

# **A Need Assessment of Micro Enterprises to facilitate Sustainable Energy Uptake in Wula Community of Cross River State, Nigeria, using Analytic Hierarchy Process (AHP) Analysis**

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## **Abstract**

Active engagement with relevant stakeholders at the local community level is essential for the establishment of new and sustainable energy systems and wider public services for community development in the Global South. Community needs assessment is one of the approaches taken to analyse gaps in needs profile for micro enterprises in Wula rainforest Community of Boki, Cross River State, Nigeria.

This study explores the primary needs of micro enterprises in a rain forest community of Wula with the aim of understanding and suggesting sustainable energy options that facilitate local and national interventions. The project further examines opportunities for co-creating sustainable energy solutions for micro enterprises and the community with the view to minimising their carbon footprint (reducing environmental impacts on the rain forest) and promote sustainable economic prosperity in line with SDG 11: Sustainable Cities and Communities, and SDG 13: Climate Action.

A review of literature was conducted to illuminate relative basic community needs of a typical African rain forest community and highlighted Electricity, Social Housing, Access Roads, Educational Facilities, Health/wellbeing, Security and Food/water, as basic needs. An Analytic Hierarchy Process (AHP) was implemented through structured focus groups and one-to-one interviews involving stratified micro enterprises owners and community leaders. The groups systematically prioritised selected needs through a pairwise comparison. Application of multi-criteria decision analysis (MCDA) allows for both independent but collaborative sharing of viewpoints in an objective approach by all participants.

The result suggest that *security* is the most prioritised community need as opposed to literature revelation. This confirms the security apprehension arising from rising cases of banditry,

herders/farmers clashes, piracy and kidnappings in the region. It is contended that this has caused significant impact on micro enterprises and there is anxiety in local communities. It has potentially reduced investment concerns in sustainable energy alternatives and forced reliance on fossil energy sources. Nonetheless, Education and Electricity were ranked second and third respectively followed by Health/wellbeing, Social Housing, Food and Water, whilst Access road ranked least; implying that there is still significant need for sustainable energy alternatives to support education and security.

Based on initial research aim and MCDA analysis of Wula community and the crucial impact of peace on the survival of micro, small and medium-sized enterprises (M/SMEs), there is need to expand the study to accommodate relevant government agencies and stakeholders to interrogate the impact of sustainable energy on community security with the aim of co-creating robust and sustainable solutions. An in-depth review of sustainable energy sources in the community is required to construct replicable alternative of low carbon energy systems that promote and sustain economic prosperity among micro enterprises owners and Wula community dwellers.

**Keywords:** Community needs assessment, Micro Enterprises, Small and Medium-sized Enterprises, Global South

## 1.0. Introduction

Community needs assessments are receiving increasing attention globally to respond to the local needs including households and small & micro enterprises. Active engagement with relevant stakeholders at the local community level is essential for the establishment of public service provision including sustainable energy systems for growth and community development. Micro-enterprises have a role in reshaping the economy for local economic development and they must be promoted through co-created solutions by the government and stakeholders (Mokoena, 2019). Micro-enterprise is an enterprise which employs less than 10 persons and has a turnover or annual balance sheet not exceeding €2 million (Financial Conduct Authority, 2021). Micro enterprises can help achieve the United Nations' (UN) Sustainable Development Goals (SDGs) as the absence of sustainable energy is hindering the growth of the businesses in the Global South with wider impacts on society (Udie et al, 2020). The role of micro-enterprises is important more than ever now due to Covid-19 pandemic in African context. The increasing role of these small and micro enterprises in local livelihoods and economic recovery are the key motivations for this project. Community needs assessment is one of the approaches taken to analyse gaps in needs for micro enterprises in communities generally and Wula Community of Boki rainforest area of Cross River State, Nigeria. Needs assessment activity by engaging local community leaders and stakeholders can help co-create interventions to solve the challenges being faced within the community (Ledwith, 2020).

Therefore, the aim of the project was to explore the primary needs of micro enterprises in a rain forest community of Wula, Nigeria with the view of understanding and suggesting sustainable energy options that facilitate local and national interventions. In developing countries such as Nigeria, inaccessibility and regular outages of electricity from the national grid compels micro enterprises to mainly rely on fossil-fuel energy which causes pollution and carbon emissions whilst contributing to the damage to the climate (Udie *et al.*, 2020). Therefore, this project carries out needs assessment of micro enterprises to support sustainable energy uptake to reduce carbon footprint as part of climate change mitigation strategy. With regards to the community needs, the study looks at wider sustainable development issues which are social, environmental, and economic in nature as well as reflect on the uptake of renewable and sustainable energy. Section 2 presents literature review as theoretical background on community needs assessment, the nexus between community needs and micro enterprises and sustainable energy uptake and impact on micro enterprises. Section 3 offer research

methodology and data collection applied in the study. Section 4 presents the analysis and findings arising from the data analysis whilst section 5 offers discussion and conclusion.

## 2.0. Literature Review

Examination of community needs is essential to the understanding of perceptions and the aspect of sustainable development required to accelerate growth that impact livelihoods at local levels. Most times, a participatory approach is undertaken to appreciate the needs dynamics and opportunities for co-creating solutions and interventions that cushion impact of needs absence and to ensure a common feedback strategy that connects all stakeholders (AlDossary *et al.*, 2017; Baig, Shaw-Ridley and Munoz, 2016). Example of crucial stakeholders are micro enterprises that sustain local economies through provision of basic needs and services. How this is made possible in the case of Wula rain forest community of Boki in CRS Nigeria is not clear, hence this study.

### 2.1. Community needs and assessment

Community needs assessment aim to gather information which is representative of the needs of a community prior to taking any decision or social action. It is conducted for a clear picture of the community needs and their level of satisfaction about the available facilities (Raju and Rani, 2017). Needs assessment is a key part of strategic planning process for communities. There are various components to a community needs assessment study however, typical components include education, health, infrastructure, social development, environment, and income generation ((Raju and Rani, 2017). In developing countries, a large percentage of the population live in poverty and live in rural areas where there is a lack of basic amenities such as potable water, good roads, electricity, and health facilities (Akpan *et al.*, 2013). Various studies have been conducted for conducting community needs assessment using participatory processes in different sectors across the world (for example, Berger *et al.*, 2021; Escobedo *et al.*, 2019; Mannix *et al.*, 2018 and Bundle *et al.*, 2018). Due to the current Covid-19 pandemic, this also includes addressing community needs and preparing for the broader impacts of Covid-19 in poor economies. The crisis continues to challenge the vulnerable part of populations and communities in disproportionate ways long after the infection numbers peak (Quinn and Laws, 2020). Therefore, community needs assessment involves research and systematic consultation with community stakeholders and project beneficiaries before the project is designed and implemented.

## 2.2. The nexus between community needs and micro enterprises

Micro enterprises operate in local communities provide essential services and play a key role in community development (Vargas, 2000). Micro-enterprises are the engine of community-based economy particularly in developing countries. Generally, low and moderate-income individuals take a start with microenterprises for creating their own jobs or providing extra income and they rarely engage in formal contractual agreements (Roy and Wheeler, 2006). Micro-enterprises have certain needs to operate in local community to achieve their livelihood. As far as the basic community needs of a typical African rain forest community, these include energy such as electricity, health, education, food/water, security, social housing, access to roads, and other required social services (Adams and Hulme, 2001; Sebitosi and Pillay, 2005; Harding and Higginson, 2005; Antwi and Ley, 2020). Vargas (2000) argues that micro-enterprises can foster sustainable development as they are community based. It is mainly when they are integrated considering community development that links the social, economic, and environmental domains. Micro-enterprises as key local stakeholders have potential for community development if they are empowered by the local government (Guntur and Nur, 2020). However, micro enterprises' efforts have been mainly focused on economic development but ignoring how the environmental and social values can risk success, hence require a holistic approach to addressing the global challenges (Vargas, (2000).

## 2.3. Sustainable energy uptake and impact on micro enterprises

Whilst there is need for energy supply to micro enterprises in the local communities, the corresponding impact of carbon emissions cannot be ignored. Increasing level of carbon emissions in the atmosphere and related environmental problems have forced national and local policymakers to implement policies and novel strategies aimed at cleaner sources of energy (Surroop and Raghoo, 2018). Access to clean, affordable, and reliable energy is paramount for societal prosperity and economic growth (Chu and Majumdar, 2012). Micro and small enterprises (MSEs) contribute significantly to the challenge of climate change through their energy use (Udie *et al.*, 2020). The readily available sources of energy are fossil-based despite the increasing awareness of the need to reduce carbon emissions by utilizing sustainable and renewable energy technologies (Adepoju and Akinwale, (2019). Kurata *et al.* (2018) argue that micro-enterprises are more likely to adopt sustainable energy such as solar when other energy costs are high for them. Shahidullah and Haque (2014) in their study of enterprises in rural southwestern Bangladesh found that microenterprises given guidance by developmental non-governmental organizations (NGOs) have the potential to make substantial ecological

contributions and address the issue of climate change from the bottom of the social ladder upwards.

Access to sustainable and affordable energy system is crucial in reducing poverty and enhancing local economic development. Several studies are carried out on the impact of access to sustainable electricity on small and micro-scale enterprises in the context of developing countries and investigated the role of small and micro-enterprises in fostering economic growth by understanding the importance of energy access as a basic ingredient of development (Akpan et al., 2013). There are a range of positive effects beyond simple access to energy linked with the implementation of sustainable energy projects in the area. The potential positive outcomes are the productive use of energy and sustainability project expected to create value, for example through increased local availability of goods and higher incomes, thus, having a positive impact on livelihoods in a local community (Terrapon-Pfaff et al., 2018). Akpan et al. (2013) examined the impact of rural electrification on rural micro-enterprises in Niger Delta, Nigeria and found that micro-enterprises in electrified communities are more profitable. However, despite the importance of energy for micro enterprises, a key question remains where energy stands in comparison to other community needs.

### 3.0. Research Methods

We interrogate existing literature to illuminate basic community needs of a typical African rain forest community based on expert peer reviewed journal articles of community needs on energy, health, security and other social services (Adams and Hulme, 2001; Sebitosi and Pillay, 2005; Harding and Higginson, 2005; Antwi and Ley, 2020). From scoping these and other relevant literature, crucial community needs were highlighted and includes Electricity, Social Housing, Access Roads, Education Facilities, Health/wellbeing, Security and Food/water. These needs were examined

#### 3.1. Application of Analytic Hierarchy Process

Examination of literature revealed seven (7) crucial needs common to Wula community and were pairwise compared to determine a hierarchical community need preference framework for sustainable interventions.

Accordingly, Analytic Hierarchy Process (AHP) questionnaire was administered for data collection through a multi-criteria pairwise decision-making approach (MCDA). involving structured focus groups and one-to-one interviews. MCDA is a tool to apply for complex decision-making process. It has characteristics of a useful decision support tool applicable to

solving problems that are characterized as a choice among alternatives (Cinelli et al., 2020). Individual participants comprising community leaders, MSMEs operators and youth leaders were systematically stratified and recruited into 5 focus group for the study. Focus groups in social research creates opportunity for knowledge sharing, scoping summarised diverse views as well as eliminates individual dominance of the interviewee. It also stimulates rigorous debates amongst group members yet creates opportunity for data elicitation. In this study. the focus groups comprise of women, men, and disabled members of the community to ensure coherent and rigorous debate, diversity of opinion, fairness of purpose in contributing towards prioritising the needs of MSMEs operators in the community. The study further adopts and conducted one-to-one interview with 15 MSMEs operators with the view to triangulate and adequately corroborate views that enhances quantitative analysis of AHP data.

### 3.2. Participants Stratification

Twenty (20) of about twenty-seven (27) owners of micro enterprises were carefully recruited based on identified criteria: residence, duration of operation, number of employees (where applicable), ability to communicate, and time available to the participant. MSME operators' residents outside the Wula Community were excluded from the sample as well as those whose activities couldn't afford them the time to actively participate in the study.

### 3.3. AHP Process

The analytic hierarchy process in this study involved numerical scales (1 – 9) in pairwise comparison to determine hierarchical preference of the selected community needs referred to as *alternatives*. The intermediate values (2, 4, 6, and 8) are not captured in the APH process but can ensure that fractional opinions are accounted for in the study (Goepel, 2018). It presents a logical construct, inferences, and decomposes analytical process into goal setting, synthesis of alternatives and analysis of the mean values obtained from participants viewpoints through the multiple inputs (Mi – AHP) sheet.

Table 1; Numerical Scale for Pairwise Comparison

Numerical Scale	Verbal scale
1	Equal importance ( <i>i</i> = <i>j</i> )
3	Moderate importance ( <i>i</i> is slightly important than <i>j</i> )
5	Strong importance ( <i>i</i> is strongly important than <i>j</i> )
7	Very strongly importance ( <i>i</i> very strongly important than <i>j</i> )
9	Extreme importance ( <i>i</i> is extremely important than <i>j</i> )
2,4,6,8	Intermediate values

### 3.4. Hierarchical comparison of Alternatives

Selected alternatives (need) were pairwise comparing through an AHP matrix framework. Normalised principal eigenvalues for the level of analysis are recorded as indication of deviation in participants summarised agreement level. The result from Mi-AHP software is exported and tabulated to indicate the priorities of selected needs.

### 3.5. Limitations of AHP Process in this study

In this study, evaluation of alternatives (selected needs) through the AHP pairwise comparison exclude special indicators due to the nature of assessment required. However, to deeply understand how these needs could impact on the MSMEs and the community, certain indicators would be required to efficiently evaluate, prioritised, and recommend sustainable solutions at implementation phase.

## 4.0. Result and Analysis

Results of both interviews and AHP pairwise comparison of selected community needs by 20 stratified MSMEs operators in the rural community of Wula is presented and analysed in this section. **Table 2** shows consolidated ranking outcome from Mi-AHP spreadsheets.



**Table 2; Hierarchical Presentation of Wula Community Needs**

<b>Priority (Need Ranking)</b>	<b>Alternatives</b>	<b>Normalised Eigenvector (%)</b>
<b>1</b>	Security	23.1
<b>2</b>	Education	21.5
<b>3</b>	Electricity	20.2
<b>4</b>	Health and Wellbeing	17.4
<b>5</b>	Housing	12.0
<b>6</b>	Food and Water	3.7
<b>7</b>	Access Road	2.2

#### 4.1. Security crisis and Implications for Micro Enterprises

Insecurity in Nigerian communities is classed fundamental challenge that is undermining socio-economic developments including the smooth operations of micro enterprises. It is argued that since about 1990, terrorism, religious extremism and insurgency are responsible for the growing insecurity in across the west African and Sub-Saharan Africa (Mohammed and Baba, 2018). Whilst this study was conducted in a rural Wula community in Southern part of Nigeria where security concerns were expected to be less, the AHP data suggest that security threat have become a phenomenon of concern in both Northern and Southern communities. Furthermore, recent times, security threats ranging from kidnapping, banditry, herder- terrorists, and cybercrimes have exacerbated security tensions and spread across the country – with severe fatalities in rural areas (Chukwuma, 2020; Epron, 2019; Majekodunmi *et al.*, 2016). These threats in addition to maritime piracy in the gulf of guinea (Okafor-Yarwood, 2020) and dangerous forest poaching in the rain forest area could have further aggravated security crisis. Epron (2019) argued that these threats pose significant impacts on livelihoods, danger to property, cripple local micro businesses enterprises and scare foreign investors. This could further force unemployment rate in the country and leads to more economic challenges and by extension weakened government efforts in policy making and implementation of local sustainable interventions. ([Bloomberg 2021](#)) posited that unemployment rate in Nigeria has risen to all time high of 33% second only to Namibia. This is not unconnected with the high

insecurity involving mostly the vulnerable youthful population, which could have serious impact in implementing sustainable initiatives and interventions. This could further hinder the facilitation of sustainable energy uptake and co-creating solutions that meets energy needs of micro enterprises.

#### 4.2. Educational Crises and Implications for Micro Enterprises

Second in the AHP ranking is ‘education’ which appears highly important to the micro enterprises in the community. From interaction, the community sees education as a tool for attracting sustainable and life changing opportunities. With this, significant investment in their youth’s education through affordable schemes is crucial to them. Education and community awareness is an indicator that supports sustainable energy interventions (Ledwith, 2020; Ohta, 2017; Sodikin, 2017). Unfortunately, emerging security scenarios in Nigeria is targeted at schools – especially in the rural communities such as Wula (Alimba, 2018; Abiodun *et al.*, 2020; Onuorah, Eziamaka and Ofojebe, 2020). Education is critical to any community and plays a crucial role in community development uptake, hence the heightened participant’s views as corroborated by the ranking outcome of the study.

#### 4.3. Does Electricity Matter to Micro Enterprises?

Access to electricity increases average household income and activities of entrepreneurship especially in countries where access to energy is sparse (Vernet *et al.*, 2019; Calza *et al.*, 2018). Surprisingly, electricity ranked third with an eigen value of 20.2% slightly lower than education with 21.5% in this study. Despite the argument by Vernet et al (2019) that electrification affects household income, creates opportunities for business development and perception of social positioning, security need is ranked higher than electricity by operators of micro enterprises. However, lack of access to sustainable energy has remained a perennial crises challenging micro enterprises and start-ups expansion in Africa (Blimpo, Postepska and Xu, 2020; Blimpo and Cosgrove-Davies, 2019; Riva *et al.*, 2018). A pre-observatory assessment of Wula community suggest high sustainable alternative energy potentials that if properly harnessed, could profit micro enterprises in the community. For example, the pervasiveness of solar energy in the rural area could be harnessed for business development and growth as well as being used in combating security menace in the rural and urban communities (Tanoto *et al.*, 2020; Bhattacharyya and Palit, 2016). Availability of electricity has the potential of effectively engaging the minds of young people and refocusing them on global entrepreneurship, skill development, and business development. Engagement of young people in entrepreneurial

activities reduces unemployment, curb crime, and accelerate economic growth plans (Ruddell and Ortiz, 2015; Sharkey, Torrats-Espinosa and Takyar, 2017).

A separate study conducted on sustainable energy potential in this community provided critical insight on their energy need, energy potential and present sustainable energy potentials that could be tapped to reduce reliance on fossil based energy sources such as petrol and diesel (Udie et al., 2020). The study argued that MSMES in the community consumed over 25 thousand litres of petrol and diesel emitting well over 8,089.7 KgCo<sub>2</sub>e and spending an estimated \$12,341.1 USD. Sustainable and regular alternative energy is crucial for profitability and long-term business operations for micro, small and medium-size enterprises globally and could accelerate growth and quality of life among micro enterprises in Wula.

Other needs ranked accordingly – health and wellbeing, Housing, Food and Water and Access roads but detailed analysis of these community needs is outside the scope of paper but could be useful in a different context. Nonetheless, there are authors who argued that health and wellbeing, food and water are the most significant community and micro enterprise's needs which this study has proven otherwise based on field realities ((Quinn and Laws, 2020; Cotruvo, Craun and Hearne, 2019; Ashbolt, 2015).

## 5.0. Discussion and Conclusion

This study assessed the needs of Micro Enterprises in Wula community of Boki, CRS Nigeria with the view to facilitating Sustainable Energy Uptake through focus group and one-to-one interviews. The focus groups implemented analytic hierarchy process of Multi-criteria Decision Analysis to prioritise selected community needs for intervention. The aim is to provide sufficient details for relevant stakeholders - government and the private sector; on the needs of micro enterprises in the local community; creating opportunities that accelerate bottom-up sustainable alternatives uptake.

The study found that though there is a perception of energy need from literature, the crucial needs of the community is security and education before electricity. Though it could be argued that these are related needs which acquisition of one could provide adjoining solutions on the other, multifaceted security threats in Nigeria rural communities cannot be ignored. Another question is: How would the community access possible security support and which sustainable security architecture is effective without sustainable energy? This has further compounded the needs of enterprises as they would have to contend with these homogenously (though very discouraging) except support is allocated from State or national government. Nonetheless, the

need for sustainable energy uptake can still not be ignored due to the relatedness between energy and security (Pahl-Wostl, 2019; Guta *et al.*, 2017). The need for education, energy and security in community development cannot be overestimated though security is taking the lead due to prevailing obvious crises as highlighted.

It is important to highlight the challenges and limitations of the study both for further investigation and for stakeholders responsible for sustainable projects in communities with similar demographics. The study falls short of detailed analysis of security crises as it may affect other relevant stakeholders in the community. Hence, an in-depth and multidisciplinary investigation into the security crisis in Wula and its adjacent communities could further support sustainable energy uptake planning and execution with the view to building the confidence of micro enterprises operators in the community. Stakeholders in community energy project are expected to leverage inherent sustainable energy potential to engineer green systems that could generate the required energy needed by micro enterprises to effectively operate. Some of these include access to sunlight and wind power that are achievable through government funding, community funding support, and exploration of viable partnership options (Stone, 2015; Pattberg and Widerberg, 2016). This is in line with Adepoju and Akinwale (2019) who argue that cooperation between the relevant government agencies and private enterprises supported by political will is necessary to promote the adoption of renewable energy technologies in Nigeria.

Future research can also explore the potential interventions and their design to address the needs of the Wula community for sustainable development. One of the objectives could be to assess the sustainable and renewable energy potential to meet the energy needs of the community. It is suggested that an in-depth review of sustainable energy sources in the community is required to construct replicable alternative of low carbon energy systems that promote and sustain economic prosperity particularly in the current climate of Covid-19 pandemic among micro enterprises owners and Wula community.

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