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MARKET EXPANSION STRATEGIES FOR LPG DISTRIBUTION IN EMERGING ECONOMIES: A CASE STUDY APPROACH

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Abstract
Liquefied petroleum gas (LPG) has continued to be among the most significant transitional clean cooking fuels in the emerging economies, particularly in places where the availability of electricity is not guaranteed, and household air pollution is a significant issue to the general population. The aim of this paper is to analyze the approach to market expansion of LPG distribution in the emerging economies, qualitatively with multiple case-study. It is based on policy reports, publications of international agencies, and country case material and it examines the efforts of the governments and firms to open LPG markets by investing in infrastructure, reforming subsidies, controlling cylinders, building out retail networks, regulating, and creating awareness to consumers. The paper concentrates on India, Indonesia, and Kenya, but also makes comparative remarks based on Peru, Ghana, Brazil, and sub-Saharan Africa in general. The review concludes that effective market expansion of LPG is not a one-way intervention, but a concerted ecosystem development. The combination of affordability measures, last-mile distribution, reliable cylinder-exchange systems, and safety regulation, as well as reliable data-driven policy targeting, are the elements of effective strategies. The results also indicate that access may not necessarily translate into consistent use. Long-term adoption is often constrained by refill affordability, informal competition with biomass and kerosene and poor rural logistics. The paper summarizes that the most effective LPG distribution strategies in the emerging economies occur when they view market expansion as as much an institutional and behavioral challenge as it is a fuel-supply problem.

Keywords: LPG distribution, emerging economies, clean cooking, qualitative research, market expansion, energy access, case study.

Introduction
The availability of clean cooking has been one of the most enduring development challenges of emergent economies. According to the International Energy Agency (IEA), developing Asia and sub-Saharan Africa continue to have large populations without access to clean cooking, and the World Health Organization (WHO) is still attributing significant health impacts to polluting household fuels, particularly on women and children. This means that LPG is now a key transitional fuel due to its cleanliness in the point of use, scalability via cylinder-based distribution, and sometimes more viable than full electrification in the short and medium terms (IEA, n.d.; WHO, 2026). (IEA)

The case of developing LPG is not just related to convenience. In 2021, WHO estimates that 2.9 million deaths annually were due to household air pollution, and specifically mentions LPG among the clean fuels that can be used to mitigate the risks of exposure. Simultaneously, the World Bank and other collaborators have highlighted the fact that increasing access to modern cooking energy is associated with poverty reduction, gender equality, time savings, and environmental benefits (WHO, 2026; Van Leeuwen, Evans, and Hyseni, 2017).

However, the development of LPG in the emerging economies is not even. Some countries have already reached high rates of diffusion based on national programs of mass diffusion and individual distribution alliances, whereas other countries still experience poor infrastructure, high retail prices, unsafe informal distributions, and poor refill rates. This renders LPG a significant topic of study in market expansion. It is no longer a matter of whether or not LPG can be introduced but how the system of distribution can be extended, maintained and extended among the low-income and geographically dispersed populations. Evidence provided by World Bank and IEA indicates that the difference in infrastructure, reliance on imports, cylinder

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circulation system and affordability are determinants in the explanation of the disparate adoption of the same among the nations.

The question in this paper is as follows: Which are the strategies that are most effective in the expansion of the LPG distribution markets in the emerging economies? It provides an answer to this question by a qualitative case study approach. The article proposes that the expansion of the LPG market is successful when governments and companies get five strategic pillars aligned, such as affordability, infrastructure, regulatory credibility, retail reach, and user trust. The paper continues to describe the methodology, review the literature, and analysis of the chosen country cases and synthesize feasible market expansion strategies.

Literature Review

Literature on the LPG growth in the developing countries has been consistent to provide LPG as a transitory yet a very significant clean cooking fuel. Van Leeuwen, Evans, and Hyseni (2017) suggest that LPG has major health, social, and economic advantages, particularly in situations where the reliance on biomass is high, and when full renewability of cooking options is not realistic. The same source further states that LPG tends to be aspirational to the urban and rural household and this offers it behavioral and symbolic advantages over many other forms of technologies.

Meanwhile, the literature warns against simplistic connection-based measures of success. The systematic review of transitions to modern cooking services conducted by ESMAP demonstrates that a broader group of drivers and barriers such as cost, peer influence, performance, reliability, after-sales support and sociocultural norms determine adoption. That is, acquiring a first LPG cylinder does not equate to a sustained change in the market (ESMAP, 2021).

One of the themes is affordability. The experience of LPG in developing countries, and bottled-gas subsidies, demonstrates that the poor lack the motivation to maintain the use of these products, without specific subsidies, particularly in a situation where the initial cost of the cylinder is high and the cost of refills is also high. Expansive subsidies may augment access, although mishandled plans may cause leakage, fiscal strain, and business distortions. This has seen numerous nations trying out direct transfers, voucher systems, or social targeting mechanisms instead of standard price controls (World Bank, 2017; Kojima, 2021).

One more structural constraint is infrastructure. The analysis of the Africa region by the IEA reveals that the growth of LPG would need primary storage, import terminals, bottling plants, cylinders, trucks, and safe last-mile delivery systems. Since approximately 50 percent of the LPG demand in sub-Saharan Africa is imported, port and storage capacity are important market-enabling resources. In their absence, even well-designed policies on the demand side have difficulties in creating predictable supply (IEA, n.d.).

Lastly, governance and safety are mentioned in the literature. A case in point is the experience of Kenya, where the absence of regulation and legalized sales destroy not only the trust of people but also the development of the formal sector. When unsafe or false refilling or counterfeiting cylinder behaviors are widespread, market reputation suffers and rightful distributors are unfairly competing (van den Berg, 2018/2019)

Methodology

This research uses a qualitative multiple-case-study design. Case study research is appropriate to study complex policy and market systems in the real world, where the results are based on institutional, social and commercial interactions, but not on individual variables (Yin, 2018). The paper employs document-based qualitative analysis and provides comparisons of recurring themes in national experiences.

It will be analyzed using secondary sources provided by the IEA, World Bank, WHO, ESMAP and government portals. The sample was chosen to ensure that the policy design and market maturity are as varied as possible: India is a representative of a massive subsidized expansion

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model; Indonesia demonstrates a state-driven fuel-switching approach; Kenya reflects the difficulties of increasing LPG adoption in a less-developed market with weak regulatory and distributional frameworks. The extension of comparative interpretation is supported by references to Peru, Ghana, Brazil, and broader African markets.

The cases were analyzed using thematic analysis to determine common mechanisms, such as affordability, infrastructure, policy targeting, cylinder management, consumer behavior, and market regulation. This methodology is suitable to qualitative policy research since it enables patterns to be observed across situations without losing institutional specificity of countries.

One weakness of this research is that the study is based on secondary documentary evidence, as opposed to primary interviews. Nonetheless, this fits a comparative policy paper since the chosen documents offer a fully established factual and analytical coverage of national LPG transitions.

Case Study Analysis

Case 1: India and the Scale Logic of State-Supported Expansion

One of the brightest examples of the fast development of the LPG market by state-led scaling is India. The Pradhan Mantri Ujjwala Yojana (PMUY) was created to make LPG affordable to the poor, particularly women in low-income families. By early April 2026, the official PMUY portal was reporting over 105.7 million connections released. This scale is important as it indicates that demand creation can be hastened in cases where political commitment, identity-related targeting, and national oil marketing firms are aligned (PMUY, 2026).

The growth plan of India incorporated a number of factors. First, entry was subsidized by the government through reducing the acquisition cost of a connection. Second, it used the PAHAL direct benefit transfer architecture to enhance the delivery of subsidies and minimize diversion. According to World Bank analysis, PAHAL is the largest direct LPG transfer scheme in the world and introduces it as a significant reform in efficiency in targeting and delivery (World Bank, 2019).

India exhibits the significance of administrative systems as far as market expansion is concerned. The growth of LPG was not stimulated solely by additional cylinders and additional dealers, but it was also stimulated by the digital identity, bank connections, distributor databases, and targeting households at scale. This shows an increase in the energy market growth of these emerging economies that are based on the ability of the state in terms of making payments and administering welfare other than energy policy.

Nevertheless, the Indian case reveals another severe limitation as well: access does not guarantee frequent consumption. Recent research by IISD reports that the clean cooking transition in India has been closely linked to LPG subsidies, yet affordability and reliance on imports persist as a problem. This implies that when connection numbers are large, the refill inequality can be hidden when poor households switch to biomass or stack fuels when the LPG prices increase (IISD, 2026).

The lesson of the Indians, then, is two-fold. Massive market penetration can be established through large-scale entry subsidies and distributional growth, but in the long-run market deepening would be desirable in terms of refill affordability, predictable subsidies delivery, and sustained rural distributor density. The experience of India is good in the field of expansion and ambivalent in continued exclusive use.

Case 2: Fuel-Switch Strategy and Indonesia.

A different example is that of Indonesia with its rapid fuel transition by conversion, not by building its markets anew. The case study of ESMAP on the conversion of kerosene to LPG in Indonesia explains a nation-wide initiative whereby the household was displaced and redirected to LPG because of a state-led program to roll-out cylinders, stoves, and related appliances (Gehringer and Loksha, 2012).

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The case is also important in that it demonstrates that the growth of the LPG market can be spurred when a policy clearly pushes out an incumbent household fuel. Instead of waiting until households switch to LPG a bit at a time, Indonesia changed the economics and supply of competing fuels. This was not market creation as such in market strategy terms but market substitution.

The experience of Indonesia brings to light some valuable strategic lessons. First, during distribution expansion, supply and equipment are bundled thereby increasing the speed. Households will tend to switch to LPG when the initial obstacles are eliminated in a single package and not individually. Second, the rate of transition is enhanced when government communication and roll out logistics are coordinated nationally. Third, LPG can be made a normal fuel and not a high-end urban good within a short time with the help of state support.

But this model is also largely reliant on the quality of execution. The rapid conversion program entails stringent safety measures, timely resupplement of supplies, and strong logistics. Without the fuel-switch being complemented with reliable circulation of cylinders and the availability of refill, consumer confidence may be lost within a short time. Nevertheless, Indonesia is still among the most powerful accounts of how the decisive policy can transform the household fuel markets within a relatively short span. The larger implication is that the expansion of the LPG market performs optimally with the combination of reforms in the competing fuel markets and consumer access to equipment.

Case 3: Kenya and the Importance of Regulation and Market Trust

Kenya presents the challenges of scaling LPG in a scenario where market ambitions are high and market frictions are strong. World Bank analysis observes that Kenya had a goal of 2030 whereby LPG would be used in 35 percent of cooking fuel consumption which would translate into a per capita goal of 15 kilograms per year compared to an estimated 2 kilograms in 2013. However, take up has been behind policy ambition (van den Berg, 2018/2019).

The Kenyan case brings to fore a number of challenges that are of great concern to emerging economies. First, there is a constraint on the end-user prices. Second, illegal sale of LPG leads to a distortion of the market and undermines safety. Third, expansion of policy focus on lower-income has not necessarily been accompanied by wider ecosystem development in middle- and upper-income sectors, which are frequently required to bring about commercial scale. Suggestions that World Bank makes to Kenya are to enforce regulations more, to lower consumer prices, to increase the target of uptake on an annual basis and to have more stable metrics of progress.

In terms of market expansion strategy, Kenya shows that trust is needed in formal retail growth. Consumers must be assured that the cylinders are safe, the weights are right, and the refill outlets are authentic. Distributors must be assured that they are not disadvantaged by the informal players who are not subject to safety and taxation standards. Regulation in this sense is not a legal issue; it is a market-making issue.

The significance of segmentation also can be seen in Kenya. A market that attempts to only target the poorest of the consumers without building a commercial demand among the broader income groups might have a hard time realizing the economies of scale in distribution. Sustainable LPG growth frequently relies on expanding the entire market, and then applying specific policies to open up the market to poorer households instead of creating a pro-poor market in the first place.

Discussion of Cross-Cases: What Strategies Work

There are five strategies that can be distinguished across the cases.

1. To begin with, lower barriers to entry but also safeguard the affordability of refills. India demonstrates the worth of subsidizing connections and direct benefit systems, but also the risk of equating first use with sustained use. Market expansion cannot be achieved without onboarding and retention.

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2. Second, infrastructure should be viewed as the foundation of market development. Through the analysis of Africa by the IEA, it is evident that storage, imports terminals, bottling, transport vehicles and cylinders are not minor issues; they are the heart of feasible LPG markets. Physical distribution depth is the only way to scale retail access in countries.
3. Third, establish formal exchange ecosystems and cylinder. Customer convenience and safety revolve around the presence of cylinders, ownership regulations, maintenance and safe recirculation. Sale of bundled equipment, as in Indonesia, can be used to speed up early adoption, but long-term effectiveness requires stable refill systems.
4. Fourth, control aggressiveness to produce trust. It has been demonstrated by Kenya that lax enforcement is detrimental to both consumers and legitimate businesses. The overheads that are not required include safety, metering accuracy and anti-counterfeit measures, but are market expansion tools.
5. Fifth, apply specific and not general subsidies. World Bank evidence regarding subsidy reforms, bottled gas support indicates that more specific mechanisms can be more cost-effective and socially sustainable than general subsidies, particularly in poorer countries where leakage and distortions tend to be prevalent. This wider logic can be seen in Brazil in the targeted gas voucher strategy and in Peru in the FISE model, although the design of the program varies in different settings.

The results are also correlated with larger amounts of evidence on clean cooking. According to the World Bank, the ability to transition to modern energy cooking services, the argument is that the key factors of transition are convenience, safety, affordability, and reliability, rather than merely fuel availability. Practically, the LPG distribution markets expand, when they are incorporated in a broader service offer.

A combination of affordability, infrastructure development and well-developed regulatory systems will best increase LPG distribution in the emerging economies. Experience in India and Indonesia indicates that the first cost of LPG connections can be brought down, special subsidies given and access to cylinders and refill stations enhanced with rapid increases in household uptake. The Pradhan Mantri Ujjwala Yojana, an example of such programs in India, has notably increased access to LPG by families with low-income levels by subsidizing new connections and with direct benefit transfer systems to enhance delivery performance (World Bank, 2019; PMUY, 2026). Equally, the kerosene-to-LPG conversion initiative in Indonesia showed that the market could grow more rapidly when the governments reference the policy of fuel substitution to the distribution of equipment and the awareness programs to the population (Gehringer and Loksha, 2012). These examples indicate that the development of LPG markets is not only related to the availability of fuels but also the capacity of governments and distributors to ease the entrance barriers and create confidence among consumers.

Concurrently, long-term market growth in LPG needs to be facilitated by more than just the first access since long-term usage is contingent upon affordability of refill, safe distribution, and stable last-mile supply channels. The example of Kenya shows that the high cost of refills, the lack of compliance with safety requirements, and unofficial market operation can delay the adoption even in cases where national targets are high (van den Berg, 2018/2019). In developing economies, the most effective systems of LPG distribution are the ones that integrate physical infrastructure (e.g., storage, bottling plants, transport, and retail outlets) and effective regulation and support to low-income consumers (IEA, n.d.; Kojima, 2021). It can be therefore seen that a qualitative case study approach reveals that LPG expansion can be best described as a socio-technical and institutional process where pricing, trust, policy design, and logistics are collaborative. Without this integrated approach, LPG programs might augment ties in the short term but they will not attain a consistent and general utilization over time.

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Conclusion

The paper has discussed the market expansion strategies in the LPG distribution in the emerging economies using qualitative multiple-case-study approach. The facts indicate that growth in supply does not create successful LPG expansion. It needs a concerted effort in terms of pricing, logistics, safety, regulation, payment systems and consumer outreach.

India is an example of the strength of scale, online targeting, and government-supported distributor networks, yet it also illustrates how continued usage is susceptible to the affordability of refills. Indonesia demonstrates how a fuel-switch policy can quickly transform domestic energy markets when coordinated with equipment, supply, and policy. Kenya demonstrates that high targets cannot be achieved without the credibility of regulation, formal market trust, and commercially feasible distribution channels.

The larger implication is that distribution of LPG must be seen as a socio-technical market system. Emerging economies aiming to grow LPG effectively ought to focus on measures that are specifically aimed at helping to reduce costs, invest in storage and bottling facilities, institutionalize cylinder control, reinforce safety measures, and monitor refill trends instead of just the number of connections. LPG may not be the ultimate goal of clean cooking transitions in all countries but it is one of the most feasible growth opportunities of most emerging economies today. The most effective market strategies are hence those that are able to strike a balance between scale-up and long-term sustainability and inclusive access.

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