Entrepreneurial Capacity, Government Intervention and Diffusion of Technologies in Uganda: Comparing the Supply side of Modern Types of Energy and Mobile Telephony Technologies

George B. Batte
Makerere University Business School
gbatte@mubs.ac.ug
Izael P. Da Silva
Strathmore University – CERESD
Centre of Excellence in Renewable Energy and Sustainable Development
idasilva@strathmore.edu

Abstract

The diffusion of modern technologies plays a critical role in job creation. Mobile Telephony Technology (MTT) has been successfully diffused in Uganda, within a short time, and with minimal government intervention. However, despite heavy government interventions, Modern Energy Technology (MET) remains outside the reach of most Ugandans. Low access to MET seems to be contributing to Uganda's under-development and unemployment. Projects initiated to spur MET diffusion haven't been very successful, and METs widely used in other developing countries and successfully piloted in Uganda have found minimal diffusion and failed to upscale.

Although policy makers are quick to blame poverty and ignorance for the slow diffusion of MET, the rapid diffusion of MTT in similar environments have put to doubt most these arguments. This study explored the diffusion of technologies in Uganda, using entrepreneurial capacity as an independent variable. By comparing the fast diffusing MTT with the slow diffusing MET, this study helps to provide a better understanding of the dynamics of technology diffusion in Uganda.

Using government documents and a questionnaire survey targeting employees of MTT and MET vending firms, the study identifies differences in intervention related to governance, regulation and funding between MTT and MET vendors, which significantly affect some aspects of Entrepreneurial capacity. The study also found evidence of significant differences in the constructs of Entrepreneurial Capacity measured for MET and MTT vending firms that affect technology diffusion.

1. Introduction

With less than 10% of its rural population having access to electricity (MEMD, 2008), low access to modern energy poses one of the biggest challenges to economic transformation in Uganda (World Bank, 2004). Government realises this challenge, and has initiated several projects with the aim of increasing access (MEMD, 2008). In the 2011/12 financial year, the energy sector spent $521 million in form of project support and subsidies, and more has been contributed in terms of tax waivers and development partner support (MOFPED, 2012). This represents a 70% increase in budget allocation; and indicates the importance government attaches to the energy sector. However, with electricity still contributing just 2% of Uganda's energy mix (MEMD, 2008) progress in disseminating MET has been slow.

Many successful experiments and pilot trials have not translated into replicable models for national adoption (Karekezi & Raja, 1997). Low diffusion of MET has been attributed to poverty, lack of technical skill, lack of exposure, poor infrastructure, poor access to finance and lack of willingness to change (MEMD, 2007). However, the relatively more successful diffusion of more expensive and seemingly less critically important technologies in similar environments has put to doubt most of these arguments.

In comparison to government and donor driven MET, entrepreneur-promoted- MTT, unknown in Uganda before 1995, has found greater diffusion. Within a period of 16 years, the percentage of Ugandans owning a

mobile phone has reached 42% (Tentena, 2011). This is in sharp contrast with access to electricity at 12% despite existing for over 70 years and the massive investments and subsidies by government and other development partners.

A plausible explanation for this discrepancy could be differences in the entrepreneurial capacity of the technology vendors characterised by consistent entrepreneurial interventions aimed at identifying and exploiting opportunities. Antonneli (1998) holds that changing society is the role of entrepreneurs who see opportunity in changing accepted routines. The ability to assess economic potential in new innovations and devise means of transforming it into real economic value is what is called Entrepreneurial Capacity (Wilkinson & Hindle 2006). This enables people to seek new ways of doing things, and to adapt to changing environment by destroying old routines and replacing them with superior ways (Thornton, 1999; Thurik, 1999).

Most scholars have applauded the impact of the interventions of governments and multilateral agencies in the dissemination of MET, with a section of scholars alluding to the indispensability of government subsidies and other policy interventions. However, this study is premised on the assumption that government led dissemination efforts fall short of the entrepreneurial capacity required to achieve diffusion of technologies, hinders the participation of entrepreneurs with the necessary entrepreneurial capacity, and could therefore be responsible for the low diffusion of MET.

1.1. Problem Statement

Government, multilateral and voluntary agencies have been responsible for much of the effort in disseminating MET in Uganda. However, despite the increasing demand for electricity, the availability of a wide variety of energy sources and technologies, increasing number of projects and policies aimed at increasing access to modern forms of energy in Uganda; the rate of uptake of MET has remained low (World Bank, 2004). People remain entrenched in traditional energy technologies often characterised by low productivity and decreasing returns.

This compares badly with private sector promoted MTT which have become a permanent fixture in Ugandan homes. This study presupposes a higher entrepreneurial capacity in the private sector and proposes that differences in vendor entrepreneurial capacity may be responsible for the variations in diffusion between energy and MTT. That notwithstanding the difference in the magnitude of investment required for electricity projects vis-a-vis the corresponding of setting up MTT is a factor which needs to be taken into consideration.

1.2. Purpose of the Study

This study compares the effect of vendor entrepreneurial capacity on the diffusion of both MTT and MET, and the specific objectives of the research are to:

1. Assess the interventions of government and donor agencies in the dissemination of MET and MTT in Uganda
2. Assess the effect of government intervention on the entrepreneurial capacity of firms involved on the supply side of MET and MTT.
3. Explore differences in entrepreneurial capacity between MET and MTT vending firms
4. Investigate and compare the effect of entrepreneurial capacity on the diffusion of MET and MTT in Ugandan.

1.3. Research Questions

The study answers the following questions:

1. How has government intervened in the dissemination of MET and MTT in Uganda
2. What is the effect of government interventions on the entrepreneurial capacity of MET and MTT vending firms
3. How the level of entrepreneurial capacity of MTT vending firms compares with the level of entrepreneurial capacity of MET vending firms.
4. How differences in the entrepreneurial capacity of technology vending firms account for differences in diffusion of the technologies promoted by the firm.

1.4. Key outputs

This study is a first step in developing a framework to guide and develop entrepreneurial involvement in the dissemination of MET in Uganda by:

1. Highlighting the effect of government interventions in the disseminating technologies.
2. Illustrating the importance of building vendor entrepreneurial capacity in the process of diffusing new technologies.
3. Illustrating how differences in the entrepreneurial capacity of technology vending firms account for differences in diffusion of the technologies promoted by the firm..

1.5. Significance and Practicality of the Research

Understanding differences in growth and productivity performance of communities and nations requires an understanding of the complex process of the diffusion of new technologies. While MTT have successfully been diffused in Uganda, little effort has been made to study the dissemination processes that have led to the success achieved. No attempts have been made to use the same successful diffusion processes for the dissemination of other technologies in similar Ugandan environments. Citing the growing significance of MET to the sustainability and development of communities, it is necessary to examine the successful diffusion of MTT for eventual solutions to the low diffusion of MET. This research is a step in that direction. It will contribute to our understanding of, and develop model for, diffusion of modern energy technologies in Uganda.

1.6. Justification

This research is import because it:

1. Helps government to find solutions for disseminating new technologies in Uganda
2. Assists Entrepreneurs interested in investing in new technologies in Uganda
3. Contributes to the stock of knowledge in the field of new technology diffusion and entrepreneurship especially in the Ugandan context.

1.7. Scope of the Study

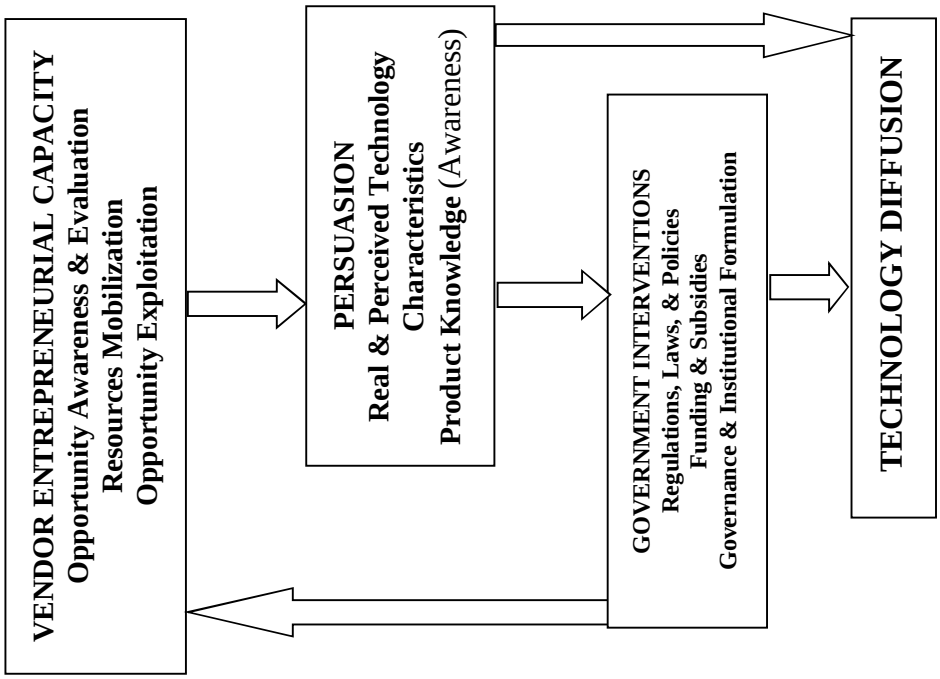
1. Data was collected from employees of MET and MTT vending firms. Although the study recognises the importance of end users in the study of diffusion, this study limited its scope to studying the supply side.
2. Conceptually, the scope is directed towards understanding diffusion of MET with a view of achieving improved access. Specific aspects investigated were the levels of entrepreneurial capacity.
3. The study focused on energy and mobile phone product vendors in Uganda. Since the technology is imported, the study concentrated on technology hardware importers as the primary promoters. The nature of business in Uganda dictates that many of these operate from, or have offices in Kampala. However in situations where the firms chosen have no presence in Kampala, they were traced to their areas of operation.
4. Diffusion was studied over a 10 year period from 2001 to 2010, while the study of vendor entrepreneurial capacity was cross-sectional with data captured at the time of the research. However, since entrepreneurial capacity is part of the firm structure that only changes over long term period, the study assumed that the level of entrepreneurial capacity identified could suffice over a ten year period.

1.8. Conceptual Framework

The constructs of the model (figure 1) are defined out of Rogers' (2003) diffusion of innovation theory and Hindle's (2007) conceptualization of entrepreneurial capacity. Diffusion arises from decisions made by potential customers to accept the new technology. This depends on the persuasions resulting from the target user's product knowledge or awareness and the real and perceived characteristics of the technology resulting from the dissemination strategies applied by the technology vendor. We conceptualize that these strategies are an expression of the vendor's entrepreneurial capacity characterized by the ability to recognize (or create) and evaluate opportunities, to mobilize the required resources, and to implement or exploit the opportunities. What the entrepreneur does to create awareness, positive perceptions and persuasion about the technology will

ultimately determine the level of diffusion. We also argue that the influence of the vendor's entrepreneurial capacity is somehow influenced by government interventions.

FIGURE 1. CONCEPTUAL FRAMEWORK



2. LITERATURE REVIEW

This chapter explores earlier works on the major variables that form the basis of the study. These variables are technology diffusion and entrepreneurial capacity.

2.1. Technology Theories

Technology is widely defined as applied science (Antonelli, 1998) by engineers. Social scientists take a broader view, defining technology to include all tools, machines, utensils, weapons, instruments and devices, and the skills by which they are produced and used (Rogers, 2003). A wider view of technology that includes all tasks, techniques and knowledge used in productive effort (Guillon, 2001) is increasingly applied.

In developing countries where technology is most often a foreign import, technology is often perceived in the technology imperative model, as an independent variable that compels individuals and groups to change (Orlikoski, 1992). In more developed economies, technology is perceived more as a natural consequence of the actions, social interactions and decisions of individuals (Orlikowski, 1992); a dependent variable relying on people's daily interactions in agreement with the strategic choice model.

This study opts for a middle ground; where technology is viewed as an external force whose influences depend on human actors and organizational contexts (DeSanctis & Poole, 1994); as a social object that derives its meaning from the way in which it is used, even when its hardware form remains fixed across time and contexts of use (DeSanctis & Poole, 1994). In this context, communities introduced to a technology form their own perceptions about it, and determine how it can be used. These perceptions and decisions are heavily influenced by the actions of the technology vendor. These perceptions influence the way a technology is used, and mediate its impact on outcomes and diffusion (Warren, Slikkerveer, & Brokensha, 1995).

2.2. Technology diffusion

Diffusion is the "process by which an innovation is communicated through certain channels over a period of time among the members of a social system (Rogers, 2003). Researchers explain the relatively slow diffusion of new technologies on uncertainty associated with newness (Dosi & Teece, 1998), strategic issues in technology adoption (Shane, Venkataraman, & MacMillan, 1995), the role of learning (Wangwe, 1995), and the role of vested interests. Switching to new technologies reduces expertise and destroys old competitive advantages, causing people so affected to engage in efforts aimed at keeping the old technologies in place (Sagasti, 2004).

Rogers (2003) identifies five major elements that determine innovation diffusion: characteristics of an innovation, decision-making process, characteristics of potential adopters, consequences of adopting, and communication channels used in the adoption process. These elements originate from the two stage diffusion model, which suggests that new technologies are first adopted by opinion leaders who then influence others to adopt (Rogers, 2003; Guilhon, 2001). This seems to challenge the commonly accepted Technology Acceptance Model, which argues that adoption of new technology is a conscious and logical decision based on perceived usefulness and ease of use of the new technologies (Bwisa & Gacuhi, 1997). Rogers (2003) notes the complexity of new technologies that makes it hard for potential users to perceive usefulness and ease of use.

The multi-step flow - diffusion of innovation theory argues that exchange of information through networks influences opinions and judgment (Rogers, 2003), influencing perceptions about technology characteristics and persuading people to adopt. This tends to suggest a passive role for the receiving community. However, Cohen (1989) shows that receiving communities receive and adopt the technology, and also modifies it and aligns it to their own priorities, just as the technology modifies structures in the receiving communities. New technologies penetrate and influence communities, and the social structures of the communities in turn influence and modify the technologies' original intention (Parker, 2000), meaning that communities can only effectively absorb new technologies when they have developed their own capabilities (Warren, Slikkerveer, & Brokensha, 1995). This may be dependent on the vendors' entrepreneurial capacity.

2.3. Vendor Entrepreneurial Capacity

Transforming society is brought about by the innovative activities of entrepreneurs, the only agents who are capable of carrying out new combinations of resources and transforming organizational forms (Audretsch & Thurik, 1999) because they see gains in changing accepted habits (McMillan & Woodruff, 2002; Thornton, 1999). Entrepreneurial capacity is required to defy old routines, disseminate new technologies, and institute new methods (Saghir, 2005), by devising business models that will disseminate and sustain the use of new technologies (Magretta, 2002).

Hindle (2007) has defined Entrepreneurial capacity as "the ability of individual or grouped human actors to evaluate the economic potential latent in a selected item of new knowledge and to design ways to transform that potential into realizable economic value for intended stakeholders". According to Cunningham & Moroz (2008), entrepreneurial capacity is the resource that is essential for discovery to become a realised commercial opportunity. It is the condition necessary for vendors to recognize the reward embedded in a new technology, the feasibility of the technology, and to communicate a promise of reward to potential adopters (Krueger, 2000; Guilhon, 2001). It demonstrates the power of possibilities, and enables people to envision the economic potential of new technologies and how to apply them to business concepts (Hindle, 2002). However, entrepreneurial capacity is less about figuring out new possibilities, and more about demonstrating that possibilities can be turned into real value.

Using Hindle (2007), we can conceptualise vendor entrepreneurial capacity as a knowledge resource that enables the identification, evaluation and exploitation of opportunities, allocation of resources to exploit new opportunities, alignment of current capabilities for the exploitation of new possibilities, and the ability to negotiate around complex environmental issue. Entrepreneurial capacity ensures that the technologies have characteristics appropriate for the context, and continuously adjust to ensure that a particular implementation is successful, replicable and sustainable (Benkler, 2006; McMillan & Woodruff, 2002).

2.4. Persuasions

Persuasion creates perceptions of desirability, feasibility and profitability to the targeted individual (Bwisa & Gacuhi, 1997; Rogers, 2003). The desirability of any technology depends much more on perceptions, much less on its actual characteristics. Perceptions rather than objective facts drive the beliefs and attitudes of potential adopters. Increasing adoption thus requires that promoters of new technologies seek to increase the frequency and diversity of cues supporting the desirability and feasibility of the technology (Kanter, 2000). Tangible benefits of new technologies are of little impact if target users perceive them as unavailable (McMillan & Woodruff, 2002). Intangibles such as social and cultural support, information, and tacit knowledge are critical to providing fertile ground for potential adopters when and where they perceive a personally viable opportunity (Kassiri, 2003).

Because perceptions of desirability come from many sources, technology vendors need to provide diverse cues that address the positive consequences of using the new technology and ensure that people are hearing these cues and interpreting them positively (Krueger, 2000). A technology needs to be perceived as not exploiting, but building the community (Gogo et. al 1998). The perception that a technology is harmful is likely to reduce perceptions of desirability, thus persuasion for adoption (Guilhon 2001). Persuasion also addresses perceived feasibility of the technology, which is achieved by helping individuals master the technology and by the modeling of a behavior by a believable source through mentors and other role models (Sagasti 2004; Rogers, 2003).

Entrepreneurial capacity ensures that vendors have creative concepts to provide social and cultural support, information, and tacit knowledge required for potential adopters to perceive new technologies as viable opportunities (Hindle, 2002; Kassiri, 2003).

2.5. Government Interventions

Integrating learning curve information on MET into a dynamic programming formulation with real options analysis, Kumbaroğlu, et al (2008) were able to show that, the diffusion of METs only occurs if targeted supportive policies exist. In the absence of subsidies or other promotion policy instruments, market players can hardly be expected to invest in more expensive METs, especially in a liberalized energy market environment. This observation justifies the need to mobilise new sources of financing to support MET diffusion especially in developing countries.

However, Faiers and Neame (2006) have observed that the policy of stimulating the market with grants does not result in widespread adoption. And, when Velayudhan (2003) used the ‘‘diffusion of innovation’’ framework to examine technology dissemination process, he discovered that the benefits promoted by government programme were, in most cases, at variance with the reasons buyers advanced for adopting technologies. He argues that over-emphasizing subsidies tends to shift focus to the cost of a technology at the expense of other technology benefits. According to Chang et al (2009), the growing levels of subsidy generate a negative impact on sustainability of the technology and the development of sustainable local markets. Theodorou et al (2010) attribute this to the misinterpretation and lack of attention to parameters involved in drafting subsidy schemes. However, the repeated failure of subsidy schemes in many widely varying situations inevitably leads to questioning the whole concept of subsidy.

Using data on government investment in research and development and technological improvements Schilling & Esmundo (2009) were able to show that greatly under-funded wind and geothermal energy were making greater strides towards commercial sustainability compared to over subsidised solar technologies. Such interventions create a vicious circle of interventions that only serve to distort technology markets and affect the creation of sufficient entrepreneurial capacity in the industry (Chang et al, 2009). Chua (1999) argues that these distortions create rent-seekers, with minimal entrepreneurial capacity, who align with people of influence to exploit government funds in an unproductive or wasteful manner at the expense of business people with genuine desire to disseminate technologies in order to earn profits.

Taylor (2008) also contrasts between technology-push and demand-pull strategies to categorise policies that either fund the supply of new knowledge or create demand for new technologies. Dissemination policies based on subsidies tend to emphasize the creation of demand at the expense of supplying new knowledge. Yet

technology diffusion requires a systematic approach based on a solid knowledge base to be used in solving emerging problems, and to overcome the complexity of the diffusion process. Radulovic (2005) questions the over-emphasis of a technology-push approach that is premised on finding ways of disseminating technologies. He recommends a technology-pull approach that seeks to establish community needs, and how best those needs could be met using the technologies available.

2.6. Regulatory Interventions

Most researchers tend to hold the notion that a supportive policy framework is a pre-requisite for successful technology diffusion (Li, 2008; Jacobsson & Lauber, 2006; Vergragt & Brown, 2007; Kobos et al, 2003). This support, they argue, is necessary to remove barriers to adoption, build capacity, facilitate a wider debate around the technology, provide leadership and regulation (Martinot et al, 1993), and provide incentives for adoption (Martinot et al, 1993). This is why Jacobsson & Lauber (2006) attribute the rapid spread of wind turbines and solar cells in Germany to the policy instruments in use. They illustrate the struggle between national institutions in the enactment of MET supportive policies against fervent opposition from stakeholders of the conventional energy systems and their sympathizers.

Although new technologies meet many forms of resistance and obstacles that require a supportive environment, it also needs a trial and error approach that encourages learning from the inevitable mistakes. Government Interventions that require rigid adherence to laws, policies and procedures, will not tolerate the deviations. Foxon et al (2005) have also noted that in spite of existing incentives in place to promote technologies, 'gaps' in the broader innovation chain prevent their diffusion. Indeed, well-meaning government interventions to promote technologies may sometimes create the gaps in the innovation chain that slow commercialization and diffusion of these technologies (Balachandra et al, 2008).

It is commonly argued that a shortage of entrepreneurs forces government and donor agencies to get more directly involved in the dissemination of technologies, little is known about the long-term effect of such interventions. Most government led technology dissemination efforts in Uganda tend to presuppose a passive acceptance from the receiving community where adoption is expected on terms and conditions set by government agencies. Cohen (1989) shows that receiving communities receive and adopt the technology, and adapts it to their own priorities; just as the technology modifies structures in the receiving communities. Structure is the basis for individual actions, and acts of each individual reproduce and reinforce the structure (Parker, 2000; Stones, 2005). Communities can only effectively absorb new technologies when they have developed their own capabilities through the modification of structures (Warren, Slikkerveer, & Brokensha, 1995).

Efforts towards the dissemination modern technologies in Uganda have concentrated on highlighting the engineering properties and physical attributes of the technology artefacts and largely ignored issues of how the social structure of relationships around a person or a community affects beliefs or behaviours towards the new technologies. These structures are affected by government regulations and the actions of government agencies. Diffusion depends on the relations between and within the technology vending firms and technology receiving communities, the interpersonal linkages created by the introduction of the new technologies (Benkler, 2006).

When new technologies are introduced, new institutions emerge from existing institutions through a process of adaptation (Radulovic, 2005). By trying to impose foreign institutional frameworks to support the deployment of technologies, regulations tend to block continuity, replication, commercialization and the creation of sustainable markets even for successfully piloted projects (Balachandra et al, 2008). Without systematic exchange through participatory use of technologies and knowledge sharing, poor technology designs are reproduced over and over with negative social implications for efficiency, effectiveness and equity; leading to exploitation of adopting communities.

Government and donor led dissemination efforts, owing to their rigid regulation regime, tend to concentrate on pushing technologies instead of developing structures that could help each market to develop according to the social dynamics and capabilities of existing actors (Srinivasan, 2005). Taylor (2008) recognises differences in communities, and recommends that different approaches should be employed in the deployment processes. The differentiated approaches help to clarify barriers to adoption, and to exploit alternative approaches to wrestle people out of their past behaviours (Dijkema et al, 2006). By interacting more closely with user communities

and allowing the target users more room to negotiate conditions of their adoption, entrepreneurial deployment efforts will cause little disruption of the social structure, enhance competences within the community and encourage new learning resulting in higher chances of technology diffusion (Shum and Watanabe, 2007).

Technology diffusion is an adaptive process that is affected by and affects the technology itself, the organization, organizational processes and members of the organization. During the diffusion process, knowledge emerges as people attempt to fit the technology to their everyday processes.

2.7. The Adaptive Structuration Theory (AST)

This theory is based on the assumption that "communities create themselves, yet members don't always realize they are crafting and reinforcing the tools that do the work." People intentionally adapt rules and resources in order to accomplish their decision-making goals. It is based on the Giddens (1984), who suggests that people in communities are active agents with the capacity to change or preserve their communities. According to DeSanctis & Poole (1989), all human action is guided by a pre-existing social structure which is dependent on norms that are characteristic of a given community and distinct from those of other communities. However, these structures are transient, and are sustained and modified by the actions of people in the community.

The repeated actions of individual agents in a community reproduce and reinforce the community structure; legitimising the structure in the given community and generating a standard against which perceptions of legitimacy of action is measured. This perception of legitimacy then tends to constrain the actions of individual agents. Thus structure and action constrain each other in an evolving way. This balancing of agency and structure is what is called the duality of structure because structures make actions possible, while at the same time actions create those very structures.

Communities in which a new technology is introduced will create their own perceptions about the role and utility of the technology, and how it can be applied to their activities. These varying perceptions influence the way technology is used and hence mediate its impact on outcomes and consequent diffusion. This makes the Advanced Structuration Theory a viable approach for studying the diffusion of technologies, by examining the types of structures that emerge as people interact with the technologies. This is useful because it reveals the persuasions that shape the perceptions of the key stakeholders, and how different stakeholders exercise their influence on the entire diffusion process.

3. Research design and methodologies

This chapter highlights the methods used in collecting and analysing data to generate the research findings found in the following chapter. It provides details about the research design, sampling techniques, measurement of variables and the methods of analysis.

3.1. Study Design

The research used a longitudinal study design to investigate diffusion of technologies. Using panel data from Uganda Revenue Authority (URA) regarding the importation of MTT and MET equipment between 2001 and 2010, we were able to estimate the diffusion of these technologies in Uganda since almost all of the technology hardware is imported. A cross sectional research design was used to study the entrepreneurial capacity of the vending firms. This is justified by the fact that Entrepreneurial capacity in organizations is structural, and only changes slowly over a long time (Earl, 2003).

3.2. Study Area

Uganda constituted the study area of this research project. All MET and MTT vending firms in Uganda formed the study population for this study. However, most respondent firms were in Kampala and surrounding areas because of the central role Kampala plays in Uganda's trade and commerce. However, where a chosen firm had no presence in Kampala, the firm was studied at its place of operation

3.3. Study Population, Sample size and Sampling Method

Multiple units of analysis were used. The units of analysis were the MTT and MET sectors, the vending firms, and the individual respondents. However, the units of investigation were individual employees in the vending firms and he sectors. The sampling frame was constructed from a list of MET and MTT equipment importers obtained from URA. All firms that imported MET and MTT related equipment between 2001 and 2010 formed the sampling frame for the study. The sample frame for the MET vending firms had a total of 762 firms from

which 35 firms were randomly selected as respondents. Of the 883 MTT vending firms in the sampling frame 41 firms were selected for investigation. We used a simple random sampling method, where names of companies were typed on a strip of paper, folded and put in a paper box after mixing up the rolled paper balls one paper ball was randomly picked and the name of the firm on that paper was taken as a respondent for the study. The paper balls were reshuffled again before the next paper ball was chosen. This was repeated over and over, until the required number of firms was chosen. The same procedure was used to choose the MTT vending firms.

The study attempted choosing five respondents from each of the selected firms using the simple random sampling method. However, most firms were not willing to provide the full lists of their employees that could have constituted the sampling frame for the simple random sampling method. We therefore opted to select the five respondents from each selected firm using the snowballing method. In this method, we chose the first eligible respondent from the organised, and this employee led and recommended us to the next respondent, and this continued until we had interviewed all the 5 employees required in an organization.

3.4. Data Collection & Management

Data were collected through a combination of surveys of employees, interviews with key informants and secondary data from URA, MEMD, MICT and the respondent firms. The entrepreneurial capacity variable was measured directly using a 7 point Likert scale questionnaire developed from constructs in the literature, in combination with the comprehensive evaluation model of entrepreneurial capacity of entrepreneurial team developed by Rua & Hua (2006). Constructs for Vendor entrepreneurial capacity included: opportunity awareness (Hindle, 2007; Cunningham & Moroz, 2008), ability to evaluate opportunities (Wilkinson & Hindle, 2006); Yencken & Gillin, 2003), resource mobilization (Lumpkin & Dess, 1996) and opportunity exploitation (Hindle, 2007; Yencken & Gillin, 2003).

Because almost all MTT and MET equipment is imported, we used the average annual growth in sales of a firm as a proxy for measuring technology diffusion. The annual sales were approximated from the volume of the firm's imports as captured by the URA. We used government funding to determine funding intervention, number of government agencies to measure governance intervention and number of policies to estimate regulation intervention.

3.5. Data Analysis

Data collection and analysis were undertaken concurrently. The primary data collected was cleaned and coded. Using the Statistical package for Social Scientists (SPSS), correlation and other descriptive statistics were generated from the data. An important dimension of our work concerned the comparison of employees' responses from the MTT and MET sectors to questions regarding the entrepreneurial capacities of their employing firms. The major dimensions of responses related to opportunity awareness (VENAWA), opportunity evaluation (VENEVA), resource capacity for implementation (RES4IMP), and the actual implementation of the technology dissemination process (METEXPL) as outline in appendix 1.

Responses from individual respondents were sorted by firm name. The sorted cases were then aggregated with firm-name as the break variable to create a new file in which the cases were transformed from individual employee responses to average firm scores. The score for each firm level variable was computed as the average of the means of the individual cases for that firm. The results obtained from this aggregation were used to explore differences in entrepreneurial capacity between MET and MTT vendors.

The One-Way ANOVA was used to test the hypothesis that the mean responses of MET vendors were different from the mean responses of the MTT vendors. Analysis of variance is an extension of the two-sample "t-test", used to test the hypothesis that several means are equal. The technique assumes that each group is an independent random sample from a normal population, and come from populations with equal variances. This was tested using Levene's homogeneity-of-variance test.

In addition to determining that differences exist among the means, we wanted to know which means differ. Post hoc tests were used to compare means, and test for trends across categories. For each group, the mean, standard deviation, standard error of the mean, minimum and maximum, and the 95% confidence interval for the mean were determined.

New variables namely: REGULATION, SUBSIDY, AWARE, EVALUATION, RESOURCES, EXPERTISE, EXPLOIT were computed from the mean of responses to questions in the questionnaire that were constructed to measure these variables. Using bivariate correlation, we were able to measure the relationship between government intervention (represented by REGULATION and SUBSIDY) and entrepreneurial capacity (represented by AWARE, EVALUATION, RESOURCES, EXPERTISE, and EXPLOIT).

Lastly, panel data on importations of MTT and MET equipment from URA was used to estimate the diffusion of the particular technology attributed to the efforts of a given firm. The average annual growth rate in imports for a period ranging from 1999 to 2010, calculated on an Excel sheet was used to measure the diffusion rate of a firm's technology. Using the relevant HS codes, we were able to ensure that our measures were based on importation of MTT and MET equipment, and not any other products.

3.6. Study limitations

During the time of conducting this research, the following limitations were encountered:

1. Data collection was complicated by the fact that individual employees were surveyed, but the unit of analysis was the industrial sector through the technology vending firms. Employees' attitudes towards their employing firms could have biased the findings, but collecting data from five employees in any organization reduced this bias. Collecting data from other stakeholders could have eliminated the bias, but making a sample frame for the respondents makes this solution too costly for this research and was therefore ruled out.
2. Owing to the fact that some firms started business much later than 1999, and others changed business during the study period, many of the computations were not based on 10 years. However, the fact that we were computing annual averages adequately made up for this anomaly.

4. Findings and Discussions

This chapter discusses the findings of the study based on the study objectives. The results are then discussed in the following chapter. A total of 372 respondents returned the questionnaires out of the 521 expected respondents. Of these 215 respondents were from MET vending firms, while 157 were from the MTT vending firms.

4.1. Descriptive Statistics

About 2/3 of the respondents were male. This was characteristic of the disproportionate representation of women on the supply side of both the MET and MTT sectors. Most of the respondents were degree holders, with 70.9% and 55.6% in the MTT and the MET sectors having a University degree. Another 17.9% and 23% in the MTT and the MET sector were Diploma holders. Although this indicates a highly trained workforce in both sectors, there is a significant difference between the degree-holders in MTT compared to MET that can be attributed to the higher university training opportunities in ICT related courses.

Above 60% of respondents were aged between 21 and 30 years of age, with only 6.5% in MET and 1.4% in MTT aged above 40 years. This is characteristic of newly introduced technologies that are most likely to attract a younger workforce. Indeed more than 65% of the companies were less than ten years old in Uganda. Only 29.6% and 32.9% of firms in the MET and the MTT sectors respectively had an existence of more than 10 years. Furthermore, more than 85% of the respondents had worked with their respective companies for less than 5 years, with about 35% having worked for less than two years.

4.2. Government Interventions in MTT and MET Disseminations

The study established that government intervention in technology diffusion could be discerned in three major ways: governance, funding and regulation. In all these dimensions the study found that government interventions in MET were much higher than the interventions in MTT.

The first form of intervention is through the creation of government ministries and agencies to handle or oversee the technology dissemination. Since independence in 1962, the Ministry of Energy has existed as one of the major ministries with it mandate changing slightly with changes in government. Today, the Ministry of Energy and Mineral Development handles MET issues, and retains its position among the most heavily funded ministries in Uganda. On the other hand, until June 2006, when the Ministry of Information and

Communications Technology was established to spearhead development of the ICT sector policies, MTT issues were handled by a department in the Telecommunications Directorate in the then Minister of Works, Housing and Communications (MOWHC). Since then MTT issues are handled by the ICT ministry and the Uganda Communication Commission (UCC) – a government agency that was recently merged with the Uganda Broadcasting Council (UBC).

While MTT issues could not warrant a full government agency, the MET sector is governed by half a dozen government agencies. Reform arising from the 1999 Electricity Act created the following agencies to govern the MET sector: Electricity Regulatory Authority (ERA); Electricity Dispute Tribunal (EDT); Uganda Electricity Generation Company Limited (UEGCL); Uganda Electricity Transmission Company Limited (UETCL); Uganda Electricity Distribution Company Limited (UEDCL); and Rural Electrification Agency (REA). This is a clear indication that compared to the MTT sector; the MET sector is clearly over governed.

Another indicator of government intervention can be deduced from the amount of money allocated to the sector. Table 1 shows the money allocated to the two sectors. We note that the money allocated to the MICT is just about 1% of that allocated to the MEMD in all the years indicated.

Table 1. Comparison of Funds allocated to MICT and MEMD:

	Expenditure Framework (Billion Uganda Shillings)				
	2011/12	**2012/13**	**2013/14**	**2014/15**	**2015/16**
MET – Government Allocation	1,105.98	1,254.20	1,255.28	1,430.41	1,744.88
MET – Donor Assistance	213.97	228.37	346.80	135.21	47.84
TOTAL	**1,319.95**	**1,482.57**	**1,602.08**	**1,565.62**	**1,792.72**
MTT – Government Allocation	12.12	15.63	16.22	18.50	22.25
MTT – Donor Assistance	0	0	0	0	0
TOTAL	**12.12**	**15.63**	**16.22**	**18.50**	**22.25**
Comparison of MTT & MET	0.92%	1.05%	1.01%	1.18%	1.24%

Source: Budget Speech (2012/13)

Moreover, government on behalf of the MET sector has entered into many partnership agreements with development partners including: The World Bank, GIZ, AfDB, JICA, KfW, IAEA, USTDA, IDB, UNDP, UNIDO, NDF, SIDA, DANIDA, NORAD and others to provide budgetary support, technical assistance, training, acquisition of machinery and equipment, The MTT sector enjoys no such support, and apart from the little money from government, the sector is completely dependent on private sector players. Funding intervention for MET is clearly higher than funding intervention for MTT

Regulatory intervention is the third form of intervention used by government. The current telecommunications policy and regulatory environment in Uganda was initiated through the telecommunications sector policy framework of 1996, the Uganda Communications Act of 1997, and the licenses that were issued to two National Telecommunications Operators created an independent regulator, implemented a limited competition period in basic telephony services, cellular telecommunications services and satellite services and the unbundled the Uganda Posts and Telecommunications Corporation.

Although the end of the limited competition period on 24th July 2005 provided an opportunity for a review of the original policy framework, the proposed telecommunications policy compiled and submitted to the then Minister of Works, Housing and Communications (MOWHC) in 2005, has to date not been approved. Apart from Ministerial Policy Guidelines of May and August 2006, which enabled the Uganda Communications Commission (UCC) to develop a new Telecommunications Licensing Regime, no clear policy has been formulated in this sector apart from a few new jerk reactions to the fast changing ICT sector.

In comparison, Uganda enacted the Electricity Act, 1999 with the aim of bringing about an enabling environment for the transformation of the electricity sector and to provide a framework for regulation of the generation, transmission, distribution, sale, export, import of electrical energy in Uganda. Since then, several policies and laws that govern activities in the energy sector such as; The Electricity Act (1999), The Energy sub-sector policy (2002), Oil and Gas policy (2008), Atomic Energy Act (2008), Renewable Energy policy (2007),

Petroleum Supply Act (2003) and the Petroleum Supply (General) Regulations (2009) have been debated and passed. Some have been revised, while more have been drafted.

4.3. Effect of Government Intervention on Entrepreneurial Capacity

The study investigated the effect of government intervention on the entrepreneurial capacity of vending firms. Table 2 indicates the findings of a bivariate correlation analysis of government intervention in terms of funding and regulation on various dimensions of entrepreneurial capacity.

Table 2. Correlations – Effect of Government Intervention on Entrepreneurial capacity

		REGULATION	SUBSIDY	AWARE	EVALUATE	RESOURCES	EXPERTISE	EXPLOIT
REGULATION	Pearson Correlation	1	.277**	-.333**	-.056	-.067	.016	-.028
	Sig. (2-tailed)		.000	.000	.256	.172	.745	.569
SUBSIDY	Pearson Correlation	.277**	1	-.221**	-.179**	-.065	.078	-.051
	Sig. (2-tailed)	.000		.000	.000	.185	.110	.298

**. Correlation is significant at the 0.01 level (2-tailed).

It is clear from Table 2 that funding interventions were significantly but negatively correlated to both opportunity recognition (awareness) and opportunity evaluation. These negative correlations were both significant at the 0.01 level. However, funding interventions did not significantly affect a firm's capacity to mobilize resources and attract expertise, and its capacity to attract exploit opportunities.

Table 2 also illustrates the effect of regulatory intervention on entrepreneurial capacity. Opportunity awareness was also negatively correlated to regulatory intervention. The negative correlation was significant at the 0.01 level. All other dimensions of a firm's entrepreneurial capacity were not significantly affected by regulatory intervention.

Table 3. Correlations – Effect of MTT and MET Subsidy on Entrepreneurial Capacity

FIRM TYPE			SUBSIDY	AWARE	EVALUATE	RESOURCES	EXPERTISE	EXPLOIT
Mobile	SUBSIDY	Pearson Correlation	1	-.324**	-.283**	-.215**	-.194*	-.221**
		Sig. (2-tailed)		.000	.000	.007	.016	.006
Energy	SUBSIDY	Pearson Correlation	1	-.133*	-.132*	.046	.284**	.077
		Sig. (2-tailed)		.030	.032	.452	.000	.214

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3 indicates the situation when cases were split according to sector and correlations compared according to sector, all dimensions of entrepreneurial capacity were negatively and significantly correlated with funding interventions in the MTT sector. In MET, dimensions of opportunity awareness and evaluation were negatively correlated with government funding at the 0.05 level, while capacity to get the required expertise was positively correlated to government funding to at the 0.01 level of significance.

Table 4. Correlations – Effects of MTT and MET Regulation on Entrepreneurial Capacity

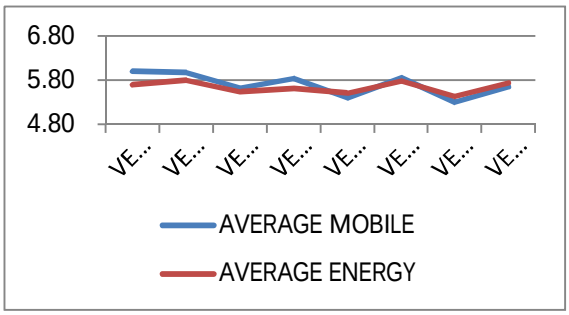
FIRM TYPE			REGULATION	AWARE	EVALUATE	RESOURCES	EXPERTISE	EXPLOIT
Mobile	REGULATION	Pearson Correlation	1	-.485**	-.143	-.046	.013	-.156
		Sig. (2-tailed)		.000	.078	.573	.878	.053
Energy	REGULATION	Pearson Correlation	1	-.232**	-.014	-.074	.021	.051
		Sig. (2-tailed)		.000	.823	.231	.728	.410

**. Correlation is significant at the 0.01 level (2-tailed).

When cases were analysed according to sector, Table 4 shows that, MTT and MET had negative correlation between regulatory intervention and opportunity awareness. Both correlations were significant to the 0.01 level.

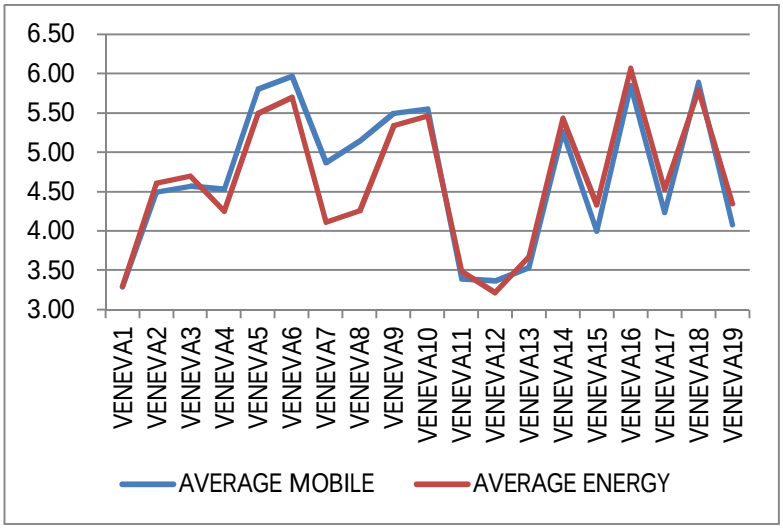
4.4. Comparison of Means

We set out to compare employees' responses from the MET industry and MTT industry to questions regarding the entrepreneurial capacities of their employing firms.



4.4.1. Opportunity Awareness

Awareness generated minimal differences between MET and MTT vendors. Only one construct relating to awareness of innovative technologies produced borderline significance although these differences were not significant. This awareness led us to the conclusion that there was no significant difference in the level of awareness of opportunities arising from new technologies within the respective business sectors. However it should be noted that MTT vending firms were marginally better in developing unconventional solutions (VENAWA1), identifying unusual opportunities (VENAWA2), accessing research on new technologies (VENAWA3), awareness of innovative technologies (VENAWA4) and finding relevance in current research (VENAWA6). On the other hand MET were marginally better at networking with other MET stakeholders (VENAWA5), engaging in seminars & workshops (VENAWA7) and awareness of Key Industry Segments (VENAWA8).



4.4.2. Opportunity Evaluation

Evaluation generated four significant differences in responses. In all this cases MTT scores are higher than those of MET. The results show that MTT vendors perceive more promising growth opportunities and better future prospects (VENEVA5) for their sector compared to MET vendors. Secondary, MTT vendors are more assured of their ability to ensure the quality of their offering to their customers (VENEVA6). Also, MTT vendors were more assured of the convenience of location of their outlets to rural customers (VENEVA7) and their rural customers' ability to use their offerings (VENEVA8). These

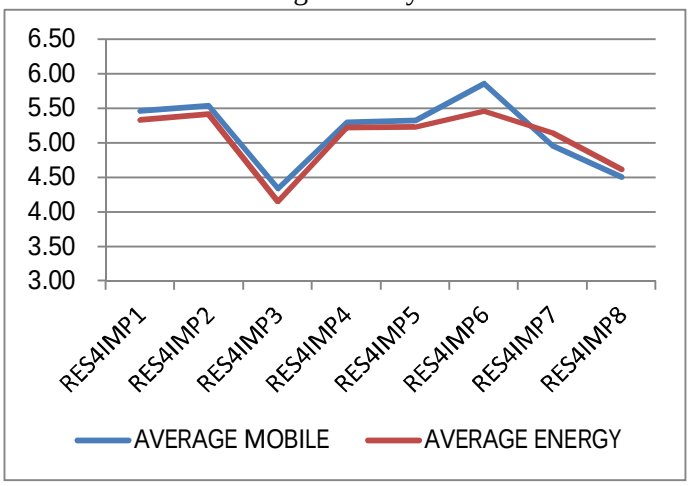
differences were proven significant using the one-way ANOVA and the robust test of significance. On the other hand MET vendors were significantly more inclined to believe in the indispensability of subsidies (VENEVA17).

However, with no proof of significant difference, MET vendors were more inclined to profess minimal market potential (VENEVA1), minimal viability without subsidies (VENEVA2), ease of availability of key inputs (VENEVA3), higher environment risk posed by their technology (VENEVA11), higher political sensitivity of their technology (VENEVA13), higher business success prospects with their technology (VENEVA14), greater ease of starting and operating rural enterprise based on their technology (VENEVA15 and VENEVA 19) and that their technology provides significant economic opportunity (VENEVA16).

Also without achieving significance, MTT vendors had more belief in the clarity of the benefits of their technologies (VENEVA4), their awareness of unmet market needs (VENEVA9), the uniqueness of their firms' offerings (VENEVA10) and the higher chances of causing social or cultural offence (VENEVA12). They also perceived themselves to possess the necessary know-how (VENEVA18).

4.4.3. Resources for Opportunity Exploitation

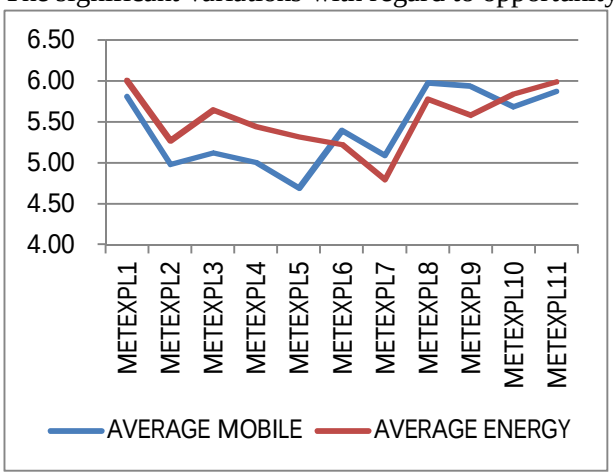
Four constructs were significantly different in the measurement of this variable, and in all cases MTT responses were significantly higher than MET. The findings were that skilled & trained labour was more readily available in the MTT sector than in the energy sector (RES4IMP1), there were more skills training opportunities available for the MTT sector compared to the MET (RES4IMP2), and there were more entrepreneurial role models in the MTT sector (RES4IMP5). The study also found that that MTT vending firms had a significantly better understanding of financial management (RES4IMP6). This construct returned a very high significance of 0.004 for the one-way ANOVA and the Welch's and the Brown-Forsythe's Robust test of equality.



Without showing significant differences, MTT vending firms were found to be constantly searching for funding (RES4IMP3) and had better skills in raising funds (RES4IMP4), while lenders' were more willing to support MET vending firms (RES4IMP7), which also had greater ease of accessing capital (RES4IMP8) compared to MTT vending firms

4.4.4. Opportunity Exploitation

The significant variations with regard to opportunity exploitation were more pronounced with MET showing higher scores with regard to Giving and Using expertise (METEXPL3), Alliances and cooperation with other firms (METEXPL4), and cooperation & Joint firm initiatives (METEXPL5), while MTT has higher scores with regard to recruiting & attracting expertise (METEXPL6), providing incentives for retaining expertise (METEXPL7), commitment to business expansion (METEXPL8), and commitment to seeking new rural customers (METEXPL9).



With opportunity exploitation, MET's higher cooperation and joint firm initiative returned a very high significance of 0.001 for the one-way ANOVA and the Welch's and the Brown-Forsythe's Robust test of equality, while MTT's better incentives for retaining

expertise was also very highly significant at 0.006. However, MET vending firms also returned marginally higher scores for use of new innovation (METEXPL1), use of skilled scientists & researchers (METEXPL2), provision of business creation support & encouragement (METEXPL10), and exploring alternative distribution plans (METEXPL11), which were not found to be significant.

4.5. Effect of entrepreneurial capacity on MET and MTT diffusion

The study also sought to establish the effect of entrepreneurial capacity on diffusion of MET and MTT technologies in Uganda. It was found that both opportunity recognition and opportunity exploitation returned positive correlation with technology diffusion at the 0.05 level of significance. Other dimensions of entrepreneurial capacity were not significantly correlated to diffusion.

Table 5. Correlations – Effect of Entrepreneurial Capacity on Diffusion

		Diffusion rate	AWARE	EVALUATE	RESOURCES	EXPERTISE	EXPLOIT
Diffusion rate	Pearson Correlation	1	.116*	.039	-.021	.054	.129*
	Sig. (2-tailed)		.023	.453	.683	.296	.012
	N	379	419	419	419	419	419

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

By classifying cases responses according to the sectors and carrying out a bivariate correlation analysis based on MET and MTT responses this study was able to establish that diffusion was positively correlated with opportunity awareness and opportunity exploitation as indicated in Table 5.

Table 1. Table 6. Correlations – Effect of Entrepreneurial Capacity on MTT and MET diffusion

FIRM TYPE			Diffusion rate	AWARE	EVALUATE	RESOURCES	EXPERTISE	EXPLOIT
Mobile	Diffusion rate	Pearson Correlation	1	.055	.049	.165*	.178*	.266**
		Sig. (2-tailed)		.496	.545	.041	.027	.001
Energy	Diffusion rate	Pearson Correlation	1	.150*	.035	-.127	-.025	.055
		Sig. (2-tailed)		.024	.604	.058	.713	.413

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6 indicates the situation when cases were split according to sector and correlations compared according to sector, diffusion of MTT was positively correlated with the firm's capacity to mobilise resources, attract expertise and the exploitation of the opportunities identified. Correlation with opportunity awareness and evaluation were not significant. Diffusion of MET on the other hand was only significantly correlated with the capacity to identify or create opportunities at the 0.05 level, and the correlation was found to be positive.

5. Discussions

The study found considerable differences in government interventions, entrepreneurial capacity, and diffusion between MTT and MET vending firms. This section discusses these differences and their implications to the wider diffusion debate.

5.1. Government Involvement

What is apparent in the findings is that government, in terms of regulation, funding and governance, is more involved in the dissemination of MET than in the dissemination of MTT. This difference in levels of intervention has a significant historical perspective. Since its introduction, electricity was considered a national priority. Subsequent governments have felt obligated to support its dissemination. Initially this was through government monopolising the generation, transmission and distribution of electricity. Government seems to have noticed the dearth of monopoly intervention when this basic model was on paper altered with the 1999 Electricity Act. However, despite of this bold move, government has failed to extract itself form MET dissemination. It is still very heavily involved in the MET sector to-date, controlling the generation, transmission and distribution through monopoly, duopoly or cartel like private sector players.

In contrast, MTT was considered a luxury at its introduction in 1995, and since this was the time when privatisation was in vogue, government did not directly invest in MTT. Its interest in the sector was limited to ensuring that the investing firms had a good invest climate, and that they could meet their tax obligations. This state of affairs has persisted to the current day. This hands-off approach by government seems to have resulted in the rapid diffusion of MTT. According to Long (2001) diffusion is an "on-going, socially-constructed, negotiated, experiential and meaning-creating process, not simply the execution of a specified plan of action. The absence of government intervention helped people with high entrepreneurial capacity to get people to adopt by laying strategies to ensure that people perceive their offerings to be important and indispensable. By persistently defining the reality of MTT using their own interpretations, these entrepreneurial firms have been able to influence buyers' perceptions and decision to adopt MTT.

5.2. Effect of Government Interventions

Government interventions were mainly manifested through increased funding, policy and regulatory framework, and the establishment of government agencies to engage or regulate a sector. This study analysed the effect of funding and regulation

Generally, subsidies are negatively correlated to both awareness and evaluation. This means that increasing funding interventions reduce firms' capacity to create or identify alternative opportunities as they strive to meet requirements for the funding opportunities available. On the other hand, the tendency to depend on hand-outs blurs the vision for sustainable development and creates a vicious cycle of subsidy dependence reflected in less optimistic evaluations of business growth in the sector. Indeed, for the MTT sector that has gotten used to self-reliance, funding interventions could negatively affect all constructs of the entrepreneurial capacity variable. However, funding intervention is positively correlated with expertise probably because the bulk of government subsidies are normally spent hiring experts and consultancies

Government intervention through regulation attempts to organise and control the commercialisation of the key technology inputs, curtailing the interactions between various stakeholders struggling to define and defend their stakes within the wider technology framework. This tends to stunt the dissemination of technologies by slowing-down the process of getting things done, increasing the number of permissions one has to seek to get ideas implemented. Political agents also develop their own preferences which are fast tracked, while other ideas are hindered, lost and rejected. Dissemination strategies have to be constantly revised by the situations encountered and the reactions of various stakeholders struggling to define and defend their own advantages. However, experts acting on behalf of government or some other superior authority are often inflexible, seeing themselves and their policies as determinants of limits beyond which action is judged illegal and punishable. This, therefore limits the capacity of various stakeholders to negotiate for their various interests.

5.3. Comparison of Entrepreneurial Capacity

There were no significant differences between MTT and MET vending firms with regard to opportunity awareness. This is because opportunity awareness occurs in the mind and involves minimal action, and is therefore not encumbered by governance issues, laws, regulations, policies and funding arising from government interventions. In situations where government interventions do not come into play, the difference in entrepreneurial capacity between MTT and MET vending firms become negligible.

Although Opportunity Evaluation is also short on action, it requires more attention to the realities of implementation compared to opportunity awareness. Evaluation therefore generated more significant differences than awareness. It generated four significant differences, and in all cases MTT scores were higher. MTT vendors perceived more promising growth opportunities and better future prospects, were more assured of their ability to ensure the quality of their offerings, were more assured of the convenience of location of their outlets to rural customers and their rural customers' ability to use their offerings.

These advantages are a result of the linkages, mainly informal linkages, which the major MTT vendors have built up with small and medium enterprises in the informal sector. Entrepreneurial capacity ensures that they build models that convince others in the distribution chain that there technologies are a viable business proposition. For example air-time cards and mobile money services are available in even the most remote areas of the country.

Because of the flexible MTT business models that allows anyone with the required working capital to join the business chain, the big MTT vending firms and their agents in Kampala do not need to traverse the rural areas in order to ensure the availability and quality of their offerings. Their formal and informal linkages with small and micro vendors in the countryside ensures that their offerings are available to the rural customer through conveniently located outlets that the vendors does not own, and with the quality controlled by the outlet owners who are more homogeneous with the rural customer.

Government interventions are based on formal agreements, which pose significant barriers to participation by small and informal players. They also attempt to organize and control the diffusion process and in the process tend to stunt the dissemination efforts. Laws, rules and policies affect the continuous interactions between target users, vendors and other stakeholders. For example the electricity distribution model is still modelled on the final customer dealing directly with one company. This model makes the distribution of electricity very expensive, and makes it harder for the vendor to ensure quality because of the limited reach. The firm fails to build the entrepreneurial capacity of more firms in the distribution channel. However, government interventions to cover its weaknesses ensure that the firm does not build internal entrepreneurial capacity, making the firm perpetually dependent on government protection. This is why MET vendors were more inclined to profess minimal market potential, minimal viability without subsidies, and higher political sensitivity of their technologies.

On the other hand, MTT vending firms had more belief in the clarity of the benefits of their technologies and were more aware of the unmet market needs. MTT vendors were also more aware of the uniqueness of their firms' offerings and perceived themselves to possess the necessary skills required to promote their technologies. MTT firms are also better equipped with skills and training opportunities. Compared to MET, opportunities for skills training in the MTT sector are significantly higher. While all public and private Universities in Uganda offered MTT related courses with enrolment estimated in thousands per year, MET related courses were only confined to two public universities and enrolment was not more than 300.

However, compared to MTT, MET firms were more inclined to give and use external expertise. Alliances and cooperation with other firms, and cooperation and Joint firm initiatives were more common in MET. MET diffusion is premised on more elaborately planned intervention models in which ideal situations are assumed. Rather than provide expertise in how the technology is used, the majority of experts concentrate on providing guidance on how to comply with the conditions required to access the government assistance. Experts are normally government agents who concentrate on controlling the program, assuming themselves to be more knowledgeable and powerful outsiders helping the more vulnerable local people. Recipients develop techniques for accessing resources by maintaining some relations with the experts, without actually buying into their

expertise. Alliances, cooperation and Joint firm initiatives are created to provide a degree of accommodation between the strategies of recipients and experts as long as the project is on-going.

For MTT vending firms with less government intervention, dissemination strategies are shaped by the interactions among the various stakeholders. They therefore have higher scores with regard to recruiting and attracting expertise rather than using and giving expertise. Their expertise is built from within based on their interactions with the technology users and other stakeholder. This expertise is deemed to be more firm-specific rather than sector wide expertise. MTT firms were compelled to provide incentives for retaining this firm-specific expertise that is harder to identify from outside of the firm. MTT firms were also more committed to business expansion and to seeking new rural customers. This was the only sure way of surviving and thriving in a competitive MTT sector. Some MET vending firms could use the same un-expanding firms to source for funds from a variety of donors, ensuring that firms thrived without expanding their businesses and attracting new customers.

5.4. Effect of entrepreneurial capacity on diffusion

Diffusion of MTT depends mainly on the capacity to exploit opportunities. Planning and strategizing are important, but the difference is mainly about how this strategies are implemented in the real world. This implementation will require resources and the necessary expertise. This is why in the case of MTT, diffusion is also correlated with the capacity to mobilise resources and to attract expertise.

This is at variance to MET diffusion, which is only correlated with opportunity awareness. This is because of the strong funding and regulatory interventions in the sector. The conceptualization of the opportunity and the ability to communicate and sell the opportunity identified to the funding and regulatory interventionists is the most important variable in the dissemination process. This is why opportunity awareness is the only entrepreneurial capacity variable correlated with diffusion.

6. Conclusions & Recommendations

6.1. Conclusions

Different stakeholders manage and interpret a new technology differently, each trying to use it for their own interests which may often differ from those of the vendor. The promotion of any particular perception depends on the situational use of other perception, and shifts in perception are not simply prompted by the provision of alternatives, but often by critical events that reveal the discrepancies between existing accepted reality and actual social circumstances (Long, 2001). Targeted users make decisions, using their own discretion and rationale based on their past experiences. Their perceptions of the technology are constructed by the vendors' message and how it is communicated, which also depend on the entrepreneurial capacity of the vending firm.

This study identified differences in entrepreneurial capacity characterised by differences in identifying (or creating) and evaluating opportunities, differences in assembling resources required for exploiting opportunities, and differences in strategies used in exploiting opportunities. These differences are affected by levels of government intervention. In situations where the vendor has government support and protection, the bargaining power of the target community is reduced, resulting in uncommitted adoption or outright rejections.

With regard to opportunity evaluation, the study concludes that more people invest in dissemination of MTTs in order to benefit from the perceived more promising growth opportunities and better future prospects in the sector, and the assurances of good quality offerings. This ensures that there is rich distribution channel that includes large, small, and micro vendors stretching to even the most rural locations of the country. This convenience of location to the customers, including the rural customer, ensures the fast diffusion of MTT.

The perceived more promising growth opportunities and better future prospects in the sector ensure that more people are seeking to gain skills relevant to the MTT sector; entrepreneurs are able to profit from providing more training opportunities in sector. The available training opportunities attract more trainees to gain expertise in the sector. Some of these are available to provide expertise to MTT vending firms, while others start MTT vending firms to increase the diffusion of these technologies. This cycle of training and new venture creation creates a critical mass of entrepreneurial role models in the MTT sector that keeps attracting more people to start new ventures in the sector.

MTT vending firms also invest in recruiting and retaining expertise while MET firms opt to use external expertise paid for by government or other external donors. Such expertise provides generic expertise that may not provide specialised competitive advantage for a specific vending firm. Such expertise assumes a "one size fit all" and ignores the personalised needs of individual users, their mental frame of mind and their specific circunstances. Retaining expertise within the firm results in greater diffusion, while generic external expertise hinders the development of alternative dissemination strategies and retards diffusion.

6.2. Recommendations

MET vendors should do more to increase their entrepreneurial capacity characterised by building dissemination models that influence the users' perceptions and decisions messages they send to their potential customers and how it is communicated to ensure that people perceived more promising growth opportunities and better future prospects in the sector so that more people invest in dissemination of METs in order to benefit from the new perceptions. MET vendors should also consider reducing their dependency on government and other external agents in their dissemination efforts. In situations where the vendor has government support and protection, the bargaining power of the target community is reduced, resulting in uncommitted adoption or outright rejections.

MET vending firms should invest in recruiting and retaining internal expertise to provide specialised competitive advantage for a specific firm instead of depending on external generic expertise paid for by government or other external donors. This will enable MET vendors to attend to personalised needs of individual users leading in greater diffusion.

The MET sector should push for more sector specific training opportunities in order to attract more trainees to gain expertise in the sector, to provide expertise to MET vending firms and start new MET vending firms to increase the diffusion of these technologies. This is expected to create a critical mass of entrepreneurial role models in the MET sector that keeps attracting more people to start new ventures in the sector.

6.3. Areas for further research

This study is the first study comparing the diffusion of MTT and MET in the Ugandan setting. While we are confident that this study has made some contribution, we are also sure that more studies need to be made to help MET players to profit from MTT business acumen. The following studies are recommended:

1. A study using technology users as respondents is required to capture their views on the diffusion of these technologies.
2. This study has been aggregated to the industrial sector with an obvious imbalance in diffusion levels. More studies needs to be done at the firm level, and widened to include more technologies in Uganda.
3. Qualitative studies are also needed to further investigate the affective and psycho-motor effects of the dissemination process.
4. A more financial biased study considering the levels of investment and financial models used by the MET industry as compared with the MTT financial model.

7. References

[1] Ajzen, I. (2002). Perceived Behavioural Control, Self-Efficacy, Locus of Control, and the theory of Planned Behaviour Journal of Applied Social Psychology 32, p. 1-20.

[2] Antonelli, C. (1998). The Micro dynamics of Technological Change. London: Routledge.

[3] Balachandra, P., Kristle Nathan, H. S., & Reddy, B. S. (2010). Commercialization of sustainable energy technologies. [doi: 10.1016/j.renene.2009.12.020]. Renewable Energy, 35(8), 1842-1851.

[4] Benkler Yochai, (2006) The Wealth of Networks: How Social Production Transforms Markets and Freedom, Yale University Press, ISBN 0300110561, 9780300110562

[5] Bwisa, H. M., & Gacuhi, A. R. (1997). Diffusion and adaptation of technology from research institutes and universities in Kenya: an empirical investigation. African Technology Policy Studies, ATPS Policy Brief.

[6] Chang, K.C., Lin, W.M., Lee, T.S., Chung, K.M., 2009. Local market of solar water heaters in Taiwan: review and perspectives. Renewable and Sustainable Energy Reviews 13, 2605–2612.

[7] Chua, S. (1999). Economic Growth, Liberalization, and the Environment: A Review of the Economic Evidence. Annual Review of Energy and the Environment, 24(1), 391-430.

[8] Cohen, I. J. (1989). Structuration Theory: Anthony Giddens and the Structuration of Social Life. London: MacMillan

[9] Cunningham, E. & Moroz P (2008) Harmonizing the concept of entrepreneurial capacity Graduate School of Entrepreneurship (AGSE) Auckland, New Zealand.

[10] DeSanctis, G., & Poole, M. S. (1994). Capturing the complexity in advanced technology use: Adaptive structuration theory. Organization Science, 5(2), 121-147.

[11] Dijkema G.P.J, Ferrão P, Herder P.M. and Heitor M (2006) Trends and opportunities framing innovation for sustainability in the learning society Technological Forecasting and Social Change; 73: 3, 215-227

[12] Dinica V., (2006) Support systems for the diffusion of renewable energy technologies – An investor's perspective. Energy Policy 2006; (34):461–80.

[13] Dosi, G., & Teece, D. (1998). eds. Technology, Innovation and Competitiveness: Oxford: Oxford University Press.

[14] Earl, P. E. (2003). The Entrepreneur as a Constructor of Connections. In Roger Koppl, Peter Kurrild-Klitgaard and Jack Birner (Ed.), Austrian Economics and Entrepreneurial Studies: Advances in Austrian Economics (pp. 113-130) Amsterdam; London: JAI/Elsevier.

[15] Electricity Regulation Authority. (2006). Tariff Determination in the Uganda Electricity Sector. Unpublished.

[16] Faiers, A., & Neame, C. (2006). Consumer attitudes towards domestic solar power systems. [doi: 10.1016/j.enpol.2005.01.001]. Energy Policy, 34(14), 1797-1806.

[17] Foxon J.J, Gross R, Chase A, Howes J, Arnall A and Anderson D (2005) UK innovation systems for new and renewable energy technologies: drivers, barriers and systems failures Energy Policy; 33:16, 2123-2137

[18] Giddens Anthony. (1984) The Constitution of Society. Berkeley: University of California Press.

[19] Guilhon, B. (2001). Technology and Markets for knowledge. Knowledge Creation, diffusion and exchange within growing economy. Boston: Kluwer Academic Publishers.

[20] Hindle, K. (2002). How entrepreneurial capacity transforms 'small-i' into 'Big-I' innovation: implications for national policy. Telecommunications Journal of Australia 52 (3).

[21] Hindle, K. (2007) Formalizing the concept of entrepreneurial capacity. ICSB World Conference, Turku.

[22] Jacobsson S, Lauber V. (2006) The politics and policy of energy system transformation—explaining the German diffusion of renewable energy technology. Energy Policy; 34(3):256–76.

[23] Kalba, K. (2008). The Adoption of Mobile Phones in Emerging Markets: Global Diffusion and the Rural Challenge. International Journal of Communication, 2 (2008), 631-666.

[24] Kanter, R. M. (2000). A culture of innovation. Executive Excellence, 17(8), 10-11.

[25] Karekezi, S., & Raja, T. (1997). Renewable Energy Technologies in Africa AFREPREN, Zed Books.

[26] Kassiri, O. K. (2003). Options for Sustainable Energy Generation in the Developing World: Financing Mechanisms [Electronic Version]. Technologies and Policies, Publication No. LFEE from http://lfee.mit.edu/publications/

[27] Kobos, P. H., Erickson, J. D., & Drennen, T. E. (2006). Technological learning and renewable energy costs: implications for US renewable energy policy. [doi: 10.1016/j.enpol.2004.12.008]. Energy Policy, 34(13), 1645-1658.

[28] Krueger, N. (2000). The cognitive structure of opportunity emergence. Entrepreneurship: Theory and Practice 24.

[29] Kumbaroğlu G, Madlener R and Demirel M (2008) A real options evaluation model for the diffusion prospects of new renewable power generation technologies Energy Economics; 30: 4, 1882-1908

[30] Li J. (2008). Towards a low-carbon future in China's building sector—a review of energy and climate models forecast. Energy Policy; 36(5): 1736–47.

[31] Long N (2001) Development Sociology: an actor perspective. Routledge, New York

[32] Lumpkin, G.T. & Dess, G.G. (1996). Clarifying the Entrepreneurial Orientation Construct and linking it to Performance. Academy of Management Review, 21(1), 135-172.

[33] Magretta, J. (2002). Why Business Models Matter. Harvard Business Review, 80(5), 86-92.

[34] Martinot E, Cabraal A, Mathur S. World Bank/GEF solar home systems projects: experiences and lessons learned 1993–2000. Renewable & Sustainable Energy Reviews 1993;5:39–57.

[35] McMillan, J., & Woodruff, C. (2002). The Central Role of Entrepreneurs in Transition Economies. Journal of Economic Perspectives, 16, 153-170.

[36] MEMD (2008). Ministry of energy and Mineral development - Annual report 2008, The Government of The Republic of Uganda.

[37] MEMD. (2007). The renewable Energy Policy.

[38] MOFPED (2012). Budget Speech, 2012/13.Ministry of Finance Planning and Economic Development

[39] Monroy C. R, San Segundo Herna´ndez A. (2005) Developing sustainable electricity supplies in rural areas of developing countries. Electr J;18(5):68–73

[40] Orlikowski, W. J. (1992). The duality of technology: Rethinking the concept of technology in organizations. Organization science, 398-427

[41] Otani, K. (1996). A human capital approach to entrepreneurial capacity. Economica. 63(250): 273.

[42] Parker, J., (2000) Structuration. Open University Press, Buckingham.

[43] Radulovic, V. (2005). Are new institutional economics enough? Promoting photovoltaics in India's agricultural sector. [doi: 10.1016/j.enpol.2004.03.004]. Energy Policy, 33(14), 1883-1899.

[44] Rogers, E. (2003). Diffusion of Innovations (Fifth ed.). New York: The Free Press.

[45] Sagasti, F. R. (2004). Knowledge and innovation for development: The Sisyphus challenge of the 21st century: Edward Elgar Publishing.

[46] Saghir, J. (2005). Energy and poverty: myths, links, and policy issues. Energy Working Notes, 4.

[47] Schilling, M. A., & Esmundo, M. (2009). Technology S-curves in renewable energy alternatives: Analysis and implications for industry and government. [doi: 10.1016/j.enpol.2009.01.004]. Energy Policy, 37(5), 1767-1781.

[48] Shane, S., Venkataraman, S., & MacMillan, I. (1995). Cultural differences in innovation championing strategies. Journal of Management, 21(5), 931.

[49] Shum K. L. and Watanabe C (2007) Photovoltaic deployment strategy in Japan and the USA—an institutional appraisal Energy Policy; 35: 2, 1186-1195

[50] Srinivasan S. (2005) Renewable and Sustainable Energy Reviews 9: 215–227

[51] Ssewanyana, J. K. (2009). ICT Usage in Microfinance Institutions in Uganda. The African Journal of Information Systems, 1(3), 5.

[52] Stones, R.,(2005) Structuration Theory. Palgrave, London.

[53] Taylor M. (2008) Beyond technology-push and demand-pull: Lessons from California's solar policy Energy Economics; 30: 6, 2829-2854

[54] Tentena, P. (2011, June 20-26, 2011). Mobile Phone Subscribers hit 14 Million in Uganda. East African Business Week, p. 28.

[55] Theodorou S, Florides G and Tassou S. (2010) The use of multiple criteria decision making methodologies for the promotion of RES through funding schemes in Cyprus, A review Energy Policy; 38: 7783-7792

[56] Thornton, P. H. (1999). The sociology of entrepreneurship. Annual Review of Sociology, 25(1), 19-46.

[57] Thurik, A. R. (1999). Entrepreneurship, industrial transformation and growth. The Sources of Entrepreneurial Activity, 11, 29-65.

[58] Velayudhan S. K. (2003) Dissemination of solar photovoltaics: a study on the government programme to promote solar lantern in India Energy Policy; 31: 14, 1509-1518

[59] Vergragt P. J. and Brown H. S. (2007) Sustainable mobility: from technological innovation to societal learning Journal of Cleaner Production; 15: 1104-1115

[60] Wangwe, S. M. (1995). Exporting Africa: technology, trade, and industrialization in Sub-Saharan Africa: Burns & Oates.

[61] Warren, D. M.,Slikkerveer, L. J, Brokensha, D. (1995) The cultural dimension of development: indigenous knowledge systems. ISBN 1-85339-251-0

[62] Wilkinson, A., & Hindle, K. (2006, 08-10 February 2006). Defining, Measuring and Assessing Entrepreneurial Capacity: A review of Selected Literature. Paper presented at the 3rd International Australian Graduate School of Entrepreneurship (AGSE) Auckland, New Zealand.

[63] World Bank. (2004). Local Pathways to Global Development. Retrieved. from.

[64] Yencken, J., & Gillin, M. (2003). Entrepreneurial Capacity and Resource Based Theory: Prior Knowledge, Skills and Motivation in the Opportunity Discovery Process.

APPENDIX 1: Research Questionnaire Form

This questionnaire is part of the research project entitled, "Entrepreneurial Capacity & Diffusion of Technologies in Uganda: A comparison of Modern Energy and Mobile Telephony Technologies" which is being conducted by George Batte with assistance from the Faculty of Entrepreneurship and Business Administration (FEBA) at Makerere University Business School (MUBS). The purpose of the research is to examine levels of entrepreneurial capacity in process of disseminating modern energy technologies.

Your participation involves the completion of a questionnaire which takes approximately 10-15 minutes to complete. The questionnaire is confidential and is not linked to your personal identity, and George Batte will keep the completed questionnaires in strict confidentiality. Your participation is voluntary and you can choose to terminate it at any time without penalty.

You may contact George Batte for any questions regarding the research project by calling 0752-953397 or e-mailing gbattesesanga@gmail.com. You may also contact the Faculty of Entrepreneurship and Business Administration (FEBA) at Makerere University Business School (MUBS) regarding the questions related to your participation in this research project.

In this section, please check the category that is most appropriate.

Gender _____Male _____Female

Age Group _____Below 18 years _____18 to 21 years
_____21 to 30 years old _____31 to 40 years old
_____41 to 50 years old _____51 to 60 years old
_____Above 60 years old

Level of education _____Below Primary Seven _____Completed P. 7
_____Completed Senior 4 _____Completed Senior Six
_____Diploma holder _____Degree holder
_____Other – Please Specify_____

How many years has the energy business existed?
_____Under 6 months _____6 to 24 months
_____2 to 5 years _____5 to 10 years
_____Above 10 years

Years worked in the firm
_____Under 6 months _____6 to 24 months
_____2 to 5 years _____5 to 10 years
_____Above 10 years

Your Job Title _____

In the following section, please indicate how strongly you agree or disagree with each statement by circling a number 1, 2, 3, 4, 5, 6, or 7 on the right side of the statement. 1= Completely disagree; 2 = Strongly Disagree; 3 = Somehow disagree; 4 = Undecided; 5 = Somehow agree; 6 = Strongly Agree; and 7 = Completely agree.

VENDOR ENTREPRENEURIAL CAPACITY **Answer these questions in relation to the company that you work for:**		
	Awareness of MET Business opportunities	
VENAWA1	Our employees think creatively to develop unconventional MET solutions	1 2 3 4 5 6 7
VENAWA2	We're able to identify new, unusual or changing MET business opportunities	1 2 3 4 5 6 7
VENAWA3	We have access to research on new MET & business development	1 2 3 4 5 6 7
VENAWA4	We are aware of innovative technologies to further our MET business	1 2 3 4 5 6 7
VENAWA5	We have adequate opportunity to network with other energy stakeholders	1 2 3 4 5 6 7

VENAWA6	Current MET Research is relevant to our business needs and interests	1 2 3 4 5 6 7
VENAWA7	We engage in Conferences & Workshops on MET and its applications	1 2 3 4 5 6 7
VENAWA8	We are aware of the key industry segments of the energy industry	1 2 3 4 5 6 7
	Evaluation of MET business opportunity	
VENAVA1	MET based business has minimal market potential	1 2 3 4 5 6 7
VENAVA2	If not subsidized, costs of running a MET business out way the costs	1 2 3 4 5 6 7
VENAVA3	Key inputs to a MET business are available and easily sourced.	1 2 3 4 5 6 7
VENAVA4	Benefits of MET products are obvious to rural users and customers	1 2 3 4 5 6 7
VENAVA5	The growth rate and future outlook of the energy industry is excellent.	1 2 3 4 5 6 7
VENAVA6	We are able to ensure the quality of our MET product/service	1 2 3 4 5 6 7
VENAVA7	We are conveniently located in relation to our rural customers	1 2 3 4 5 6 7
VENAVA8	Our rural customers can easily buy and use our MET products & services	1 2 3 4 5 6 7
VENAVA9	We are aware of the unmet needs of our target MET market	1 2 3 4 5 6 7
VENAVA10	Our products or services are unique compared to competition	1 2 3 4 5 6 7
VENAVA11	MET based businesses pose serious environmental risks	1 2 3 4 5 6 7
VENAVA12	MET businesses cause social or cultural offence to some members	1 2 3 4 5 6 7
VENAVA13	MET businesses are politically sensitive	1 2 3 4 5 6 7
VENAVA14	People starting a MET business now, have a high prospect of succeeding	1 2 3 4 5 6 7
VENAVA15	Starting & running a MET business could be easy in a rural community	1 2 3 4 5 6 7
VENAVA16	MET will provide a significant economic opportunity for our enterprise.	1 2 3 4 5 6 7
VENAVA17	Without subsidies, it is impossible to run a MET enterprise in Uganda	1 2 3 4 5 6 7
VENAVA18	We have the know-how to operate a MET business	1 2 3 4 5 6 7
VENAVA19	It is quite easy to start a rural based MET business	1 2 3 4 5 6 7
	Resources for MET business implementation	
RES4IMP1	Skilled and trained labour is available to meet all MET business needs	1 2 3 4 5 6 7
RES4IMP2	Flexible & affordable skills training exist to meet MET business needs.	1 2 3 4 5 6 7
RES4IMP3	Our Business is constantly looking for sources of funding or capital	1 2 3 4 5 6 7
RES4IMP4	We are skilled in raising funds for our MET business	1 2 3 4 5 6 7
RES4IMP5	Professional role models are available in the MET business	1 2 3 4 5 6 7
RES4IMP6	MET businesses have a firm understanding of financial management	1 2 3 4 5 6 7
RES4IMP7	Lenders are willing to take chances with MET businesses	1 2 3 4 5 6 7
RES4IMP8	It is easy to get all the capital we need when we need it	1 2 3 4 5 6 7
	Exploitation of MET opportunities	
METEXPL1	We use innovative energy technology, practices, and research	1 2 3 4 5 6 7
METEXPL2	Skilled energy scientists and researchers do practical work with our firm	1 2 3 4 5 6 7
METEXPL3	We are able to give and receive support from other energy experts	1 2 3 4 5 6 7
METEXPL4	Our company forms alliances & cooperates with others in the MET business	1 2 3 4 5 6 7
METEXPL5	Cooperative and joint Company initiatives are encouraged and respected	1 2 3 4 5 6 7
METEXPL6	We're committed to recruiting & attracting MET expertise to the Company	1 2 3 4 5 6 7
METEXPL7	Management uses incentives to attract or retain energy expertise	1 2 3 4 5 6 7
METEXPL8	We are committed to expanding existing (& creating new) MET businesses	1 2 3 4 5 6 7
METEXPL9	We are creative and innovative in seeking new rural MET customers	1 2 3 4 5 6 7
METEXPL10	Rural MET business creation is encouraged and supported	1 2 3 4 5 6 7
METEXPL11	We have other plans to distribute our MET products to rural customers	1 2 3 4 5 6 7

APPENDIX 2: ANOVA for testing Differences in Responses

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Convinience of location to rural customers	Between Groups	49.419	1	49.419	18.050	.000
	Within Groups	993.830	363	2.738		
	Total	1043.249	364			
Rural customers' ability to use offerings	Between Groups	56.198	1	56.198	24.174	.000
	Within Groups	841.549	362	2.325		
	Total	897.747	363			
Understanding financial management	Between Groups	16.604	1	16.604	8.303	.004
	Within Groups	729.903	365	2.000		
	Total	746.507	366			
Cooperation & Joint firm initiatives	Between Groups	20.386	1	20.386	11.011	.001
	Within Groups	666.509	360	1.851		
	Total	686.895	361			
Excellent growth & future prospects	Between Groups	14.509	1	14.509	7.608	.006
	Within Groups	694.172	364	1.907		
	Total	708.680	365			
Incentives for retaining expertise	Between Groups	17.878	1	17.878	7.619	.006
	Within Groups	847.097	361	2.347		
	Total	864.975	362			
Indispensebility of subsidies	Between Groups	12.814	1	12.814	3.931	.048
	Within Groups	1186.421	364	3.259		
	Total	1199.235	365			
Availability of skilled & trained labour	Between Groups	10.508	1	10.508	5.085	.025
	Within Groups	754.255	365	2.066		
	Total	764.763	366			
Availability of skills training opportunities	Between Groups	8.014	1	8.014	4.556	.033
	Within Groups	640.327	364	1.759		
	Total	648.342	365			
Availability of role models	Between Groups	7.942	1	7.942	4.977	.026
	Within Groups	579.274	363	1.596		
	Total	587.216	364			
Giving and Using expertise	Between Groups	10.841	1	10.841	5.581	.019
	Within Groups	705.148	363	1.943		
	Total	715.989	364			
Recruiting & attracting expertise	Between Groups	7.601	1	7.601	4.236	.040
	Within Groups	653.069	364	1.794		
	Total	660.669	365			
Commitment to seeking new rural customers	Between Groups	9.120	1	9.120	4.947	.027
	Within Groups	667.320	362	1.843		
	Total	676.440	363			
Identifying unusual opportunities	Between Groups	5.047	1	5.047	4.002	.046
	Within Groups	460.299	365	1.261		
	Total	465.346	366			
Awareness of innovative technologies	Between Groups	6.705	1	6.705	4.229	.040
	Within Groups	578.680	365	1.585		
	Total	585.384	366			
Minimal viability without subsidies	Between Groups	12.945	1	12.945	4.859	.028
	Within Groups	961.721	361	2.664		
	Total	974.667	362			
Ability to ensure quality of offerings	Between Groups	10.064	1	10.064	5.957	.015
	Within Groups	614.975	364	1.689		
	Total	625.038	365			