



Institutional structures and fair power supply: Consequences for underserved populations in Ilkiding'a Ward, Arusha Region, Tanzania

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ABSTRACT

A higher quality of life is largely dependent on having access to electricity, which has significant effects on social justice, economic growth, health, and education. Using institutional theory as the analytical framework, this study investigates how much institutional frameworks affect marginalized populations' access to electricity in Ilkiding'a Ward. 132 households in five subvillages within the ward were the focus of a quantitative case study design. Questionnaires were used to gather information from the sampled households, and documentary reviews were used to gain additional insights. Using SPSS version 27, the analysis integrated descriptive and inferential statistical methods. The results indicate that institutional frameworks had conflicting effects on access to electricity: while bureaucratic procedures and strict regulatory frameworks produced obstacles, resource allocation mechanisms promoted favorable results. The study comes to the conclusion that specific policy changes are necessary to increase marginalized populations' access to electricity. Subsidized financing plans, community-based cost-sharing models, improved community awareness and engagement initiatives, fair resource distribution, and regulatory framework reforms are among the suggested actions. When taken as a whole, these interventions are crucial for increasing electrification rates and promoting socioeconomic development in underserved areas.

Keywords: Equitable and Fair Power Supply, Ilkiding'a Ward, Institutional Structures, Tanzania, Underserved Populations

I. INTRODUCTION

One of the most important factors influencing socioeconomic growth and human welfare is access to electricity. It supports a variety of facets of life, such as productivity, security, healthcare, and education, and it promotes social justice and inclusive economic growth. Hospitals and schools can operate more easily with dependable and reasonably priced electricity, which also boosts industrial and agricultural output, improves household welfare, and lowers poverty by fostering business growth and job creation (World Bank Group, 2022). Ensuring equitable access to energy is therefore a significant matter of social justice and institutional governance rather than just a technical one. Sustainable Development Goal (SDG) 7 encompasses access to electricity globally and aims to "*ensure access to affordable, reliable, sustainable, and modern energy for all*" by 2030. Its achievement crosses over into other SDGs, especially those that deal with gender equality (SDG 5), poverty eradication (SDG 1), quality education (SDG 4), climate action (SDG 13), and decreased inequality (SDG 10) (United Nations, 2023). Even though electrification rates have increased globally, from 83 per cent in 2010 to 91 per cent in 2020, access is still unequal, particularly in developing nations where barriers to equitable distribution of energy services include poverty, remoteness, and weak institutional frameworks (International Energy Agency [IEA], 2022).

According to World Bank Group (2024), 970 million people, or roughly 75% of the world's population, live without electricity in Sub-Saharan Africa alone. Rural communities in nations like Malawi, Mozambique, Niger, and South Sudan continue to face energy poverty, making these nations the most affected. Both institutional and infrastructure flaws that compromise the efficacy of investments and the execution of policies are reflected in these disparities.

Tanzania is a good example of this problem. Despite being reclassified as a lower-middle-income economy, the nation still has significant rural–urban disparities and an electrification rate below 50% (World Bank, 2023). Due to factors like industrialisation, population growth, and climate adaptation strategies, the country's electricity demand is expected to increase by 13.82 per cent per year between 2022 and 2030 (IEA et al, 2023). The Tanzania Electric Supply Company (TANESCO), the Energy and Water Utilities Regulatory Authority (EWURA), and the Rural Energy Agency (REA) are important institutional actors in charge of rural electrification, regulation, and generation. In addition to strategic frameworks like the Tanzania Renewable Energy Expansion Programme (TREETP, 2016–2022) and the Desert to Power Initiative, policy tools like the National Energy Policy (2003), Rural Energy Act (2005), and Electricity Act



(2008) seek to raise access from 46% to 75% by 2030 (Tanzania Invest, 2025). However, ineffective institutions, little involvement from the private sector, inadequate funding, and lengthy bureaucratic processes impede progress. Hence, strong institutional arrangements are critical for promoting inclusiveness, social equity, and sustainable development in Tanzania's electricity sector.

1.1 Research Objectives

This study's main objective was to investigate how institutional frameworks influence the availability of electricity for underserved populations. This is grounded in institutional theory, which holds that formal and informal norms, laws, and governance structures have a big impact on how public resources are distributed and services are provided.

II. LITERATURE REVIEW

2.1 Theoretical Framework

2.1.1 Institutional Theory

Understanding how established institutional structures, norms, and policies affect the availability and accessibility of electricity for marginalised populations is primarily possible through the theoretical lens of institutional theory. Meyer and Rowan in 1977 first proposed the theory, which was later improved by DiMaggio and Powell (1983) and Scott in 2014. It asserts that formal and informal institutions that govern social and economic interactions influence organisational behaviour and results. These organisations, which are supported by normative, cognitive, and regulatory pillars, define appropriate behaviour, create stability, and give organisations and society's actions legitimacy. Institutional frameworks include the organisational, legal, and regulatory structures that govern the production, distribution, and use of energy in the context of electricity governance. Important Tanzanian organisations, including the Tanzania Electric Supply Company (TANESCO), the Energy and Water Utilities Regulatory Authority (EWURA), and the Rural Energy Agency (REA), function in accordance with the Electricity Act (2008), the Rural Energy Act (2005), and the National Energy Policy (2015) (The International Network on Gender and Sustainable Energy [Energia], 2020).

According to the United Nations (2023), these frameworks are meant to support equitable and universal access to electricity in line with Sustainable Development Goal 7. Systemic issues like bureaucratic inefficiencies, low stakeholder engagement, lax enforcement, and insufficient funding, however, frequently impede their implementation (World Bank, 2023; Jennifer et al., 2025). How these limitations affect the efficiency and equity of electricity distribution can be analytically explained using institutional theory. More specifically, it sheds light on how institutional inertia, organisational legitimacy, and adherence to established norms can all help or hurt the provision of equitable services. While adherence to regulatory standards frequently results in procedural rigidity in Tanzania's electricity sector, a lack of adaptive governance mechanisms makes it more difficult to respond to the needs of particular communities. Because it depends on the way rules, values, and governance arrangements are formulated and implemented, the theory emphasises that equitably providing electricity is not just a technical or financial problem but also an institutional one. Whether marginalised households fairly benefit from national electrification efforts is determined by the way institutional behaviour, through normative, regulatory, and cognitive pressures, shapes community participation and access outcomes in the Ilkiding'a Ward case.

2.2 Empirical Review

The theoretical claim that institutional quality and governance structures significantly influence electricity access and equity is supported by empirical research. Omole et al. (2024) highlights how institutional coherence, creative financing strategies, and engaged community involvement are key components of successful rural electrification projects in Nigeria. These factors are in line with institutional theory's focus on legitimacy and coordinated governance. Likewise, Sergi et al. (2018) and Keshavadasu (2023) emphasise how crucial stable policy environments, open regulatory processes, and predictable incentives are to promoting the sustainability and uptake of renewable energy. Sergi et al. (2018) name institutional hurdles as the main obstacles to off-grid energy growth in Kenya and Tanzania, including disjointed regulations, inadequate oversight, and bureaucratic hold-ups. Jennifer et al. (2025) go on to show how ambiguous regulations and conflicting roles among regulatory agencies limit investment and erode public confidence, leading to ongoing disparities in energy access. These results confirm that energy poverty is a direct result of institutional inefficiencies, especially in marginalised and rural areas.

Empirical research consistently shows that the quality of institutional governance and infrastructure investment are both necessary for electrification policies to be effective in Tanzania. Bishoge et al. (2020) and Matimbwa and Mng (2024) discovered that when local institutions exhibit openness, responsibility, and community involvement, rural electrification initiatives have a higher chance of success. On the other hand, inflexible bureaucratic processes, poor institutional capacity, and a lack of coordination among implementing agencies impede service delivery and lead to



disparities between urban and rural populations. It is clear from these empirical findings that the provision of equitable electricity depends on institutional effectiveness, which is demonstrated by accountability, efficiency in governance, and stakeholder inclusivity. This suggests that in the context of Ilkiding'a Ward, policy changes that improve institutional accountability, encourage community involvement, and strengthen regulatory clarity are crucial to closing the ongoing gap between the goals of national energy policy and the actual results on the ground. Therefore, the foundation for guaranteeing that access to electricity results in noticeable advancements in social justice and welfare for underserved communities is strengthened institutions.

III. METHODOLOGY

This study used a case study design and a quantitative research approach to assess how well institutional frameworks in Tanzania are able to improve the availability of electricity for underserved communities. Because it enables a thorough examination of intricate socio-institutional dynamics, makes it easier to investigate causal relationships, and offers context-specific evidence to inform policy and practice, the case study design was deemed suitable. About 7 kilometers north of Arusha city, in the Ilkiding'a Ward of the Arumeru District Council of the Arusha Region, the study was carried out. The ward was specifically chosen because of its high percentage of low-income residents and the recent landslide that uprooted households, which increased worries about power outages and infrastructure disruptions. With a population of 15,218, Ilkiding'a is an 8.1 km² area that is divided into several sub-villages. To represent differences between peri-urban areas impacted by city proximity and remote communities dependent on traditional livelihoods, five sub-villages, Mula, Ndikala, Laizer, Naresho, and Ilkiding'a, were purposefully chosen. Because of this diversity, it was possible to evaluate how socioeconomic and geographic factors affect access to electricity.

Numerous communities in Arumeru District are still disconnected despite continuous projects like the Densification Project Phase IIB and HEP IIA, which reflect enduring disparities in energy access. A sample size of 132 households was established using Yamane's formula. Simple random sampling was used to choose the respondents, with assistance from executive officers and village chairpersons. A lottery system made sure that households from a variety of socioeconomic backgrounds were included, which allowed for the capture of a range of viewpoints. A structured questionnaire intended to extract household-level experiences and opinions about the efficacy of institutions in providing electricity was used for data collection. The community's low literacy and lack of digital literacy led to the adoption of Kobo Toolbox, a popular digital survey platform in environments with limited resources. Among its features are data validation, real-time entry, offline functionality, secure storage, reduced transcription errors, enhanced data quality, and confidentiality protection. This guaranteed dependability and inclusivity, especially for underrepresented groups. Every one of the 132 surveys was filled out and incorporated into the analysis. A multiple regression model was used to analyze the data to determine how institutional frameworks affected access to electricity. While inferential statistics revealed important connections between institutional effectiveness and the results of electricity provision, descriptive statistics offered broad trends. Both general insights and statistically supported evidence regarding the institutional roles in promoting equitable energy access were provided by this analytical approach.

IV. FINDINGS & DISCUSSION

4.1.1 Demographic Characteristics of Respondents

A total of 132 respondents were included in the study, and their demographic traits were carefully examined as shown in Table 1.

Table 1
Demographic Characteristics

Characteristics	Category	Frequency (%)
Gender	Women	52.3%
	Males	47.7%
Occupation	Farmers	44.7%
	Small Business	37.9%
	Employed	11.4%
	Unemployed	6.1%
Source of income	Crop Farming	43.9%
	Small Business	38.6%
	Paid Salary	11.4%
	Remittance	5.3%
	Others	0.8%
Total		132



The findings show that the respondents were fairly evenly represented by gender, with 52.3% of them being women and 47.7% being men. The distribution of occupations also reflects the community's socioeconomic makeup. 37.9% of respondents were involved in small business operations, whereas 44.7% of respondents were farmers. Just 11.4 per cent were officially employed, while 61.1 per cent said they were unemployed. According to this distribution, household energy decisions are strongly correlated with the dynamics of the informal sector and subsistence livelihoods. Regarding income sources, 38.6% of respondents relied on small businesses, while 43.9% of respondents said that crop farming was their main source of income. 53.3 per cent of households received their income from remittances, while 11.4 per cent came from paid work. Merely 0.8 per cent reported earning money from beekeeping and dairy farming. These results show how agriculture and small-scale trade dominate household income and, consequently, how accessible and affordable contemporary energy services are.

4.1.2 Energy Use Patterns

In terms of energy use patterns, respondents reported reliance on various alternative sources beyond electricity, as shown in Table 2 below.

Table 2

Energy Use Patterns

Alternative Sources of Energy	Frequency
Charcoal and Firewood	42.4%
Gases	28%
Solar	24.2%
Others	5.3%
Total	132

As presented in Table 2, charcoal (42.4%) and firewood (28%) emerged as the most common, underscoring continued dependence on traditional biomass, particularly in rural and peri-urban settings where access to grid electricity remains limited. Gas was used by 24.2% of households, signifying a gradual shift toward cleaner energy options among middle-income groups. Solar energy accounted for 24.2%, highlighting its growing adoption as a renewable and sustainable alternative in areas with unreliable or absent grid connections. Other sources, including geothermal energy, biogas, generators, kerosene, and wind power, represented 5.3% collectively. While their usage remains minimal, these sources indicate potential for diversification of household energy portfolios, especially under supportive policies and investment. The reliance on traditional biomass versus modern energy illustrates the persistent energy transition gap facing marginalized communities in Tanzania.

4.1.3 Institutional Framework Effectiveness

Results from Table 3 show that institutional frameworks have a major impact on how marginalised communities access electricity.

Table 3

Findings on the Effectiveness of Existing Institutional Frameworks

Institutional frameworks	Mean	Std. Deviation
Limited knowledge affects electricity access.	2.70	1.054
Corruption/favoritism limits access	2.71	1.030
Bureaucracy hinders electricity access.	3.29	1.401
Awareness campaigns are effective.	3.41	1.446
Community participation is important.	3.69	0.792
Govt. addressed access challenges.	3.71	0.834
Govt. ensured affordability/fairness.	3.75	0.758
Govt. involvement impacts fairness.	3.80	0.685
Institutional reforms are needed.	3.85	0.658
Govt. efforts improved electricity services	3.92	0.737
Awareness of electricity programs	4.02	0.592
Education improves electricity access.	4.05	0.299
Knowledge prevents benefiting from services.	4.10	0.369
Education on energy-saving improves access.	4.64	0.526
Weighted mean & Standard Deviation	3.69	0.798



According to the weighted mean score of 3.69 out of 5 on a five-point Likert scale, the majority of respondents concurred that these frameworks are efficient systems for allocating and controlling electricity services. This emphasises how crucial laws, rules, and institutional players like TANESCO and EWURA are to making access easier. The weighted standard deviation of 0.798 indicates that there was moderate variation in the responses, suggesting that not all households had an equal experience with the effectiveness of the frameworks. Although most people had a favourable opinion of them, some people disagreed or remained neutral, perhaps as a result of localised difficulties in providing electricity across sub-villages, inconsistent policy implementation, or infrastructure constraints.

4.1.4 Inferential Statistics

The study employed inferential statistical techniques to examine the relationship between institutional frameworks and electricity access among marginalized populations in Tanzania. Key tests included Cronbach's alpha for assessing internal consistency, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy, Bartlett's Test of Sphericity for factor analysis suitability, and multiple linear regression to evaluate the predictive effect of institutional effectiveness. Together, these methods provided a robust analysis of institutional roles in facilitating electricity provision.

4.1.5 Internal Consistency

Internal consistency was assessed using Cronbach's alpha, a widely applied measure of reliability. This test evaluates the extent to which items within a construct consistently measure the same underlying concept. In research practice, an alpha value of 0.70 or higher is considered acceptable, indicating that the scale items exhibit satisfactory reliability for analyzing the institutional effectiveness in electricity provision.

Table 4

Reliability Statistics of Variables

Variables	N of Items	Cronbach's Alpha
Institutional Frameworks	14	0.832

A Cronbach's alpha value of 0.832 for the effectiveness of institutional frameworks variable indicates good internal consistency among the fourteen items used to measure this construct. This suggests that the items are well-correlated and reliably measure the concept of institutional frameworks.

4.1.6 Factor Analysis

Factor analysis was conducted to identify the underlying dimensions of institutional factors affecting electricity access.

Table 5

KMO and Bartlett's Test

Test	Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.578
Bartlett's Test of Sphericity	
Approx. Chi-Square	358.652
Degrees of Freedom (df)	91
Significance (Sig.)	0.000

The KMO value of 0.578 is mediocre, suggesting that the sampling adequacy for factor analysis is acceptable, but improvements could be made ($KMO > 0.6$ is generally preferred). The significant Bartlett's Test ($p < 0.001$) indicates that the correlations among variables are sufficient for factor analysis.

Table 6

Total Variance Explained (Eigenvalues)

Component	Eigenvalue	% Variance	Cumulative %
1	2.661	19.008	19.008
2	2.033	14.523	33.531
3	1.480	10.573	44.104
4	1.427	10.190	54.294
5	1.055	7.536	61.829
6	1.000	7.144	68.973
7–14	<1.0	–	100.000



Six components with eigenvalues > 1 explained ~69% of total variance, justifying extraction as indicated on the scree plot. The scree plot illustrates the distribution of eigenvalues across the extracted components. A sharp decline is observed up to the sixth component, followed by a noticeable flattening of the curve. This pattern indicates that six components possess eigenvalues greater than 1, thereby accounting for the majority of the variance in the dataset. The inflexion point, or “elbow,” occurring at the sixth component, provides statistical justification for retaining six factors for further analysis as summarized in Figure 1 scree plot below.

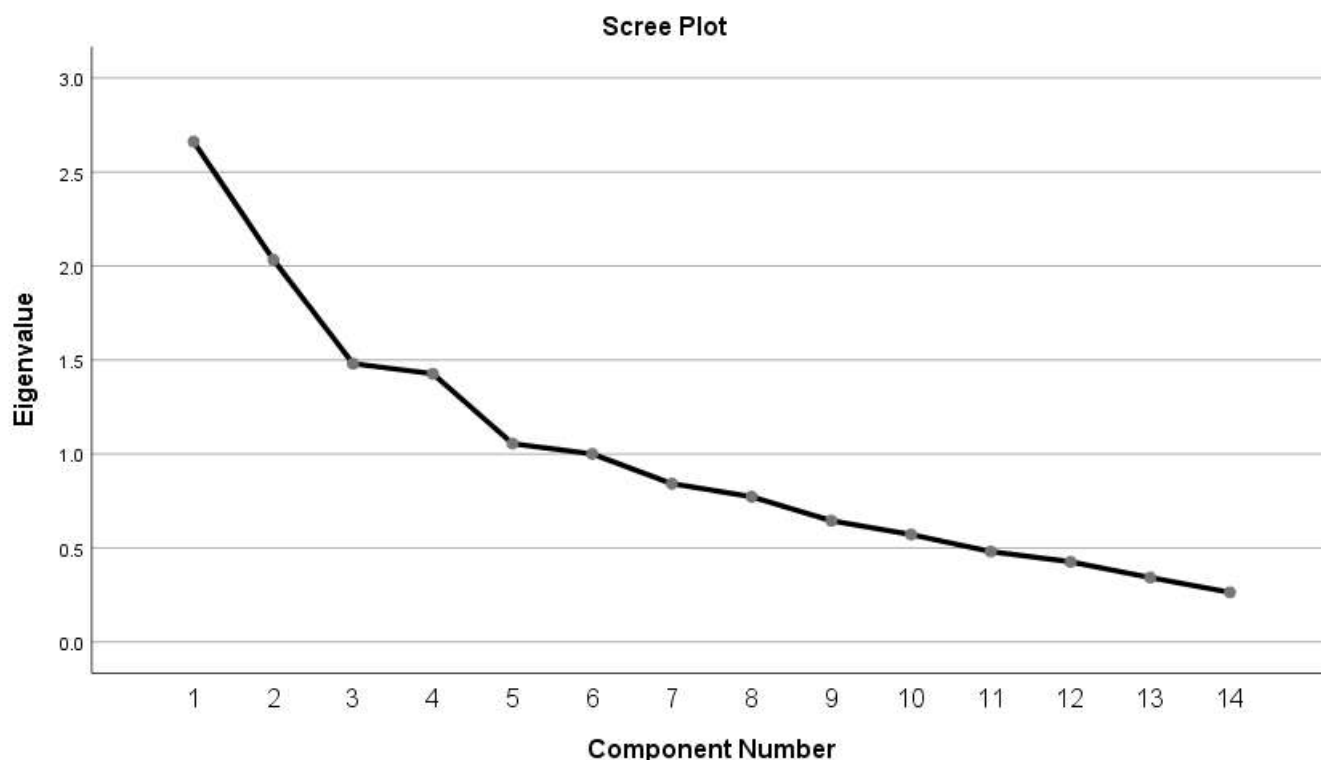


Figure 1
Scree Plot

4.1.7 Rotated Factor Analysis

The interpretation of each component or factor from the rotated component matrix describes the research findings, which revealed 6 distinct components underlying the institutional frameworks for electricity access. When the factor is greater than 0.5 is allowed to correlate with the component obtained from eigenvalues. Below is a detailed interpretation of each component supported by the highest loadings, which were leadership and transparency, policy enforcement, regulatory frameworks, Institutional support, resource allocation and bureaucratic barriers.

Table 7
Rotated Factor Analysis On Institutional Factor

Institutional Factor	1	2	3	4	5	6
The government supports improving your household's access to electricity	0.03	0.008	0.84	-0.055	0.019	0.258
The government addressed electricity access challenges	0.167	-0.074	0.878	-0.049	0.032	-0.095
Lack of transparency in distribution affects access	0.517	-0.023	0.41	-0.061	-0.315	0.202
There is poor coordination among electricity institutions	0.692	0.006	0.127	-0.024	0.143	-0.295
Your household is informed of the electricity access procedures	0.116	0.241	-0.106	0.833	-0.062	0.017
Lack of follow-up by the electricity authorities delays connection	-0.238	-0.089	-0.011	0.834	0.175	0.047
Institutions are responsive when you inquire about electricity access	0.543	0.015	0.098	-0.133	0.06	0.062
Corruption among electricity service providers affects connection	-0.33	0.234	-0.018	-0.057	0.755	-0.075
You trust electricity service institutions to serve equally.	-0.017	0.847	-0.107	0.029	0.22	0.091
There are enough technicians to meet connection demand	0.074	0.211	0.125	-0.101	0.31	0.677
You feel electricity services are fairly distributed	0.316	0.076	0.041	0.189	0.753	0.142
Your household has benefited from electricity related programs	-0.062	-0.12	0.066	0.132	-0.137	0.773
Political influence plays a role in determining access	0.728	-0.182	-0.048	0.091	-0.136	0.046
Electricity policies are effectively implemented in your area	-0.125	0.894	0.033	0.106	0.039	-0.061



4.1.8 Multiple Linear Regression

A regression model was estimated to examine the predictive power of institutional framework factors on electricity access.

Table 8
Regression ANOVA

Model	SS	df	MS	F	Sig.
Regression	3.882	6	0.647	6.527	0.000**
Residual	12.093	122	0.099	–	–
Total	15.975	128	–	–	–

The model was statistically significant, $F(6,122) = 6.527$, $p < 0.001$, confirming that institutional factors significantly predict electricity access.

Table 9
Model Coefficients

Variable	B	Beta	Sig.
(Constant)	2.093	–	0.000
Leadership & Transparency	-0.022	-0.062	0.434
Policy Enforcement	0.053	0.151	0.057
Regulatory Framework	-0.059	-0.166	0.037*
Institutional Support	0.011	0.031	0.696
Resource Allocation	0.138	0.392	0.000**
Bureaucratic Barriers	-0.066	-0.186	0.020*

Overall findings revealed three components from the institutional framework significantly predict the electricity access process that are Resource Allocation (positive influence), Regulatory Framework (negative influence), and Bureaucratic Barriers (negative influence). These findings can guide policy recommendations and institutional reforms to improve access to electricity. The regression model indicated a significant intercept ($B = 2.093$, $p < 0.001$), meaning that when all institutional factors are neutral (score = 0), the expected access score is 2.093.

4.2 Discussion

The results show that institutional frameworks affect marginalised populations' access to electricity in two ways. Access is greatly improved by efficient and transparent resource allocation, but electrification results are adversely affected by bureaucratic processes, strict regulatory frameworks, and procedural complexity. This is consistent with institutional theory, which holds that organisational behaviour and resource distribution are shaped by formal and informal rules, norms, and structures (Bishoge et al., 2020). In this situation, equitable electricity provision is limited by bureaucratic red tape and disjointed regulations, while effective governance and equitable resource distribution serve as enabling mechanisms. These findings align with those of Omole et al. (2024) and Sergi et al. (2018), who contend that the growth of energy infrastructure is slowed by institutional inefficiencies, regulatory bottlenecks, and a lack of funding and human resources. Furthermore, Keshavadasu (2023) emphasise that even small institutional changes can boost rural electrification, especially in situations where the economy and politics are unstable. Jennifer et al. (2025) also point out that the adoption of renewable energy in sub-Saharan Africa is hampered by ambiguous policies, disjointed regulations, and bureaucratic delays, while Sergi et al. (2018) show that, despite financial and technological assistance, institutional flaws like drawn-out licensing processes and insufficient stakeholder engagement still exist in Kenya and Tanzania. When taken as a whole, these results highlight how institutional frameworks actively influence the results of policy. Technological developments and falling energy prices by themselves do not guarantee equitable access, as explained by institutional theory. Gaps between electrification policies and their actual implementation will continue to exist in the absence of inclusive, flexible, and transparent institutions, especially for marginalised communities. Therefore, in Tanzania and similar contexts, attaining sustainable and inclusive energy transitions requires enhancing institutional independence, elucidating regulatory frameworks, and encouraging stakeholder participation.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

The study comes to the conclusion that institutional frameworks play a crucial role in determining Tanzanian marginalized populations' access to electricity. Important elements that greatly influence the efficiency of electricity supply include regulatory frameworks, resource allocation, and bureaucratic procedures. Policies, programs, and procedures are meant to make access easier, but when they are not applied consistently, service delivery is compromised,



and agencies' ability to address the unique needs of marginalized communities is limited. While inflexible rules, bureaucratic inefficiencies, and procedural complexity serve as obstacles, results are improved by resource allocation that is open and carefully considered. Stakeholder engagement is crucial for converting policy intentions into tangible outcomes, and the results demonstrate that institutional strength is defined by clarity and efficiency. Strong, flexible, and inclusive institutional arrangements are necessary to guarantee equitable and sustainable electricity provision, bridging the gap between policy design and successful implementation. Financial investments and technological advancements alone are insufficient.

5.2 Recommendations

According to the study, policymakers should give reforms top priority in order to fortify the institutional frameworks that regulate Tanzania's electricity supply. To guarantee that resources for electrification effectively reach marginalized populations, important steps include strengthening inter-institutional collaboration, enhancing accountability, and putting in place strong monitoring and evaluation systems. In order for local governments and utility providers to effectively carry out projects, respond to community-specific needs, and maintain infrastructure sustainably, institutional capacities should be strengthened through focused initiatives like training programs, financial management, stakeholder engagement, and systematic project monitoring. The policy implications emphasize that effective governance is just as important to equitable access to electricity as financial and technological resources. Policymakers can close the gap between the creation of policies and their actual application by instituting openness, flexible regulation, and inclusive decision-making. This will promote equitable and sustainable energy access for underserved communities.

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