Global Governance, Energy Policies and Security of Supply of Liquefied Petroleum Gas in Tanzania

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Abstract
Energy security is important for human development and welfare. Governance regimes at both global and country levels are crucial for the realization of energy security. This study highlights the role of global governance for security of supply of liquefied petroleum gas (LPG) in Tanzania. Specifically, the study examines the effect of global governance on the development of the liquefied petroleum gas sector in Tanzania and proposes strategies for improving the development of liquefied petroleum gas energy security in Tanzania. The study adopted the qualitative research design and underpinned by action research approach. Key informant interviews and Focus Group Discussions were used to collect primary qualitative data, while review of documents was done to provide secondary data and triangulate findings. A sample of 30 respondents was purposively selected among policy makers as well as other private and public sector actors. Thematic analysis was used to analyse the data. The findings establish that the low level of LPG supply security in the country is contributed to by both national energy policies and global energy governance. It was further found that global governance affects the LPG energy security in Tanzania due to the selective nature of global energy governance institutions. The study recommends that in order to improve the LPG energy security in Tanzania, clear and implementable policies as well as encouragement of public private partnership should be given priority. The study further recommends that Tanzania should strengthen essential elements such as technology, expertise and infrastructures to attract more investors in LPG.

Key words:
Energy policy, energy security, global governance, Liquified Petroleum Gas.

1. Introduction

Energy security has become a key subject related to the survival and wellbeing of the people in both developed and developing nations (Alemzero, et al, 2021). Recent natural gas discoveries in Sub-Saharan Africa are creating development opportunities. At the same time, the increased global interest in energy is forcing developing countries to choose policy strategies that either prioritize domestic consumption or export of energy resources. The strategy that a government chooses affects the overall energy security of that country. In addition, enhancing energy security for developing countries is more than securing investment to respond to global energy demand. For example, Hache (2018) has shown how renewable energies improve energy security in developing countries. The author found also that energy security is increasingly becoming a major

focus in the world today but also that, for developing countries, energy security is limited by lack of access to resources and critical infrastructure.

Countries formulate policies to ensure stable access to energy for their people. Energy policy cuts across a variety of globally important issues including environmental, geopolitical, economic, political and developmental issues (Azzuni and Breyer, 2018). Le and Nguyen (2019) pointed out that access to energy is not only crucial in supporting the provision of basic needs such as food, lighting, water, and essential health care, but it is first and foremost a precondition to economic growth, political stability and prosperity. According to Christoffersen (2016), there are five aspects of energy security including availability, accessibility, acceptability, affordability, and develop-ability.

In 1974, the International Energy Agency (IEA) was created to ensure secure and affordable energy supplies. It conducts analyses on current and future risks for oil supply disruption, emerging gas security challenges, and increasing system flexibility and resilience of the electricity sector (Azzuni and Breyer, 2018; Alemzero, et al., 2021). Other organizations have been set up with an energy policy function at global level. Gökgöz and Güvercin (2018) found that, there are institutions which set rules and standards including the World Trade Organization (WTO), Energy Charter Treaty (ECT) and United Nations Framework Convention on Climate Change (UNFCCC). They aim at establishing legislation on rule setting for market exchange or the global climate change regime (Gasser, 2020). In spite of this global arrangement, countries set up country – specific energy governance regimes with a leve of governance autonomy which, at times, may go against the global governance standards and complicate energy governance in general. For instance, Christoffersen (2016) argues that, global energy governance institutions encouraged China – which has ungoverned domestic energy spaces – to reform and strengthen its capacity for domestic energy governance. Rather than reform, China has attempted to create an alternative global energy order and established a leadership role using the Brazil, Russia, India, China and South Africa (BRICS) framework. But BRICS exists in the global ungoverned energy space and has not prioritized global energy governance.

In Tanzania, Liquefied Petroleum Gas (LPG) market demand has experienced considerable growth over the past decade, with consumption increasing from 30,000 metric tons in 2010 to approximately 150,000 metric tons in 2021. This growth can be attributed to several factors, including the country's expanding economy, urbanization, and the Tanzanian government's efforts to promote LPG as a cleaner, more sustainable energy source. In addition, Tanzania's strategic location on the Indian Ocean makes it an attractive hub for LPG imports and distribution within the East African region (Ndunguru & Lema, 2020; Bishoge, et al, 2018). The government has played a crucial role in promoting the growth of the LPG sector through various policy initiatives and regulatory measures. Key government agencies involved in the sector include the Ministry of Energy which is responsible for energy policy formulation, monitoring, and regulation. There is also the Energy and Water Utilities Regulatory Authority (EWURA) which is the primary regulatory body overseeing LPG operations, including licensing, pricing, and safety standards (Chuwa& Perfect-Mrema, 2023). Tanzania like many other developing countries has been facing some challenges in the LPG sector. For instance, Ndunguru & Lema, (2020) mentioned quantity of sell, household income,

household size, and the level of awareness as key challenges facing LPG sector in the country. On the other hand, Bishoge, et al, (2018) pointed out that availability of fuel, canister size, financing of first costs and refilling costs and transportation are constraints to the LPG sector in Tanzania.

Global energy governance as constructed by the developed countries has been criticized as inadequate to meet numerous challenges (Kober, et al, 2020; Tanzania Renewable Energy Policy Handbook, 2022 Update; Tanzania Energy Congress, 2022). Yet, the effects of global governance on energy security and in particular LPG security in developing countries has not been systematically analysed. Some related studies include Rocco, et al, (2021) who examined enhancing energy models with geo-spatial data for the analysis of future electrification pathways, and Simpson, et al, (2021) who investigated the adoption rationales and effects of off-grid renewable energy access for African youth. To fill this gap, the study examined the effect of global governance in LPG Energy Security in Tanzania.

2. Background of Energy Security Governance

Energy security as an area of study emerged following the 1970s' oil predicaments. Global energy governance then emerged as a new crosscutting policy agenda, which seeks solutions to energy poverty, and also addresses issues of energy justice, energy and economic development, nuclear proliferation, resource management, and climate change (Gasser, 2020). Wang and Zhou (2017) reveal that energy security enhances economic growth for both developed and developing countries. On the other hand, energy insecurity – measured by energy intensity and carbon intensity – has a negative impact on economic growth (Khattak, Lee, Bapujee, Tan, Othman, AbdRasid, & Kazi, 2018). This means that at the global level, energy for economic development, energy security, and climate change mitigation should be approached as integrated themes since there are linkages among these three agendas.

According to UNIDO (2020) the global energy governors are intergovernmental organizations such as United Nations Development Programme (UNDP) and International Energy Agency (IEA) as well as international nongovernmental organizations such the World Resources Institute, multilateral financial institutions such as the World Bank, and regional organizations such as Asia-Pacific Economic Cooperation (APEC). These organizations have specialized in the issues of energy and they have conducted relevant activities and are involved in current efforts. Nevertheless, global energy security is put at risk by the uneasy relationship between the international political system and the international energy system. The political framework of the International Energy Agency (IEA) was created to manage energy security in the developed world and the relations with producing countries of the Organization of the Petroleum Exporting Countries (OPEC) (Christoffersen (2016).

3. LPG Governance

Evidence shows that countries have forged their own policy regimes to govern the development and security of LPG supply. In Malaysia, Oh, et al (2018) reported that, since the Malaysian government started to emphasize on the use of Liquefied Petroleum Gas (LPG), energy security has been assured for more that 60 percent. This was necessary as part of its energy reform to implement a more common energy regulatory

framework involving all relevant agencies to safeguard a secured and sustainable energy future. Moreover, Shackleton, Sinasson, Adeyemi and Martins (2022) reported that developed by the Department of Mineral Resources and Energy (DMRE), South Africa's Liquefied Petroleum Gas Rollout Strategy has been approved by Cabinet with the objective of advancing the domestic industry and expand the application of LPG in diversifying the energy mix. This has ensured energy security in general and energy affordability in particular.

Current LPG consumption in West Africa is estimated to be about 360,000 tons per year. Utilization of LPG as household fuel has been expanding in several countries in West Africa since the early 1990s, but average per capita consumption in the region remains low by international standards (Doggart, Ruhinduka, Meshack,Ishengoma,Morgan-Brown, Abdallah & Sallu 2020). The most common household fuels in West Africa are wood and charcoal (Alemzero, et al, 2021). In Sub-Saharan Africa one finds the highest deficit in clean energy access proportional to population: only 12 percent of Africans had access to clean cooking fuels and technologies in 2014. The increase since 2012 in the number of people living without LPG access is also mainly driven by Africa's population growth rates, where each year the population expands by 25 million, while access to clean cooking increases by only 4 million (World Bank, 2017). According to Ofosu-Peasah, Antwi & Blyth (2021) LPG has influenced energy security in West Africa characterized by investment, governance, sustainability, reliability, affordability, regional energy pools, energy demand-side management and oil and gas availability and security. The study concludes that energy security in both the Global North and West Africa has been influenced by investing in LPG (Cader, Pelz, Radu, & Blechinger (2018).

These country – specific energy security policies are, nevertheless, implemented in the face of a complex global governance that may, at times, limit the success of these policies. For example, Brazil implemented its first energy efficiency policies more than four decades ago after the oil price shocks of the 1970s. However, the strategies have had only a limited impact and the country continues to lag behind others at both global level and the Latin American region. To ensure energy security, Brazil has been prioritizing Liquefied Petroleum Gas (LPG) sector as reported by Carvalho, et al (2020).

A report by National Energy Policy - NEP (2015) showed that Tanzania has abundant energy resources which include natural gas, coal, uranium, hydro, biomass, solar, wind, geothermal, tidal and waves. In 2010, the energy consumption composed of residential (72.5 percent); industry (14.4 percent); transport (5.8 percent); agriculture (4.2 percent) and others (3.1 percent). Coal reserve is estimated at 1.9 billion tonnes of which 25 percent is proven. Only 12 percent of the hydro potential of about 4.7 GW has been utilized (Gill-Wiehl, Sievers, & Kammen, 2022). The average solar insolation is about 200 Wp/m^2 and several sites with wind speed ranging from 5 to 9 m/s have been observed. Tanzania has confirmed uranium deposits of about 200 million pounds.

The national energy balance indicates dominance of biomass use in the form of charcoal and firewood and its contribution to the total national energy consumption is about 85 percent. Petroleum products contribute about 9.3 percent of the total energy consumed while electricity accounts for 4.5 percent and 1.2 percent from coal and renewable energies. Charcoal consumption mainly in urban areas has nearly doubled over the past

ten years due to urbanisation, high prices or scarcity of other alternatives particularly kerosene, electricity and LPG. It is projected that demand for charcoal, without supply and demand side interventions will double by 2030, from approximately 2.3 million tonnes of charcoal in 2012.

Tanzania relies on several energy resources for its power generation. About 45% of the country's electricity comes from hydro (Kichonge, 2018). However, poor rains in the past few years led to water shortages that affected the turbines generating electricity. Bishoge, Zhang, Mushi, Suntu, and Mihuba (2018) argue that Tanzania has embarked on a deliberated measure to forge an energy mix which will ensure reliable availability of power for the economy. This deliberate measure involves promotion of increased use of renewable energy technologies (solar, wind, biomass, wastes, micro hydro), natural gas and other locally available energy sources including coal and geothermal. As of the year 2021 Tanzania's total electricity supply was 1,605.86 MW (Michael, Tjahjana & Prabowo, 2021). The Government has been promoting substitution of charcoal and firewood by providing tax relief to stimulate the use of LPG in the country. Over the past ten years, LPG supply for household cooking has increased significantly. The total volume of LPG imported in the financial year 2010/11 was 24,470 MT compared to 69,148 MT in the financial year 2014/15. The trend shows that the LPG market is growing rapidly especially in urban centres (NEP, 2015).

However, poor rains in the past few years led to water shortages that affected the turbines generating electricity. As such, Tanzania embarked on a deliberated measure to forge an energy mix which will ensure reliable availability of power for the economy. This deliberate measure involves promotion of increased use of renewable energy technologies (solar, wind, biomass, wastes, micro hydro), natural gas and other locally available energy sources including coal and geothermal. As of the year May 2023 Tanzania's total electricity supply was 1,872.05 MW.

The government of Tanzania has been taking various initiatives to ensure sustainability of the energy supply – especially LPG. The initiatives taken by the Government of Tanzania include the formulation of the National Energy Policy (2003) and the National Natural Gas Policy (2013). The Policies provide a framework aimed at promoting LPG as a clean and efficient energy source for cooking, heating, reducing deforestation, and improving public health by minimizing indoor air pollution. On top of that, the policies provide a framework on the removal of Value-Added Tax (VAT) and import duties on LPG as well as to make LPG more affordable for consumers to encourage its adoption (Chuwa & Perfect-Mrema, 2023). It is imperative, therefore, to ascertain the extent to which the policies are succeeding to mitigate various limitations facing the supply of LPG in the country and particularly how global governance affects the implementation of the policies and other strategies (Stilo, 2018).

4. LPG Governance

Developed by Kindleberger (1984), Hegemonic Stability Theory (HST) indicates that the international system is more likely to remain stable when a single state is the dominant world power, or hegemon. The key mechanisms in hegemonic stability theory revolve around public goods such as energy provision, i.e., to resolve collective action problems regarding public goods, a powerful actor who is willing and able to shoulder a

disproportionate share of public goods provision is needed (Gavris, 2022). Hegemonic stability theory entails self-reinforcing cooperation, as it is in the interest of the hegemon to provide public goods and it is in the interest of other states to maintain an international order from which they derive public goods (Hornat, 2021). The theory assumes that, developed countries wish to dominate the provision of public goods such as energy so that weak countries remain dependent on the powerful. In this case, global governance favours the powerful countries in the world, leaving behind the weak ones (Van de Graaf, Colgan, 2016). The situation has led to some countries finding various initiatives to ensure energy security especially LPG (Gavris, 2022; Noor, 2022). In the context of this study, the theory is useful as it shows how the super power countries affect energy accessibility, sustainability and affordability in the developing countries (Speight, 2019).

The issues of global governance and energy security in developing countries are related. According to Koenig-Archibugi (2019) global governance encompasses activities that transcend national boundaries at the international, transnational, and regional levels and is based on rights and rules that are enforced through a combination of economic and moral incentives. Barnett (2021) added that global governance brings together diverse actors to coordinate collective action at the global level. The goal of global governance is to provide global public goods, particularly peace and security, justice and mediation systems for conflict resolution, functioning markets and unified standards for trade and industry. The International Energy Agency (2020) presents energy security as having stable access to energy sources on a timely, sustainable and affordable basis. Enhancing energy security requires a strong energy sector based on a sound energy strategy and effective energy policies because energy security affects the political, economic, and social aspects of every country. According to Sovacool (2021), energy security is a multifaceted concept that involves ensuring the availability, affordability, reliability, and sustainability of energy sources, as well as protecting energy systems against physical, economic, and geopolitical threats. The Sovacool explains that energy security as the condition in which a nation, organization, or individual can remain to depend on a sufficient, affordable, and reliable energy supply while minimizing vulnerability to unexpected or harmful disruptions.

On the other hand, Fang, Shi and Yu (2018) have attempted to widen the scope of energy security to focus on the entire energy system, from primary energy resource acquisition to final energy consumption, and have proposed that energy security is not just about ensuring reliable supply of fuel, but also ensuring that there is reliable infrastructure in place to carry energy to the end user. ,Azzuni and Breyer (2018) also advocated for the consideration of geopolitical factors in energy security. They argued that energy security is not solely an economic or environmental issue, but also a geo - political issue with wide ranging implications for international relations, security, and power dynamics. This study is underpinned by the contention by Barnett (2021) that global governance brings together diverse actors of LPG to coordinate collective action to promote energy security in the world – in this case, in Tanzania.

5. Methodology

A qualitative action research study was conducted and data was collected through key informant interviews, and focus group discussions. Additional data was collected through documentary review. Action research creates opportunities for organizational learning

(Ivankova and Wingo (2018). A sample of 10 key informants was purposively selected to respond to semi-structured interviews. These were from institutions and public offices which play direct roles of overseeing and regulating energy in the country, including President Office of Regional and Local Government Administarion (PO - RLGA), Ministry of Finance (MoF) and Ministry of Energy were interviewed because they are responsible in formulating policies related to energy in the country. Two Focused Group were conducted, each included 10 participants. Focused group discussions involved the officers from The Rural Energy Agency (REA), The Energy and Water Utilities Regulatory Authority (EWURA), Tanzania Petroleum Development Corporation (TPDC), Petroleum Bulk Procurement Agency (PBPA) and Petroleum Upstream Regulatory Authority (PURA). The qualitative data collected were analysed through thematic analysis technique. The information collected from various reports and policies about energy their content were analysed to validate information from the participants of interview and focus group discussion (Creswell, 2024).

6. Findings and Discussion

Respondents indicated that the LPG sector in Tanzania faced many challenges including high price and price fluctuations which lead to low usage of LPG among Tanzanians. Low-income families cannot afford the high price of LPG. It was further revealed that limited distribution network of LPG is another challenge facing Tanzania in LPG sector. Limited distribution network has resulted to the inadequate availability of the LPG in some places. In this way, the supply chain of LPG in general was said to be unreliable.

One of the officers from ORYX commented that:

> *"…as a country we have some challenges facing the LPG sector. If addressed, the country will achieve liquefied petroleum gas energy security. In my view, one of the serious challenges is inadequate policies that direct the community to use the liquefied petroleum gas. The use of firewood and charcoal continues thus compromising liquefied petroleum gas energy security in the country."*

Key informants from the policy making cadre indicated that the national strategies for improving liquefied petroleum gas energy security in Tanzania are in place. These include government policies and various strategic plans. This argument was supported by an officer from the Ministry of Energy in Tanzania who remarked that:

> *"…as a nation we have been striving to have national strategies for improving liquefied petroleum gas energy security in collaboration with other stakeholders both public and private. Therefore, my opinion is that we have national strategies for improving liquefied petroleum gas energy security but the problem is that this issue has to do with the complexity of global governance"*

The findings indicates that one of the major effects of global governance on liquefied petroleum gas energy security in the Tanzania is unavailability of adequate liquefied petroleum gas thus affecting energy security. Global political propaganda has affected security of liquefied petroleum gas energy in the country by making the LPG price high. Because of this situation, there are few investors in LPG in the country despite the available opportunities (Synák, Čulík, Rievaj, & Gaňa, 2019). Commenting on the effect of global governance on liquefied petroleum gas energy security in Tanzania, an officer from REA argued said:

> *"…it is true that global governance has effect on liquefied petroleum gas energy security in Tanzania. The country has been striving to ensure energy security through the use of various energy sources like the liquefied petroleum gas. However, the strategies have been handicapped by global governance".*

The argument above is also supported by an officer from EWURA who said that,

> *"…it is important for the country to focus on economic and political diplomacy as means of accessing adequate liquefied petroleum gas from various countries in the world. This will ensure adequate supply of liquefied petroleum gas in the country thus realization of liquefied petroleum gas energy security."*

Yet another respondent said:

> *"…you know in most cases the liquefied petroleum gas is imported from other countries. This has made the availability and accessibility to be limited thus affecting its security. Therefore, limited availability and accessibility is what affects its security. In connection to the same, global governance has not prioritized the availability and accessibility of liquefied petroleum gas in developing countries like Tanzania."*

These findings support those by Fang, Shi and Yu (2018) who evaluated the sustainability of energy security in China. They reported that global governance affects the energy security in developing countries because there is no guarantee of availability and affordability. Since many developing countries depend on importing LPG from developed countries, they end up getting it at high price which affects the end users especially those from low-income families.

Moreover, key informants had the opinion that one of the effective strategies for improving the development of liquefied petroleum gas energy security in Tanzania is to ensure that there are effective energy policies that encourage the use of liquefied petroleum gas. On the other hand, the policies should discourage the use of charcoal and firewood. Findings reveal that the country needs to attract more investors in liquefied petroleum gas. This will ensure adequate production of liquefied petroleum gas thus energy security will be realized. The informant from Tanzania Traditional Energy Development Organization (TATEDO) offices commented that:

> *"…development of liquefied petroleum gas energy security in Tanzania depends solely on two kinds of national strategies. One is a strategy to attract investors to increase the production of liquefied petroleum gas. More production of liquefied petroleum gas guarantees its availability and affordability especially for poor households because prices will go down. The second is effective policies that encourage the use of liquefied petroleum gas."*

Kazimierz (2019) argued that, policies and fiscal incentives remain important for the development of energy on the African continent but are not the decisive factors. Kazimierz, suggests that international private participation in energy generation and renewable/wind energy expansion in Africa is critical and expected to increase. Nakanwagi (2021) suggests that policy focus should be on limiting the vulnerability to disruption and ensuring the provision of adequate supply for future increased demands. The problem of ensuring energy security is, therefore, not just confined to the dimensions

of supply and demand. Various emerging issues like global governance and cross-border energy interdependence have also been added to the risks of energy security.

Similarly, Kichonge (2018) argues that, good strategies that can be used for improving the development of liquefied petroleum gas security in Tanzania include the incorporating of various stakeholders into the LPG sector. Incorporating stakeholders can help to identify potential barriers and opportunities, enhance the effectiveness and sustainability of policies, and ensure the successful adoption of new technologies in LPG. In particular, Kichonge examined the geo - political and geo – economic implications of energy security in Africa. It is contended that addressing these issues requires a more nuanced understanding of the complex and dynamic interactions between politics, society, and energy, as well as an emphasis on inclusive and sustainable growth that benefits all parties.

It was equally proposed that international strategies for improving energy security should be adopted to the developing countries like the Tanzania corresponding to those put forward by Christoffersen (2016) who indicated that international strategies for improving energy security in the developing countries are not given priority. According to UNIDO (2020) there are six types of global energy governors: intergovernmental organizations such as UNDP and IEA, summit processes such as BRICS, international nongovernmental organizations such the World Resources Institute, multilateral financial institutions such as the World Bank, and regional organizations such as APEC.

The challenges facing Tanzania's LPG sector are related to those highlighted by Ndunguru and Lema, (2020) who found that despite the significant growth of LPG sector in Tanzania, there are several challenges that need to be addressed. One of the challenges is affordability, another is high upfront costs for LPG equipment, particularly for low-income households. Safety concern is another challenge. Insufficient public awareness about LPG safety and improper handling of LPG cylinders poses risks to public safety and is considered to be a bottleneck. Limited distribution network and inadequate distribution infrastructure, particularly in rural areas, restrict LPG access to a significant portion of the population.

7. Conclusion and Recommendations

This study set out to examine the effect of global energy governance and local energy policies in Tanzania on the development of energy security in terms of supply of LPG in the country. The study concludes that global governance has considerable effect on the development of the liquefied petroleum gas energy security in Tanzania. International propaganda and politics involving the production and distribution of LPG negatively affects its price and availability. The existing regime of strategies and energy policies and institutions at the global level have not been prioritizing the development of the LPG in developing countries, Tanzania included. They have been selective, politicized and exclusive. The country still imports much of its LPG and has not been able to attract enough investment in the sector.

In addition, local policies governing the LPG sector have been found to be limited in their ability to ensure reliable supply chains for the LPG. Neither have they attracted adequate investment from private international capital towards the LPG sector. Existing

policies have also not been effective enough in promoting the use of LPG among Tanzanians. Likewise, the policies have not effectively discouraged the use of charcoal as a source of domestic energy for cooking. In this way the security of the supply of LPG in the country has not been ensured.

The study recommends that in order to improve the liquefied petroleum gas energy security in Tanzania, clear and implementable policies should be given priority, focusing on citizen sensitization and promotion of the benefits of LPG and discouraging the use of charcoal and other unsustainable sources of energy. Moreover, the study recommends that public private partnership should be encouraged as a means to improve the level of liquefied petroleum gas energy security in Tanzania. Private sector inclusion may go as far as cross border bilateral agreements that may help in reducing dependence on expensive sources of LPG. Finally, Tanzania should strength essential elements such as technology, expertise and infrastructures to attract more investors in the LPG sector. This should go hand in hand with having policies that favour investment in energy sector.

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