheat because they produces them at a lower opportunity cost. Thus, they import basic goods mentioned above and tomatoes from the City of Mutare and export maize and wheat through barter trade. Their advantage emanates from the fact that the price of electricity from the micro hydro power plant in terms of unit cost per kilowatt is cheap compared to electricity from the grid, used by farmers in the City of Mutare. Moreover, access to electricity enabled irrigation; hence, farmers have two cropping seasons in a year: the rain-fed and irrigated season, whereas most farmers in the City of Mutare rely on one cropping season (the rain-fed season).

On the other hand, Vendors in from the City of Mutare have specialized in basic goods required by Chipendeke; green bar soap, sugar cooking oil, tomatoes, and second hand clothes which they export and import maize and wheat. They have a comparative advantage in the production of basic goods. As a consequence of an El Niño induced drought, the price of maize and wheat increased due to high demand giving advantage to the farmers at the Chipendeke Community; they bargain for more basic commodities with a few tonnage of scarce maize or wheat. Ultimately, the effect of this high demand for maize and wheat is that when farmers at Chipendeke plan their cropping activities, they deliberately allocate more acreage under maize and wheat at the expense of tomatoes (they trade off tomatoes acreage for maize and wheat); some farmers opted not to even cultivate tomatoes for their own

consumption as they put all acreage under maize and wheat because it is cheaper for them to buy them elsewhere. Hence, because of this planning, where tomatoes are deliberately allocated small acreage, the regression model reflects a decline in the tomato crop harvest as shown in Table 19, where the variable TAP is not significant. This does not imply access to electricity has no effect on tomato crop production.

6.1.1.3 The effect of treatment on farmers

Income generated by farmers from trading their farm produce indicates the strength of the treatment effect on farmers in the treatment group. Table 20 is a logistic regression model of farmers' income levels. The coefficient 2.9 for the variable TAP denotes incomes of farmers in the treatment group to be three times more than that of farmers in the control group. Given this outcome, the study failed to reject the working hypothesis that "farmers having access and use of electricity obtain a higher harvest compared to farmers having no access to electricity". Furthermore, this result resonates the importance of confining energy ownership to the main beneficiaries of the project as a contributing factor to high crop harvest output. Unlike other studies, such as Kirubi et al., (2008) where energy ownership includes a diverse range of stakeholders such as institutions and entrepreneurs in the community to maximise output, the lesson to take home in this study is: confining energy ownership to direct beneficiaries contributes to sustainability of the project and increased crop harvest output. In other words, it is not necessary to spread ownership to a wide range of stakeholders. In addition, the statistical significance of the variable TAP in the regression models attests to the importance of access to energy in a production function which includes energy in farming. This is confirmed by other studies such as: Kumar et al., (2007) which points to energy input as an important contributor to output of maize and wheat production in varying altitudes in the hilly regions of India, Singh et al., (2004) whose research on energy consumption pattern of wheat production in India points to wheat produced as a direct function of energy input, and the same results apply to a study by Shabani et al., (2011). In all these cited studies, energy input is a function of output, and there is a positive relationship between energy input and output, a trend which is in harmony with the outcomes of this research.

6.1.1.4 Other reported impacts on the effect of energy access

Apart from improving crop harvest output as shown by TAP in the econometrics models, other related impacts, such as storage of fresh farm produce, use of Information and Communication Technology (ICT), environmental sustainability, and improved transportation, were also experienced in the Chipendeke community. Regarding farm produce, access to electricity enabled some farmers and entrepreneurs to buy small refrigerators to store fresh farm produce and other perishables. Quality of life in the community improved through the use of information and communication technology on a daily basis. Farmers purchased some electrical appliances like radios, televisions and cell phones which enabled them to be efficient in communication with the outside world. Farmers can now listen to news and farming programmes on radio and television where they get advice on issues including various farming techniques. This information is widely shared to other community members without radios and televisions. Furthermore, on days where interesting programs are aired, other households without radio and television are welcomed to listen to programmes. This, combined with their indigenous knowledge systems of interpreting weather conditions and farming activities, has improved farming practices in the community.

In the environmental arena, the energy produced from Chipendeke Micro Hydro Power plant is clean. No greenhouse gases are emitted, unlike the case study by Kirubi et al., (2010), where diesel-powered generators provide energy to the community. Wengezi-Chitora River, where the micro hydro power plant is mounted, is a major form of livelihood for communities downstream. Irrigation, laundry and livestock drinking water are some major uses of the river. The Micro Hydro Power plant does not affect these downstream uses because the technology simply diverts waste from the river, harnesses the hydro energy in it, then re-channels it to the main stream of the river. Even aquatic life in the river is not affected by this process. Hence, it is contributing to environment sustainability. The advent of electricity in Chipendeke Community resulted in improvement of transportation as commuter omnibuses were introduced. Before electrification, it was impossible to travel to and from the nearby City of Mutare, which is about 100km away. This journey could take about a week as walking was the only option to reach the highway where transport to the city was found. In addition, due to electrification, the remote rural Chipendeke community has been transformed into a look and learn visitors' centre. It is now frequently hosting academic visitors (mainly students from

universities and technical colleges in the country studying sustainability related disciplines) who are learning from its experience.

6.1.2 Discussion on the relationship between access to energy and culture change

Access to energy contributed to culture change through influence of foreign media as households purchase electrical appliances such as radio and television. Children's exposure to foreign media allowed them to learn and imitate some behaviours which are alien to their culture. Despite this influence of media (radio and television) on culture, results showed that not all attributes of culture are changed. Table 43 show the study failed to reject the working hypothesis on the following attributes: dressing, foreign music, and language use among youth whereas the working hypothesis was rejected on love relationships, traditional & contemporary music, and youth language use with elders. For example, on language usage, as indicated by Tables 36 to 39, youth in rural Manicaland province showed they adhere and respect values enshrined in indigenous culture by using formal language when communicating with elders in the community. Nevertheless, when communicating with their peers, they deliberately switch to colloquial and mixed language.

Furthermore, these results purport that Zimbabwean indigenous culture is overall not static. This is confirmed by those attributes of culture where the working hypothesis is rejected, implying deviation from expected norms which is an epitome of culture change. Those attributes where the study failed to reject the working hypothesis, the implication is they cannot be changed by development associated with access to electricity. The plausible explanation is that these attributes constitute the flagship of indigenous culture; hence, they are resistant to change by external forces imposed by development. For example, most interviewees when asked the following question; given the option to change your culture, are they willing to? Their response was they are proud of their cultural identity, they are not willing to change, but can change minor aspects if they view the change as adding value to their quality of life. Such responses means regardless of how advanced development may engulf their community, there are some fundamental attributes which are the flagship or building blocks of their culture which society is not willing to not willing to trade off.

In a nutshell, these results are contrary to Yakubu (2002) and Mbaiwa (2011) studies which state complete change in culture as a consequence of development. Mbaiwa (2011) argued that

development in the Okavango Delta, Botswana was a cause for major culture changes, such as decline in traditional livelihoods and lifestyles like hunting and gathering crops. New forms of modern livelihoods emerged, such as formal employment in the tourism project through basket making, wood carving, and the sale of crafts to tourists. Income earned enabled transition from staying in traditional huts to modern houses and to substitute consumption of traditional food with foreign food. Furthermore, Yakubu (2002) underscored that the development crisis in Nigeria has led to a decay of indigenous cultural heritage and the subsequent advent of a horrible culture. This is highlighted by the following conclusive remarks in the study:

“..millions of young people have moved away from their indigenous communities and cultures, and finding no rehabilitation elsewhere, wallow in the life of vagrant, jobless youth, hence hooliganism, thuggery, robbery, corruption, and insecurity, all of which are indication of the emergent monstrous “molue” culture are, increasingly, getting established as the contemporary Nigerian way of life, a way of life which is beginning to largely characterize every sector of national experience” (Yakubu, 2002, p.35).

Culture change in Nigeria has negative effects to the extent that the country is craving for cultural rebirth and rediscovery. Lesson learnt is, if one opts for culture change, the culture of choice must be employed perfectly as natives of that culture do, but it is impossible; one cannot be original to a borrowed culture and a hybrid culture destroys self and society as shown by the Nigeria case study. It is a noble idea to stick to culture of origin; if change is to occur it has to be confined to those aspects which tangibly improve quality of life, because not all attributes of a culture are perfect. For example, some indigenous cultures deny a female child access to education, force her into child marriage, and deprive her from family inheritance. These cultural practices are incompatible with modern life and child rights; hence, empowering the girl child with education is an acceptable aspect of culture change. Therefore, in the Mbaiwa (2011) and Yakubu (2002) studies, all the attributes of indigenous culture changed as a consequence of development, but results in this thesis differ. They reveal that not all attributes of culture change, and on those aspects where change takes place, it is not so negative as to warrant culture re-birth in Zimbabwe as argued by Yakubu (2002) in the case study of Nigeria. This points to some attributes of culture constituting flagship of the community; they are resistant to change. Hence, a holistic approach to development needs to be culture sensitive or tailor made to suit the context of culture where it is implemented in order to avoid friction with the flagship or fundamental cultural beliefs which binds the society together.

6.1.3 Discussion on relationship between access to energy and environmentally sustainable farming practice.

Analysis of farmers behaviour during 18 rounds of the simulation experiment provides a deep insight on their willingness to use a market-based incentive to conserving their fast degrading farming environment. Farmers were seen willing to substitute chemical fertilizers with organic fertilizers in the presence of a market-based incentive in the form of access to a lucrative market for organic farm products. During the initial rounds of the experiment, Figure 24 shows that some farmers were free riding on the conservation effort of others. However, Round 13 is shown as the turning point, as most free riders began to exhibit co-operating behaviour. This indicates the effectiveness of a market-based incentive. Farmers were willing to cultivate crops using organic fertilizers. Accordingly, the benefit was to sell their produce on the lucrative market for organic farm products. Consistent with these results, experimental research indicates that death awareness can drive individuals with self-serving behaviour to adopt more pro-social behaviour (Joireman & Duell, 2005). Thus, after engaging in death reflection, farmers were seen opting to cultivate with methods which benefit their community and future generation of farmers.

The use of organic fertilizers in crop cultivation produces environmentally sustainable agriculture farm products. These farm products are more expensive than similar products with unsustainable methods. Distinction of these products is shown on the market through the use of eco-labels, indicating that a product had been sustainably produced. Thøgersen, Haugaard & Olesen (2010) pointed out that consumer awareness campaigns had succeeded in convincing customers about the benefit to the environment they bring each time they make a choice to buy eco-labelled products. Thus, despite being expensive, there is a deliberate effort by environmentally conscious customers to pay extra for sustainably produced products.

Most importantly, these results are linked to the theory of death awareness whereby the process of death reflection drives an individual exhibit pro-social or helping behaviour (Cozzolino et al., 2004; Ring, 1984). In the experiment, when farmers reflected upon their death, results show that they opted for farming methods which help their community and the upcoming generation of farmers. Other studies focusing on the impact of introducing market based incentives in collective action towards conservation of public goods showed that market based incentive and formal institution, such as Payment for Ecosystem Services (PES), crowd out the moral incentive for conservation as some participants free ride on the conservation effort of others

(Sommerville et al., 2010): Ostrom 1990) : Reason & Tisdell 2010). A consistent finding in these studies is that market based incentives defeat the purpose of collective action because they replace intrinsic motivation on existing conservation efforts. Contrary to this, the outcome of the simulation experiment with farmers at Chipendeke community confirms that introduction of market-based incentives contributed to the conservation of farming lands. There was elimination of free riding as most farmers turned into co-operators.

Answers on collective action problems emanate from a two sided approach: the experimental side and real-world empirical evidence side; effort in these approaches has gone in trying to identify key factors that affect the likelihood of successful collective action (Feeny et al., 1990) : Baland & Platteau 1996). In line with this observation and given the fact that this thesis is based on the experimental side of collective action, it has shown that after playing many rounds free riders are converted to co-operators. Hence, it contributes to the experimental side of collective action problems. Furthermore, from the results of the experiment where co-operators' behaviour predominated in the last rounds compared to initial rounds, the real life implication can be deduced as follows: the longer a collective action regime stays in a community the more willing are the players to contribute to conservation of public goods. Less sanctions applied as time passed because people conform to set rules and become cooperators. This explanation is based on the fact that cooperators' behavior from free riders in the experiment emerged after many rounds were played.

6.2 Conclusion

The problem statement which saw the need for conducting this research centres on the following: the relationship between energy input and output in the context of communal farming in rural areas, the relationship between access to energy and environmentally sustainable farming practices through providing market based incentives, and the dynamics between access to energy and culture change. In terms of energy input and output on crop harvest, many studies had shown a positive relationship between agriculture output and energy input, but the issues of energy ownership and output is not a widely researched area. Hence, this research, by incorporating the aspect, it pointed out community ownership of the micro hydro power plant as one of the main influencing factor on output. On the perspective of culture, studies such as Yakubu (2002) and Mbaiwa (2011) to mention a few, posit that development contributes to complete culture change. However, this study agrees that development has a causal effect on culture change, but differs on the dimension that not all

attributes of an indigenous culture are prone to change as a consequence of development. Possible explanation for those attributes which are resistant to change is that they are the flagship of a society culture, passed inter and intra-generationally. Hence, these attributes are deep-rooted in the society and are resistant to change. Furthermore, the collective action simulation experiment has shown a positive relationship between access to energy and environmentally sustainable farming practice. This relationship strengthens with time during the initial rounds of the experiment; some participants who were free riders, as more rounds were played, transformed to co-operators, as indicated from round 13 to the last round. Conclusively, Kirubi et al., (2009), Maher et al., (2003), and Khennas & Barnett (2000) underscored that studies on access to renewable energy and rural economic development exist, but they focus mainly on geographic regions such as South and East Asia and Latin America. Empirical case studies from Sub-Saharan Africa are rare. In light of this argument, this study, by presenting a case study of the Chipendeke community which is located in the Sub-Saharan Africa, has contributed to science by filling in this identified research gap.

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8 APPENDECES

8.1 Appendix 1, A case study summary of Chipendeke community

The Impact of Access to Renewable Energy Technologies On Economic Development of Remote Rural Communities in Developing Countries, A Case Study Approach.

Ivan Manyonga
University of Vienna, Department of Development Studies.

Introduction

... more than 1.4 billion people worldwide lack access to electricity, 585 million people in Sub Saharan Africa (including over 76 million in Nigeria and some 69 million in Ethiopia) and the rest in developing Asia (including 400 million in India and 86 million Bangladesh). Some 85% of those without access live in rural areas". (International Energy Agency, 2010 p. 248) Chipendeke case study in Zimbabwe is among the ongoing global efforts to enhance universal access to modern energy.

CHIPENDEKE MICRO HYDRO PROJECT

CHIPENDEKE DEMOGRAPHICS

Male	Female	Total	Household	Population
18	17	35	18	11

THE POWER COMPANY ORGANOGAN

The Micro Hydro Project is being operated as a community owned private company called Chipendeke Power Company (Pvt) Ltd. Shares for dividends business model, which promotes sustainability through community investment dividends shares in the form of sweat equity contribution is being used.

THREE JET PELTON TURBINE

FREED FROM BIOMASS

Methodology

DIFFERENCE IN DIFFERENCE METHODOLOGY
To explore the impact of access to electricity through renewable energy technologies, this research employs the Difference in Difference methodology in conjunction with OLS ordinal logistic regressions to model crop harvest output. The difference in difference methodology will be used as an evaluation tool to make causal inferences regarding community access to renewable energy and quantity of agriculture output which is the main economic activity at Chipendeke. This approach is most appropriate since observations made for two time periods, before and after electrification which is the year 2010 and 2015.

GRAPHICAL ILLUSTRATION OF METHODOLOGY

To grasp how the DID methodology works, practical interpretation of the above graph is applied to the Chipendeke case study. In Chipendeke community, 115 farming households were observed in two time periods, $t = 0, 1$ where 0 indicates the pre-treatment phase, the year 2010 which is a time period before the treatment group receives treatment or put simply, before electrified farming households has access to electricity and 1 is the post-treatment phase which is a time period after the treatment group receives treatment, put simply this is the year 2011 to the present time when some farming households had access to electricity.

Every group is indexed by the letter $i = T, C$ where T indicates the treatment group which farmers with access to electricity, and C indicates the control group which are farmers without access to electricity.

Let Y_{0T} and Y_{1T} be the outcome for the treatment group before and after treatment respectively, and let Y_{0C} and Y_{1C} be the corresponding outcome for the control group.

Results

Field data collected was used to produce a dataset called Chipendeke Energy Survey 2015. This dataset is comprised of 115 observations across 21 variables. Following the DID methodological approach, the dataset was structured in a way that observations for the first time period, the year 2010 before electrification was represented by the dummy variable 0. For the second time period which is the year 2015 after electrification was represented by the dummy variable 1. Observations numbered 1-38 are households in the treatment group which has access to electricity while observations numbered 39-115 are households with no access to electricity which forms the control group. A variable of interest named TAP was generated from the dataset from the product of the variables Time and Access. This new variable TAP, according to the DID methodology is the most important because it shows the treatment effect.

MAIZE HARVEST MODEL

WHEAT HARVEST MODEL

BEANS HARVEST MODEL

LOGIT, INCOME LEVEL MODEL

SUMMARY OF VARIABLE TAP FROM THE MODELS
To determine the effect of treatment on the treatment group, the variable TAP is instrumental to the DID methodology as it informs us about the effect of treatment. For the three econometrics models presented above, the coefficient of the variable TAP shows the treatment effect in each model.

The unit of measurement for harvest is in kilograms hence, the treatment group shows that Maize harvest is 2.2 tons, and Wheat 1.6 tons more than the control group. Ologit model for income levels shows TAP coefficient of 2.952667 means that the incomes of farmers in the treatment group were 3 times more than the control group

Conclusion

Conclusively, the overall research outcome is that, we failed to reject the null hypothesis that, "access to electricity through renewable energy technologies has an effect on remote rural areas economic development". Why? The answer is partly attributed to more time to concentrate on farming activities created by elimination of some tasks such as gathering firewood and walking long distances to the diesel powered grinding mill to process maize meal the staple food for the community. Reduction of drudgery from cooking smoke and kerosene lamps used for lighting had contributed to the health of farmer's health hence, good health for farmers is positively correlated to high agriculture output.

However, some sentiments echoed by farmers were that, there is still need to connect more households to electricity since a maximum of 100 can be connected with current power output. In addition, there is also need to upgrade the capacity of the micro hydropower plant to generate more than 30 KW

OTHER IMPACTS
Ability to store of fresh farm produce and some perishables bought from the city due to purchase of refrigerators by entrepreneurs.

Quality of life had improved because of use of Information and Communication Technology (ICT). Purchase of gadgets such radio, television and cell phones had enabled to be efficient in communication with the outside world.

Lastly, the community had been transformed into a look and learn visitors center, frequently hosting academic visitors mainly students from universities and technical college in the country studying sustainability related disciplines.

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8.2 Appendix 2, Invitation letter to present at Internatioal Conference

ICERE 2016

International Conference on Environment and
Renewable Energy

25-27 May 2016, Munich, Germany

Mr.Ivan Manyonga

Invitation

Dear Mr.Ivan Manyonga

Organizing Committee of ICERE 2016 International Conference on Environment and Renewable Energy which will be held in Sheraton München Westpark Hotel, Munich, Germany 25-27 May 2016, invites you to the conference.

Your abstract **The impact of access to renewable energy technologies on economic development of remote rural areas in developing countries** was reviewed and accepted for Poster Presentation at the conference.

For updates about program, residence, visa and other necessary information, please visit our website

<http://energy.conference-site.com/index.html> In case of any questions, please contact +43 676 9673772 or email

adeo.office@gmail.com. The conference is organized by the International Scientific Journal. We ask German

consulate to grant visa to Mr.Ivan Manyonga for a period of the conference.



Sincerely,
Elena Ringo
ICERE 2016
Organizing Committee,
Editor-in-Chief of the International Scientific Journal
17.03.2016

<http://energy.conference-site.com/index.html>

8.3 Appendix 3, Certificate of Participating in International Conference



8.4 Appendix 4, Memorandum of Understanding



Memorandum of Understanding (MoU) between

Practical Action Southern Africa

“Practical Action” (4 Ludlow Road, Newlands, Harare) represented by Kudzai Marovanidze
(Regional Director) Email: Kudzai.Marovanidze@practicalaction.org.zw
Contact number: +263 4 77 6631-3

And

Ivan Manyonga, representing self (University of Vienna)
Email: ivanjune3@gmail.com
Contact number: +43 676 743 7605

Agreement Number: Energy Access/Research/IM

This Agreement (“this MoU/Agreement”) is dated 03 August 2015

1. Parties

(a) Practical Action is a registered charity organisation (number 247257) with company registration number 871954 England, UK. It has regional offices in Latin America, South Asia, East Africa and Southern Africa. In Southern Africa Practical Action has its office at 4 Ludlow Road, Newlands, Harare, Zimbabwe. The Zimbabwe offices work in Malawi, Zambia, and Zimbabwe. The organization started operating in Zimbabwe in 1989 under the trading name of Intermediate Technology Development Group (ITDG) before the change of name in 2002 to Practical Action Southern Africa, registered as a charity organisation under the Private Voluntary Organisation (PVO) Act with the registration number PVO 13/2009 in compliance to the national statutory requirements for welfare organizations. Its vision is that of a world free of poverty and injustice in which technology is used to the benefit of all,

The objectives of Practical Action – Southern Africa are to promote sustainable technology in areas of energy, water and sanitation, sustainable agriculture and livelihoods and market systems that alleviate poverty.

And

(b) Ivan Manyonga (IM) is a PhD student at the Institute of Development Studies, University of Vienna, Austria. He is researching on the impact of access to electricity through renewable energy technologies on economic development and socio-cultural

transformation in remote rural communities in developing countries. A case study of Zimbabwe.

The objectives of IM are

1. To visit Chipendeke Community Micro Hydro Power Plant and the Gravity fed irrigation fields and make a pilot survey on the impact of access to electricity on agriculture output then adjust research instruments if it is necessary
2. Conducting the actual survey on the impact of access to electricity on agriculture output and a public good simulation experiment on the role of collective action in addressing environmental problems faced by rural small holder farmers
3. Contributing to knowledge by publishing the work of Practical Action Southern Africa in a top tier, peer reviewed academic journal well as in the form of a PhD Thesis
4. Presentation of Chipendeke case study results at a selected International Conference whose theme is related to renewable energy and environment.

Background to the MoU

This project focuses on a case study of Himalaya community which is currently accessing electricity through a Micro Hydro Power Plant. The project will be in two parts, first part is based on econometrics modelling techniques by employing Difference in Difference, (DID) methodology in order to evaluate the impact of access to electricity on crop harvest output of 110 farmers in Himalaya. The second part will be a public good simulation experiment on the role of collective action in addressing environmental problems faced by peasant farmers. 60 farmers will participate in this experiment and they will be randomly selected with the catchment area of the Micro Hydropower Plant.

2. Purpose and terms of the MoU

This MOU is agreed to guide, regulate and harmonise the relationship and partnership between Practical Action and Ivan Manyonga in this joint engagement. The target group of this project are 50 farming households currently benefiting from the Micro Hydro Powered Irrigation System, 60 farming households currently benefiting from the gravity fed powered irrigation and 100 farming households from villages which are not benefiting both gravity fed and micro hydro powered irrigation systems. The Purpose of this project will be to evaluate the impact of access to electricity through renewable energy technologies on economic development of rural communities in Southern Africa and to conduct a public good simulation experiment on the role of collective action in addressing environmental problems faced by rural farmers. This will be done by presenting the case study of Himalaya Community located in the Eastern Highlands Region of Zimbabwe near the border with Mozambique.

3. Principles that will guide the partnership

The principles guiding this partnership are mutual support, trust, respect and understanding

Wherever possible Practical Action and Ivan Manyonga will play a complementary role and seek to add value and build capacity of each other to engage in joint advocacy for economic development of remote rural communities through enhanced access to electricity.

4. Role of Practical Action

- Assist with transport to site for Ivan Manyonga
- Documentation available at Practical Action disposal on the Himalaya Micro hydropower project

5. Role of IM

Through this project, the core Outcomes which the partner, (Ivan Manyonga) will seek to achieve include

5. To state in quantitative terms, the change in harvest quantities of different crops for two time periods, before and after electrification and ascertain the project impact
6. To contributing to knowledge by publishing the work of Practical Action Southern Africa in academic journal of energy and development as well as in the form of a PhD Thesis.
7. To document quantitatively showing by how much the harvest output of different crops farmed in Himalaya have changed before and after access to electric powered and gravity fed irrigation system
8. Presentation of Chipendeke case study results at a selected International Conference whose theme is related to renewable energy and environment.
9. To contribute to other communities in different countries replicating Chipendeke example and visiting the area for look and learn excursions
10. Present research proposal, Journal publication and copy of PhD dissertation to Practical Action.

In order to achieve this, the partner will provide research expertise through application of the difference in difference techniques to evaluate the impact of the energy project. Furthermore he will conduct a public good simulation experiment with farmers. The focus of the simulation experiment is to establish the willingness of farmers to engage in collective action regime which mitigates environmental problems caused by their farming practices.

6. Period of this Memorandum of Understanding

This MOU shall remain in effect from 01/09/15 to 01/09/16 at which time the parties will decide whether or not to extend or terminate the agreement.

7. Modifications to the terms described by the MOU

Both parties agree to review and update the MOU every six months. The next review will be on 01/03/16. Any modifications to this MOU will only be done by mutual agreement and formally signed-off by each of the two parties.

8. Arbitration

Any disputes arising out of or in connection with this agreement should be raised with the other party prior to the next MOU review meeting. If attempts at negotiation fail, both parties agree to submit their position for arbitration by a third party acceptable to both signatories of the MOU. The decision rendered in this arbitration shall constitute final adjudication of the disagreement.

9. Termination

This agreement may be terminated if one of the below conditions is met

- by mutual agreement with a minimum of one month notice given in writing;
- if one or both parties are in breach of the agreed terms of the contract or MOU

10. Force Majeure

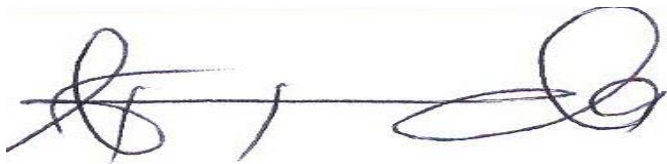
If the performance of this MOU and the project should be rendered wholly or substantially impossible or is otherwise frustrated by force majeure - any event beyond the reasonable control of the party so affected – then the party shall immediately notify the other party in writing. As from that date the obligations of both parties under this MOU will be immediately suspended pending renegotiation at the earliest possible opportunity.

11. Reporting and Financial Arrangements

The agreement will not bring any financial benefits to either party.

12. Signatures

On behalf of Practical Action	On behalf of Ivan Manyonga
Signature: 	Signature: 
Name: Kudzai Marovanidze	Name: Professor Cunat, Alejandro

Job Title: Regional Director	Job Title: PhD Student Supervisor for Ivan Manyonga at University of Vienna
Date:08/09/2015	Date: 08/09/2015
As witness for Practical Action	As witness
Signature 	Signature 
Name: Godfrey Sibanda	Name: Ivan Manyonga
Job Title: Head of Energy Access	Job Title: PhD Student at University of Vienna
Date:08/09/2015	Date: 08/092015

8.5 Appendix 5, Ministerial authority to conduct research in schools



ZIMBABWE

Reference: C/426/3 Harare
Ministry of Primary and
Secondary Education
P.O. Box CY 121
Causeway
ZIMBABWE

7 May 2015

Ivan Manyonga
University of Vienna
Austria

RE: PERMISSION TO CARRY OUT RESEARCH IN HARARE PROVINCE: WARREN PARK/ MABELREIGN DISTRICT: QUEEN ELIZABETH, ALAN WILSON, PRINCE EDWARD, ST JOHNS, GATEWAY, MABEREIGN GIRLS, LORD MALVERN, MOUNT PLEASANT, ARUNDEL AND GIRLS HIGH SCHOOLS: MANICALAND PROVINCE: BUHERA DISTRICT: ST JOHNS, HANDE, MASOCHA, NYASHANU, ST ALBANS, HOLY FAMILY, GUNDE, MUKWASI, CHAWATAMA, NYAMUNYAZA SECONDARY SCHOOLS

Reference is made to your application to carry out a research in the above mentioned schools in Harare and Manicaland Province on the research title:

"THE IMPACT OF ACCESS TO ELECTRICITY THROUGH RENEWABLE ENERGY TECHNOLOGIES ON ECONOMIC DEVELOPMENTS AND SOCIO-CULTURAL TRANSFORMATION IN REMOTE RURAL COMMUNITIES IN DEVELOPING COUNTRIES."

Permission is hereby granted. However, you are required to liaise with the Provincial Education Director Harare and Manicaland, who is responsible for the schools which you want to involve in your research. You should ensure that your research work does not disrupt the normal operations of the school.

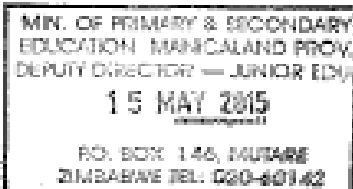
You are required to provide a copy of your final report to the Secretary for Primary and Secondary Education by December 2016.


P. Muzawazi

Director: Policy Planning, Research and Development

For: SECRETARY FOR PRIMARY AND SECONDARY EDUCATION

cc: PED – Harare Province



** D.E.O. Buhera District.*

Please assist the above named officer to carry out the stated research. He should observe the stated conditions

*Deregi
15/05/15*

8.6 Appendix 6, Provincial and district authority to conduct research

All communications should
be addressed to
"THE PROVINCIAL
EDUCATION DIRECTOR"

Telephone : 792671-9
Fax : 796125/792548
E-mail :
moeschre@yahoo.com



ZIMBABWE

REF: G/42/1
Ministry of Education,
Sport and Culture
Harare Provincial Education
Office
P. O. Box CY 1343
Causeway
Zimbabwe

Ivan Manyonga
University of Vienna
Austria



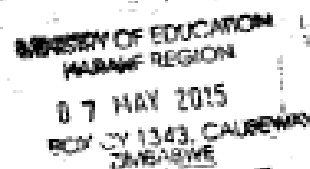
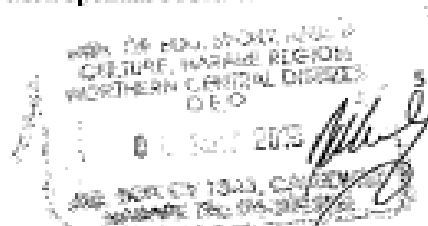
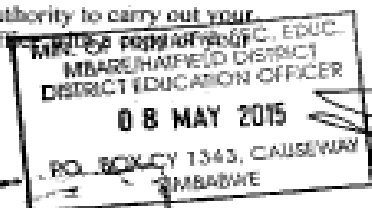
RE: PERMISSION TO CARRY OUT RESEARCH IN SOME SELECTED SCHOOLS

TOPIC: THE IMPACT OF ACCESS OF ELECTRICITY
THROUGH RENEWABLE ENERGY TECHNOLOGIES ON
ECONOMIC DEVELOPMENTS AND SOCIO-CULTURAL
TRANSFORMATION IN REMOTE RURAL COMMUNITIES IN
DEVELOPING COUNTRIES ON SELECTED SCHOOLS IN HARARE AND
Reference is made to your letter dated.....07 MAY 2015.....

Please be advised that the Provincial Education Director grants you authority to carry out your
research on the above topic. You are required to supply Provincial Office with your
research findings.

ZISHIRI M

For: Provincial Education Director
Harare Metropolitan Province



8.7 Appendix 7, Survey instrument; access to renewable energy and crop harvest output

We are conducting the survey in Himalaya farming community; the aim is to identify the impact of access to electricity through renewable energy technologies on agriculture output or harvest for selected crops which you are farming. Feel free to answer give honest answers because of this survey will be used for academic purposes only and your responses will be treated with confidentiality.

(1) How many hectares of land are you cultivating all your crops?

0,2	0,5	0,7	1(ha)	1,5(ha)	>1,5 (ha)
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(2) What was your main purpose of farming before irrigation started?

To sustain my family (0) For business (1)

(3) What was your main purpose of farming when irrigation started

To sustain family (0) For business (1)

(4) Which of the following crops were you farming before irrigation started?

Maize (1) Tomatoes (2) Beans (3) Wheat (4)

(5) Which of the following crops are you farming after electrification, 2015 farming season

Maize (1) Tomatoes (2) Beans (3) Wheat (4)

(6) Indicate the total hectares which you were planting the following crops in 2010.

Maize	0,1	0,2	0,5	0,7	1(ha)	1,5(ha)	>1.5(ha)
Wheat	0,1	0,2	0,5	0,7	1(ha)	1,5(ha)	>1.5(ha)
Beans	0,1	0,2	0,5	0,7	1(ha)	1,5(ha)	>1.5(ha)
Tomatoes	0,1	0,2	0,5	0,7	1(ha)	1,5(ha)	>1.5(ha)

Indicate the total hectares which you were planting the following crops in 2015

Maize	0,1	0,2	0,5	0,7	1(ha)	1,5(ha)	>1.5(ha)
Beans	0,1	0,2	0,5	0,7	1(ha)	1,5(ha)	>1.5(ha)
Wheat	0,1	0,2	0,5	0,7	1(ha)	1,5(ha)	>1.5(ha)
Tomatoes	0,1	0,2	0,5	0,7	1(ha)	1,5(ha)	>1.5(ha)

(7) Which type of fertilizer did you use for all the crops which you harvested in the last season?

Maize Beans Wheat Tomatoes

(14) What is your gender Male (0) Female (1)

(15) In which category does the head of this household falls into?

Female Adult (0) Male Adult (1)

(16) In which category does your age falls into?

Under 18 (1) 19-25 (2) 26-30 (3) 31-40 (4) 41-50 (5) Above 50 (6)

(17) How many people provides your household with farming labor?

>2	3	4	5	6	7	8	9	>10
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(18) What is the highest level of education attained by the household head?

Primary (1) Secondary (2) Tertiary (3) No formal Education (4)

(19) In which category does your annual income from farming activities in US\$ falls into?

<700	800-900	1000-1,3	1,4-1,7	1,8-2000	>2000
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8.8 Appendix 8, Survey instrument; relationship between access to energy and culture change

We are conducting a survey on the impact of development on indigenous culture in your community. We have selected five attributes of your culture and we want to hear your views on how these attributes have been affected by development in your community. Feel free to talk as we need your honest opinion, we will not record your name and your responses will be treated with confidentiality.

(1) What do you see as the main changes in your indigenous culture which are emerging due to access to modern energy related developments in your community?

(2) Given choice, would you abandon your cultural practices and adopt to a foreign culture?

(3) From the various types of music in the country, can you list 3 types in your order of priority, which consider as your main form of entertainment

(4) When you attend to the following events: Parties with friends, Official events and culture related events. Can you explain the different types of attire that you wear?

(5) Can you rank order the occurrence of various forms of crime in which you hear reported in your neighbourhood?

(6) State the percentage of the type of music that you listen to or which you have stored on your music library, cell phone, flash discs or cassettes for your entertainment?

Traditional Music	0%	20%	50%	100%
Contemporary Music	0%	20%	50%	100%
Foreign music-Classic, Reggae, Jersey etc.	0%	20%	50%	100%

(7) In the last three social events which you attended, which of the following attire did you dress up with, or which of the following is your main form of dressing in your day to day life

African /traditional attire	1
Long skirts	2
Miniskirts	3
Trousers	4

(8) What is your relationship status?

In a relationship	0	Not in a relationship	1
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(9) If you are in a relationship right now would you HUG your partner in open space, in view of other people?

Never	0	Yes	1
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(10) If you are in a relationship right now would you KISS your partner in open space, in view of other people?

Never	0	Yes	1
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(11) When communicating with your elders, which of the following form of language do you normally use?

Formal language	1	Colloquial language	2	Mixed language	3
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(12) When communicating among with your peers, fellow youth, which of the following form of language do you normally use?

Formal language	1	Colloquial language	2	Mixed language	3
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(13) Do you have access to electricity in your house?

No	0	Yes	1
----	---	-----	---

(14) In which category does your age falls into?

>10	11-15	16-20	21-25
-----	-------	-------	-------

(15) What is your gender?

Male	0	Female	1
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(16) In which category does your parent's monthly income falls into?

>300 3-500 5-1000% <1500

(17) How many are you in your household?

>3 3-5 6-8 <9

(18) Who is the breadwinner in your household?

Father 1 Mother 2 Relative 3