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Bremermann Leonardo Elizeire, Teplov Roman, Mortazavi Sina, Väättänen Juha,
Gupta Suraksha

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Public-private partnership as a mechanism to encourage MNEs' contributions to sustainable development goals - Insights from Brazilian experience

Authors:

Leonardo Bremermann*, Roman Teplov†**, Juha Vääänen**, Sina Mortazavi**, Suraksha Gupta***

*INESC-Brazil,

São Paulo, Brazil

**LUT University,

Lappeenranta, Finland

***University of Newcastle,

Newcastle, UK

†Corresponding author

Abstract

The involvement of multinational enterprises (MNEs) is considered an important element in accomplishing sustainable development goals (SDGs). However, profit-oriented MNEs are often reluctant to address the needs of the poorest populations and do not see economic potential in operating in the bottom of the pyramid (BOP) markets. This research aims to understand the importance of public and private sector partnerships in supporting SDGs, mostly with a specific focus on poverty alleviation at the bottom of the pyramid (BOP). The study applies a triangulation approach by combining the findings from a qualitative study with a descriptive analysis of the secondary data. The primary data was collected from Brazilian policy makers and multinational enterprises' representatives. The findings highlight challenges and benefits arising from collaboration between MNEs and the Brazilian government. Based on the results, this paper proposes a research framework which can be used for future studies by scholars in international business.

Key words:

Poverty alleviation, Bottom of the pyramid (BOP), Public-private partnership (PPP), Sustainable development goals (SDGs), Multinational enterprise (MNE).

Introduction

Can sustainability disputes like the social empowerment challenges of developing nations be resolved in the next decade through the United Nations' (UN) initiatives and programmes? International organisations (IOs) such as the World Bank (WB), International Labor Organisation (ILO), United Nations Industrial Development Organisation (UNIDO), United Nations Children's Fund (UNICEF), and more than 30 other United Nations entities are now aiming to tackle the issue of poverty in emerging markets. However, will this work in practice?

The support to such initiatives may come from companies operating on global market. Generally, a large sum of the global market consists of disadvantaged and poor communities of people who earn less than 1 dollar per day (Prahalad, 2005). These markets or communities are commonly referred to as bottom of the pyramid (BOP) or base of the pyramid markets (Prahalad & Hammond 2002; Prahalad, 2006). Recent sources define BOP communities as people who cannot afford the basic goods and services needed to easily survive (Sinha et al., 2017). BOP markets are highly important, as they may be new sources of growth for multinational enterprises (MNEs) and include more than 4 billion people and are less saturated compared to developed markets with a high demand for investment and job creation (Prahalad & Hammond 2002; Sinha et al., 2017). At the same time researcher account for the differences in consumer behaviour between BOP and traditional markets (see e.g. Barki and Parente, 2010)

Foreign Direct Investments (FDI) by MNEs could be an efficient instrument for enhancing the social empowerment of people in BOP markets and providing inclusive growth for these regions (Prahalad & Hammond 2002). However, MNEs often lack the motivation to enter these markets due to substantial challenges and low expected profit (Schuster & Holtbrügge, 2012). For instance, MNEs in pharmaceutical sector in India find it challenging to find a price point that matches the BOP markets making it difficult for their managers to generate capability building in developing countries (Gupta, 2017; Roy Chaudhury, 2005). To advance the social empowerment of BOP societies, the UN and related international organisations have created several frameworks to facilitate the sustainability of both businesses and BOP societies.

Millennium Development Goals (MDGs) were declared by the UN in New York on 8 September 2000, which was the result of an assembly comprising 189 countries. The MDGs agreement was designed to improve the following elements: poverty and hunger, universal education, gender equality, child health, maternal health, HIV/AIDS, environmental sustainability, and global partnership (United Nations, 2000). It is argued among scholars that

MDGs aimed to improve the global partnership of actors both in private and public sectors of countries resulting in linkages that can offer growth to developing nations (Gupta, 2017).

Undoubtedly, MDGs were developed with good intentions and based on admirable moral values of the UN and their partners, offering a bandwagon for disadvantaged people. However, were MDGs successful? Several studies have found that MDGs had some fairly positive effects on sustainability issues, but they were not successful by far (Held, 2005; Saith, 2006; Cormier, 2016; Briant Carant, 2016).

The UN was not able to gain satisfactory results for the MDGs. This was evident in 2015 as the UN outlined a new humanitarian agenda in the form of Sustainable Development Goals (SDGs) (United Nations, 2015). SDGs extend the MDGs' objectives and primarily focus on combating hunger, poverty, inequality, human right boundaries, gender inequality, and environmental issues (United Nations, 2015).

It is crucial for UN and related entities to monitor and create a mechanism which allows all the governmental and non-governmental organisations in different nations to address the SDGs. Thus far, the UN advocates that Public-Private Partnerships (PPPs) in the form of collaboration between governing institutions and MNEs can significantly enhance the speed of achieving SDGs (United Nations, 2015). It is argued by scholars that partnerships and networking by MNEs is an important tool for MNEs in pharmaceutical sector in developing countries (For instance when working with the local government) to overcome the market constraints such as regulatory challenges (Buckley & Ghauri 2004). Therefore, the UN has called for a more robust partnership between MNEs and the governments of developing countries to increase social empowerment in BOP communities (UNDP, 2017). However, in spite of the topic's importance and noticeable interest within academia, there is still a gap in the International Business (IB) literature regarding the role of partnerships in implementing strategies to address SDGs by empowering BOP markets (Cormier, 2016; Parnell, 2016).

It is previously documented in some IB research that collaboration between MNEs and public institutions can improve social empowerment in developing countries (Belcher, 2005; Fisher, 2004; Scher e al., 2003) However, these studies have also demonstrated contradictory findings. For instance, Fiaschi et al. (2015) argue that in India, the government is not able to address social issues such as social empowerment in the most efficient way. This may be the result of misaligned objectives between the MNEs and policy makers. Some also argue that although MNEs in the BOP markets are gaining business grounds, they have not had a large impact on

the social empowerment of the local population (Schuster & Holtbrügge, 2012; Schwittay et al., 2011; Karnani, 2007). **Therefore in order to be regarded successful the model should not only bring economic benefits for MNEs but provide the real improvement of well-being for BOP population.** The energy sector is an illustrative example since electrification in remote rural areas has been long recognised as an instrument for improving living conditions and empowering poor societies (Gomez & Silveira, 2010; Slough et al., 2015; Sovacool, 2012). However, high infrastructure investments and low profit margins due to the population's low density in rural areas discourage profit-seeking MNEs from operating in such markets (Pereira et al., 2011; Ruiz et al., 2007; Xu et al., 2016).

In light of the above complexities, it is evident that a research gap exists related to how MNEs and governmental institutions of the host country can work together to address the BOP market's social empowerment challenges, as well as what existing challenges and solutions could improve the quality of life for the BOP markets. In this regard, there is a lack of studies to offer guidelines for managers and policy makers in designing and implementing mechanisms to work toward SDGs that benefit people in BOP markets. **Moreover, as argued above, many of the studies have focused on BOP markets in India and we aim to focus on the Brazilian BOP market and understand how the energy sector influences poverty issues in the country. The Brazilian electrification program was a large project involved both public actors as well as private businesses and MNEs and have had a large impact on poor population wellbeing improvement.** Thus, to address the identified problem, we propose the following research question:

How can public-private partnerships in the energy sector facilitate poverty alleviation?

This paper consists of the following sections. In the next chapter, a literature review will discuss previous studies and reveal problems existing in the current understanding of the issues studied. Next, in the method chapter, the research will be justified, followed by the case of the Brazilian energy sector. Finally, the study will be finalised through a conclusion and discussion, followed by a proposed research model for future studies.

Literature review

Poverty alleviation has been part of the UN's and IOs' sustainable development programmes for over 40 years, and initiatives such SDGs and MDGs are perfect examples of this effort (Shackleton et al., 2008; United Nations, 2015). The UN has stated that the social class of

society that does not earn enough income to provide the necessities of daily living are considered part of the poor class of society (United Nations, 2000). Consequently, poverty alleviation can be seen as the result of multiple improvements in various areas such as enabling access to energy, improving sanitation, and capabilities building (United Nations, 2015). MNEs are considered to have become more influential on a global scale as they hold valuable resources which can help bring prosperity to many developing nations (Lall, 1983; Wells, 1983; Cuervo-Cazurra & Genc, 2008). It is observed from the literature that investments by MNEs in emerging markets have led to poverty reduction, which can be a cause of better linkages, outsourcing the locals, tax generation, and planning by MNEs and governing bodies (Firth & Ghauri, 2010).

MNEs are attracted to targeting BOP as it is considered an eye-catching market (Prahalad, 2002; Karnani, 2007; Pitta et al. 2008). However, some industry segments such as the energy sector are more challenging and less attractive for international firms' investments. The International Energy Agency highlights that emerging markets in developing nations need modern energy services as more than 1.2 billion people have no access to power (IEA, 2016). They also argue that MNEs are mostly interested in investing in densely populated regions since rural areas are not considered fruitful for business due to a less dense population and significant challenges such as poor infrastructure requiring additional investments.

At the same time, while organisations such as the WB, UN, Global environmental facility (GEF) share enormous concerns for rural electrification, the results of their activities do not have the desired impact (Rahman & Ahmad, 2013; Wamukonya, 2007). Yet, the same sources consider host country governments' alliances with the private sector a key element for rural electrification. This is due to the fact that public institutions (i.e. government) in developing countries encourage MNEs to invest in the energy sector by offering attractive incentives and subsidies so MNEs will engage the locals in business (Haaland & Wooton, 1999; Radulvic, 2005; Srinivasan, 2005; Purhit, 2007).

Partnerships can have benefits in several forms for private (such as MNEs) and public sectors (such as governmental bodies). Previous studies have concluded that MNEs can improve host countries' technological infrastructure and help the local companies have more business opportunities (Fan et al., 2000; Rangan et al., 2006). Foreign direct investments (FDI) by MNEs has direct (e.g., new jobs creation, infrastructure development, and other forms of investments in the host country's economy) and in-direct (also known as the spillover effect) influences on

the host country's economy (Borensztein et al., 1998). The positive effects of direct investment by MNEs are often seen in eliminating technological gaps and reducing unemployment rates of the host country (Findlay, 1978; Wang, 1990). However, this may result in losing important knowledge and resources by the firm to local companies in the host country, which is considered a spillover effect (Borensztein et al., 1998).

Research has shown that partnership between governmental institutions and private companies in emerging markets such as India (in the construction industry) and several African countries (in the mining sector) was one of the preferred routes for prosperity for both the people and the MNEs of these regions (Dansereau, 2005; Patil & Laisharm, 2016; Papadopoulos et al., 2017). However, the same sources maintain that the trust issues existing between the MNEs and the policy makers of India and African countries are also evident and challenging for the operational activities of MNEs as it limits sustainable business in these regions. So, how can MNEs and the public sector gain sustainable achievements and trust to foster business opportunities as well as social empowerment in developing countries? Even though sustainability achievements may depend on several factors in the host country (e.g., innovation, policy environment, and the firms' international experience and business models), PPP is the most important influencer (Bansal, 2005; Clark, 2007; Boons & Lüdeke-Freund, 2013).

The literature has documented PPP from diverse angles. Some common synonyms of the term partnership are contracting-out, nongovernmental-governmental alliance, linkages, and community-local government cooperation (Rangan et al., 2006; Johnston & Romzek, 2005; Krishna, 2003). The public sector may be governmental bodies, whereas the private sector could be MNEs or other non-governmental firms (Chen & Johnson 2015; Rangan et al., 2006). According to Bovaird (2004), a PPP is carried out when there is a working plan between a public-sector organisation and any organisation other than public sector bodies. PPP is also defined by Klijn and Teisman (2003) as a mode of cooperation between public institutions and other institutions that form a linkage between each other. The same source confirms these linkages can also be described as changing arrays of social relationships between inter-reliant actors that can influence political, economic, and social problems. Linkages with other local firms in the form of outsourcing are key elements for MNEs when establishing businesses in emerging markets (Hitt et al., 2002; Wright et al., 2005; Haanyika, 2006; Yiu et al. 2007).

It is apparent from previous studies that PPP can play a vital role in addressing sustainability and social issues such as poverty alleviation (Brinkerhoff & Brinkerhoff, 2011; Bäckstrand,

2006; Dansereau, 2005). However, most research on the role of PPP is still in the form of conceptual studies and significantly less empirical research has been conducted (Brinkerhoff & Brinkerhoff, 2011; Hood et al. 2007; Wettenhall, 2003). Moreover, confusion emerges as some researchers argue that public and private sector relationships may not yield the intended public benefits (Edwards et al., 2004; Clark, 2007).

In this regard, it can be observed that empirical research such as case studies in the context of PPPs and their influence on social issues can extend the literature of international business as it helps scholars examine these notions. In particular, analysis of the Brazilian electrification programme Light for All (LfA) may bring new insights on implementing PPPs in achieving SDGs. Indeed, Brazil possesses vast energy resources generated mainly by large hydro-power plants (IEA, 2013). However, a significant portion of distant rural communities in Brazil lacks access to electricity. A challenging environment, lack of infrastructure, and low population density make simple grid extensions economically problematic and distract private companies from operating in such markets.

To tackle the energy problems, the Brazilian government launched several electrification programmes. Whereas earlier programmes suffered from a misalignment of stakeholder objectives, poor performance, and failure to meet stated aims, later initiatives received a more positive evaluation (cf. Pereira et al., 2010; Ruiz et al., 2007, Winkler et al., 2011). The important feature of the LfA programme is the creation and development of local businesses to improve local population well-being. Private electrical companies (e.g., distribution companies) in Brazil are obliged to construct an electrical network infrastructure to make electricity access possible in remote areas. The partnership between business and public players is, therefore, an important mechanism implemented by the government.

Data and method

To address the research objectives and account for the scarcity of empirical studies related to the topic, we applied a multimethod approach. Given the exploratory nature of the research, primary data was collected in the form of in-depth interviews (cf. Denzin & Lin, 2008; Eisenhardt & Graebner, 2007; Patton 1989). To ensure the quality of the research, we applied a data triangulation approach (see e.g., Eisenhardt, 1989) and complemented the findings arising from interviews with a descriptive statistical analysis of the secondary data.

The study concerns the case of the Light for All (LfA) electrification programme. Its first stage was implemented by the Brazilian government from 2003 to 2008. The second stage occurred from 2009 to 2016, and the third stage is currently active. The programme's objectives are to provide electricity for people living in remote rural areas and promote simultaneously renewable energy solutions instead of a traditional fossil fuel-based system for autonomous energy generation. **During the programme execution its objectives and rules have been constantly adjusted in order to increase coverage of the poorest part of the Brazilian population (i.e. BOP).**

The semi-structured interviews were conducted by two authors in 2016 as part of a large international projectⁱ conducted under the European Union's Seventh Framework Programme for research, technological development, and demonstration. The overall number of in-depth interviews is five, including two with policy makers and three with industry representatives. The questionnaire was initially developed in English and then translated into Portuguese by native speakers. The interviews were conducted in Portuguese and then transcribed and translated into English. Due to the relatively small number of interviews available, we did not go through the formal qualitative coding procedure (see e.g., Corbin & Strauss, 2009). However, careful analysis and investigator triangulation (i.e. the interviews were independently analyzed by two researchers and the findings were then discussed with the team) have been applied.

Secondary data was provided by the Ministry of Mines and Energy of Brazil. The data was collected by MDA PESQUISA, which interviewed 3,105 beneficiaries of the Light for All (LfA) electrification programme between the months of July and September of 2013.

The Case of Brazil

The Brazilian energy sector is completely regulated by the Brazilian Electricity Regulatory Agency (ANEEL). It is responsible for developing and applying rules and laws concerning both local firms and MNEs. After becoming established in Brazilian territory, MNEs must comply with current tax, environmental, labor, and health laws, as well as social norms. However, to attract MNEs, the government provides incentives at both federal and regional levels. In general, these incentives are offered in the form of tax reduction or access to finances such as e.g. funding for renewable energy projects implementation. The typical form of operation is concessions, where a company is granted the right to operate in a specific area. By providing such incentives, the government expects to encourage multinational companies to

operate in otherwise economically unattractive regions. Furthermore, companies are expected to contribute to regional economic and social development. The important requirement is that they operate in poor regions. Before being granted the right to serve profitable urban areas, companies must establish businesses in rural areas where the expected profit is lower.

There are several reasons why private companies enter developing markets. For instance, these companies might be interested in local technical expertise. However, more often the primary reason is economic efficiency. This is the main reason why MNEs are concentrated in the southeast and southern regions of Brazil, where the human development index (HDI) is higher than the northern and northeast regions.

Since certain cases of rural network expansion do not have significant economic benefits for companies, governmental regulation and subsidies are offered to stimulate companies to provide electricity to both rural and urban areas. To encourage firms, the government has applied subsidies to make a company's costs equal in rural and urban areas. As a principle, higher costs are not transferred to the consumer.

To achieve economic efficiency, MNEs outsource certain activities (e.g., maintenance, construction of transmission lines) to local firms and provide necessary training. This practice also corresponds to the government's intention to stimulate the formation of linkages between MNEs and local businesses. Nevertheless, some negative effects were also recognised from the PPP between the MNEs and the Brazilian government. According to the interviews with local policy makers, when policy makers have formed partnerships with MNEs and supported their operations, they expected more positive outcomes for the region. Some policy makers note that the level of collaboration between MNEs and local stakeholders is inadequate. However, in some other regions, the government seems to be satisfied with the existing level of collaboration. This mainly depends on the level of capability and knowledge possessed by local companies and is often not enough to satisfy the requirements of multinationals.

Therefore, quality control schemes were developed to measure the skills of the local workforce. In some cases, the MNEs are satisfied with the level of quality provided by local suppliers, but in other situations, they must contract with established international players as there are no adequate local firms as alternatives. Strict quality requirements and increased competition create additional pressure on local firms. However, as it was noted by one of the respondents, the demands from MNEs may also stimulate entrepreneurship and lead to the emergence of new local firms.

A direct effect in the form of job creation is the main benefit often cited by the respondents. Additionally, the presence of foreign firms may lead to improvements in infrastructure and the introduction of new, more sustainable business practices. Attitudes toward spillover effects differ between business representatives. While some admit the positive impact of technology diffusion, others do not explicitly mention it. Also, policy makers are not fully satisfied with the diffusion of innovations from MNEs to local firms. As a result, a combination of various effects can be achieved when PPP works well, contributing positively to the local economy. However, it is interesting that the government expects MNEs to have a larger impact than a regular company. This may have led to certain disappointments in the actual results in Brazil.

Although the impact of MNEs' presence may be considered insufficient, there is possibly a positive feedback loop. This would occur when job creation leads to an increase in the population's wealth, which in turn leads to a growing demand for products and services and then to further job creation. The improved wealth of a region increases tax revenues which enable greater investments in healthcare, education, and other public services. An MNE representative also noted positive social impacts generated by the company.

The LfA programme's socioeconomic impact was evaluated from secondary data through the following aspects, which are consistent with MDGs/SDGs: increased family income, gender equality, local improvements in health and education access, avoiding a rural exodus, increased purchases of electric appliances (providing comfort and saving time that can be used in other profitable activities), and changes in women's activities. The analysis reveals the relationships between various MDGs and SDGs and demonstrates how electrification can contribute to poverty alleviation.

Regarding poverty alleviation concerns and family income, it was noted that the minimum wage increased after the LfA programme was implemented (Figure 1). For instance, in 2013, there was an increase in the number of families with income greater than minimum wage level, which is about 41% of the families. Around 64.2% of the interviewed households experienced an increase in their children's school activities. Similarly, electrification together with governmental support lead to creation of new healthcare centres primarily focused on providing prenatal care and paediatric assistance. Increased number of healthcare centres resulted in increased availability of medical services for population which was reported by 40.6% of the interviewed.

-----Insert Figure 1 here-----

The programme also affected migration into rural areas. In the regions covered by the programme, about 96,000 families arrived to live in the rural area because of newly available electricity access in 2009. The number increased to 155,000 families in 2013.

In the increased purchases of electrical appliances stimulated by the programme, the most useful home appliance acquired was the refrigerator, followed by the laundry tub and the washing machine. Among the beneficiaries, 57.4% said that by saving time on housekeeping tasks, women started to engage more in other activities such as helping their husband and children complete their chores. Additionally, through entrepreneurial activities developed by some of the women, such as crafts and sewing, many families increased their income

This programme revealed the difficult task of achieving universal electricity access. To be a successful programme, parallel actions should be taken, such as education and entrepreneurship support for beneficiaries. It is also important to achieve a certain level of success. This could be more easily reached by considering the PPP strategy and involving MNEs, local companies, and the government. Overall, it can be concluded that although the third stage of the programme has not yet been completed, results achieved during previous stages demonstrate the significant impact electrification can have on poverty alleviation and improvements in the population's overall well-being.

Discussion and Conclusion

The analysis of the Brazilian electrification programme reveals the interplay between governmental initiatives aiming to address a sustainable development agenda and improve the population's living conditions and business objectives perceived by MNEs as well as local players. It also highlights interconnections between different SDGs and demonstrates how efforts towards achieving one goal can contribute to realising other goals. Indeed, as it was also demonstrated in previous works (cf. Azimoh et al., 2017; Birol, 2011; Haanyika, 2006), merely relying on self-regulating business mechanisms is not sufficient for energy provision to remote communities. Thus, even large electricity providers may be discouraged by significant costs associated with grid extension and low profitability in comparison to urban areas with a higher population density. Profit-oriented companies try to avoid excessive costs associated with infrastructure development and local workforce training.

The main positive effect of FDI is often seen in job creation (cf. Fan et al., 2000; Yang, 2003; Rosca, et al., 2016.). This was also noted to a certain extent by interviewees, by interviewees from both the business sector and policy makers. However, the danger of the crowding out effect should also be taken into account. Furthermore, the lack of capabilities among local businesses plays a negative role. From one viewpoint, MNEs are eager to outsource some activities (e.g., grid construction and maintenance) to local subcontractors, but from another, the level of quality local firms can provide often does not meet the MNEs' requirements and forces them to contract another, often multinational, service provider. This not only limits the possibility for technological and knowledge spinoffs but also directly decreases the number of new workplaces generated and leads to an even greater crowding out effect in the local market.

From the case of the LfA programme, we can conclude that electrification programmes' success depends on a balance between incentives attracting FDI and regulatory norms ensuring the programme's objectives are addressed. The formation of PPPs demonstrated the ability to mitigate the above-described problems if not avoid them completely. Therefore, the role of public policy makers lies not in merely attracting FDI, but in creating incentives for MNEs to operate in less profitable areas such as remote rural communities. In particular, the Brazilian government offered subsidies to bring the operating costs in rural areas down to figures comparable with urban areas and thereby avoided transferring excessive costs to consumers.

When attracting MNEs, governments also encourage the formation of linkages between MNEs and domestic firms. The linkages can facilitate technology and knowledge transfers and facilitate the development of innovative domestic firms. However, as previously noted, a current lack of capabilities, and consequently low absorptive capacity, decreases technology diffusion. In this regard, PPP can be considered a way to combine the efforts of business and public players to improve the level of local capabilities and reach the point at which the collaboration between MNEs and local business can be mutually beneficial.

The analysis of secondary data contributes to the works of Chaurey et al. (2004) and Kooijman-van Dija and Clancy (2010) by identifying positive linkages between electrification and poverty reduction. Furthermore, addressing remote rural communities contributes to improving the condition of the BoP population. The Brazilian case demonstrates that electrification leads to improved living conditions and creates new business opportunities which in turn develop new markets for multinational firms. Eventually, the self-reinforcing positive feedback loop between population wealth and business opportunities for MNEs can be triggered.

Therefore, in respect to the proposed research question, PPP can be viewed as an important element in facilitating the provision of clean energy (SDG 7) and consequently contribute to poverty reduction (SDG 1). The interconnections between public and business players can be systematised as seen in Figure 2. According to the presented framework, PPP can contribute to other well established but often ineffective mechanisms such as direct aid or corporate social responsibility (CSR). In this respect, PPP should be viewed not as an alternative but as a complementary tool which enables governments to better combine regulations and incentives and encourage MNEs to contribute toward sustainable development agenda objectives.

-----Insert Figure 2 here-----

The study contributes to the academic literature by highlighting the role of PPP in government efforts to achieve sustainable development agenda objectives. In particular, the study provides insights from a real case to this mainly conceptual discussion. The framework proposed can be applied in the empirical analysis of the impact of PPP in comparison with alternative mechanisms to achieve SDGs. The interconnections between SDGs, although intuitively appealing, so far have not received sufficient attention in the academic literature. Therefore, with this paper, we also aim to bring this issue into broad academic discussion.

The study identifies several implications for practitioners and specifically for policy makers. Attracting FDI is often achieved through economic instruments such as improved access to finances and tax rebates. However, regulations should require MNEs to also invest in less profitable projects such as the electrification of remote rural areas. PPP can be considered a mechanism for establishing a balance between incentives and regulations.

Regarding the capability-building aspects of PPP, governments should stimulate capability-building activities by both stimulating MNEs' investment in local training and supporting local entrepreneurship initiatives, resulting in the emergence of new firms. Governments need to create incentives for a skilled workforce to remain in rural areas.

Clear environmental regulations and incentives for adopting renewable energy-based solutions are essential. The optimal mix of various energy sources can be estimated with respect to each region's objectives. However, such off-grid systems need to be designed while considering technical sustainability, meaning further extension should be allowed as demand grows to avoid future investment costs.

The study also has several limitations arising from its explorative nature. A single case design limits the findings' generalisability, and therefore, the derived implications should be carefully reconsidered when expanding to other sectors. Furthermore, although the study focuses on emerging markets, the case country-context should be considered. Indeed, Brazil has vast water resources and a well-developed energy generation industry relying mainly on hydropower, which may not be the case for other developing countries. Finally, although the proposed framework is based both on practical findings and an extensive literature study, it has not been tested by a large-scale quantitative study. Nevertheless, the authors tend to view these limitations not as deficiencies of the current work but rather as prospective avenues for further studies. We believe the issues discussed in this work will trigger additional research and eventually produce a solid understanding of the potential of PPP in achieving the UN's sustainable development agenda objectives.

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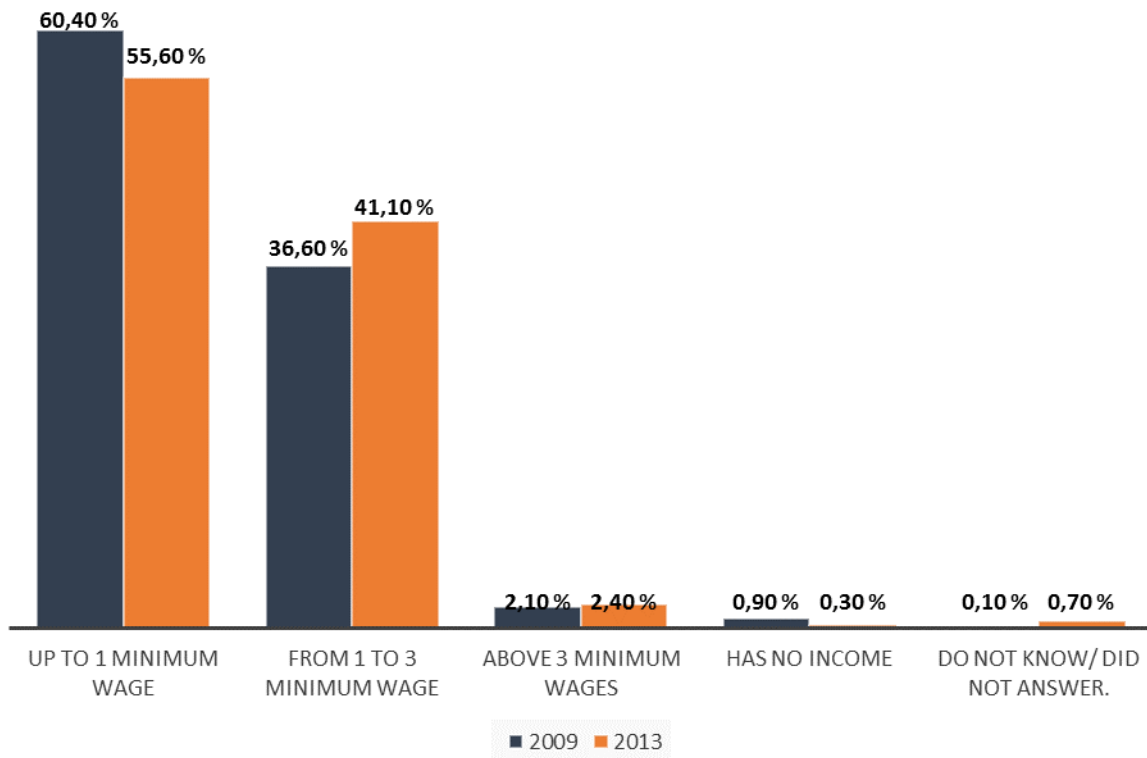


Figure 1. Average monthly family income (public data from Light for All Department/Ministry of Mines and Energy (MME), 2013)

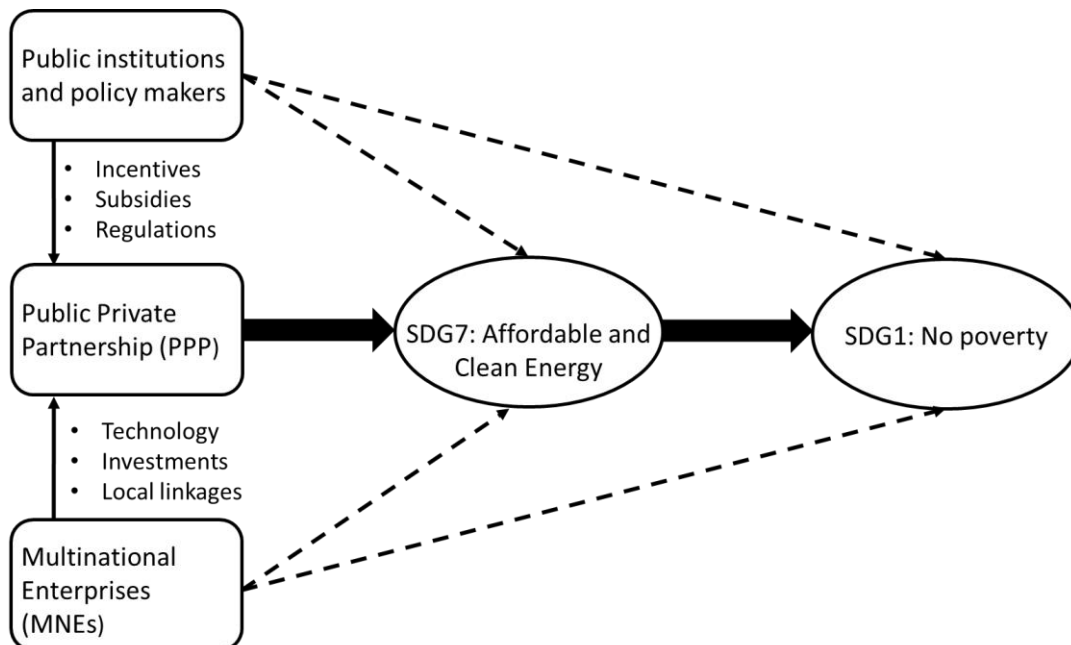


Figure 2. Framework

ⁱFor the purpose of blind review, the name of the project has been hidden.