

Unlocking Developing Countries' Clean Energy Endowment: Funding Structure for Renewable Energy Independent Power Producer Infrastructure Projects

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Abstract

Emerging markets are facing energy challenges related to accessing modern energy grids and funding for small Independent Power Producers (IPPs) simply because existing funding structures and contributions by multi-donor organisations are insufficient to scale up funding for the energy transition to renewable energy (RE) in the Southern African Development Communities (SADC) region. The main aim of this study is to examine the impact of current Re-funding structures on the small IPP capital structure. Furthermore, the study investigates how capital market and banking borrowing conditions affect the optimal capital structure of small IPPs, particularly in rural communities. The research adopted qualitative methods and document analysis techniques to review and evaluate secondary material related to RE funding structures. The findings reveal that current energy funding structures fail to incorporate other financial instruments which attract the lowest interest, or no interest, denominated in local currency to fund energy projects in emerging economies. These concerns are explicitly evident in the impact of current funding structures on the capital structure of REIPPs risk return relationships and their role to encourage small medium enterprises and community participation as highlighted in the literature review. This study will, therefore, assist in bridging the funding gap for small IPPs and promote community involvement in RE projects. It contributes to developing a funding structure suitable for RE funding in emerging markets, particularly the SADC region.

Keywords: capital structure; funding structure; independent power producers; renewable energy projects

1. Introduction

Access to sustainable energy in the Southern African Development Community (SADC) region remains challenging. The current energy supply fails to meet the growing demand for households and businesses, as recognised by the UNESCO 2030 programme on sustainable development. Africa needs a sustainable long-term solution to meet the current energy demand to cope with the

current economic transition in the SADC region, which has been the main driver of energy consumption (Dahunsi et al., 2020). The SADC region has the potential to become a leading global producer of clean energy, given the abundance of renewable energy (RE) sources as per the International Renewable Energy Agency (Soumonni, 2016). Small IPP companies still face significant financial constraints in providing energy for the SADC region. They often express concern about accessing funding from conventional financial institutions primarily owing to their small-medium size profiles and limited record in the energy sector. In South Africa's case, most debt facilities provided by commercial banks and other financial institutions feature credit margins that price small IPP companies out of the market. These bottlenecks reflect the market failure to attract small IPP companies' participation in the energy sector and the enhancement of commercial markets' contributions to the energy transition. Research shows that existing funding structures provide far below the required funds for sustainable energy transition (Müller et al., 2020). Government and private equity investment alone cannot bridge existing funding gap for small IPP companies accordingly, (Fatoki, 2021). Historically, government solely failed to bridge the large funding gap in energy transformation in most of the SADC countries. Consequently, public-and private participation are critical (Vallecha and Bhola, 2019). To promote Small- Medium IPP participation in the energy sector, this study proposes inclusive financial instruments with the purpose of incorporating inclusive blended financial instruments such as grants, community investments and government surety bonds as a proposed funding structure for energy projects in emerging communities with a specific focus on the SADC regions.

2. Literature Review

2.1. Contribution of various financial securities' risk factors to the capital structure of RE for IPPs in emerging economies

Financial securities have a significant impact on the economic system by allowing smooth trade between countries and individuals (Ji & Zhang, 2019). One of the most significant features of financial securities is the ability to be converted into liquid funds or assets in a short space of time and to contribute to the company capital structure (Kobina et al., 2020). Nevertheless, the extent of contribution to the capital structure has many implications in terms of risk, return and companies' future earnings (Musah, 2018). Lawrence (2020) indicated that Renewable Energy Independent Power Producers (REIPP) companies 'capital structure in emerging markets is exposed to several risk factors, such as Exchange Rate Risk, Revenue Risk, Participant Risk, Transmission and Infrastructure Risk, Change in Law Risk, Political Risk, and bribery and corruption.

Exchange Rate Risk

Exchange rate risk is critical for the REIPP capital structure in emerging markets. Li et al. (2020) indicated that most cost components for REIPP projects are made out of hard currency, such as pounds sterling, Euros and US dollars, while operating costs constitute local currency. Consequently, companies must identify and assess the impact of currency risk. Sigué (2020)

sampled 295 Indian manufacturing companies during the period 1995 - 2011 and found that 75% of companies are exposed negatively and that 25% of companies are exposed positively to exchange rate risk, thus influencing the capital structure. Exchange rate volatility and financial crises affect the company debt ratio adversely, which forms part of the company capital structure (Yang, 2021). Yang (2021) concluded that local companies having liabilities in the hard currency would be adversely affected by depreciating local currency. The effect of exchange rate risk on a capital structure, however, depends on the type of debt (Kusi et al., 2021). In most cases, REIPPs are funded through bank loans and equity or a combination of both (Harvey, 2020). In emerging markets, REIPPs source funds from several multiple donors, such as the Sustainable Energy Fund for Africa and Africa Renewable Energy Fund (Dong & Mori, 2017). Dong and Mori (2017) developed this type of funding to promote private sector participation in the RE sector in Africa (Dong & Mori, 2017).

Revenue Risk

There are revenue risk determinants that affect REIPP capital structure (Bolarinwa & Adegboye, 2020; Odusanya et al., 2018). The most determinants at company level include agency and leverage costs, bankruptcy and reorganisation costs, debt and non-debt tax shields, collateral value, liquidation costs and asymmetric information (Bolarinwa & Adegboye, 2020). In conceptualising these theoretical determinants, Habib et al. (2020) emphasised that costs associated with resolving the competing interest of management (agent) and shareholders (principal) which emanate from loan agreements increase the cost of debt.

Markannen and Braeckman (2019) indicated that agency costs form part of the challenges that small REIPP companies in emerging markets face when trying to access funds for their projects. REIPP companies mitigate this challenge by relying more on equity than on leverage (Probst et al., 2021). Regarding the effect of financial leverage on company profitability, Dalci (2018) concluded that highly leveraged companies earn lower rates of return than those that are less leveraged. This is consistent with Laborda et al. (2020), who found that increasing leverage for a company increases the volatility of earnings and cash flow, as well as the credit risk of the said company. The risk of funding with more debt than equity is that debt increases default and bankruptcy risk (Murphy, 2018).

Participant Risk

Participant risk is an important risk factor to be considered by both international and local markets when deciding to invest in companies in emerging markets. Despite direct and indirect support by the government in emerging markets, foreign investors are still susceptible to participant risk, which could pose financial distress for REIPP companies in emerging markets (Schmidt et al., 2017). Foreign investors fail to engage actively in the implementation of effective risk management, together with small REIPPs in emerging markets (Chakabva et al., 2021).

Efforts have been made to address issues relating to risk mitigation in emerging markets, yet the focus has been on the deployment of financial risk-sharing instruments (Fawzy et al., 2020). Despite the regular deployment of these financial products to emerging markets, they still impose

financial costs on the transaction, and ultimately, costs are passed on to end users, such as REIPPs, through higher tariffs (Solwa, 2019). Financial de-risking instruments are transaction specific, and they focus on addressing risks related to specific transactions. Consequently, a broader approach is required (Solwa, 2019). Some of these risks emanate from broader regulatory and institutional constraints and considering the nonfinancial de-risking approach (Anagnostopoulos & Kabeega, 2019). is advisable. Non-financial de-risking measures are long-term solutions aimed at addressing and removing barriers which are the root cause of specific financial risks at the transaction level (Yang et al., 2021). Non-financial de-risking, such as de-risking at a project level, may be an appropriate solution to addressing participant risk in emerging markets (Mungai, 2021).

Change in Law Risk

REIPPs must analyse the risk impact of changes in a country's law and government policy influence on credit extensions to put themselves in a more advantageous position when deciding on organisation capital structure policy (Soumonni & Ojah, 2021). Iddrisu and Alagidede (2020) highlighted that inflation control policies by countries' central banks significantly affect domestic investments, either directly through the cost of capital and indirectly through bank lending policies. Alagidede (2020) further states that government policies maintaining low-interest rates stimulate banks' lending position to private companies and ultimately improve domestic investments. Bloom et al. (2019) reiterated that sensible, innovative policy design is a key to bridging the funding gap in emerging markets. Polzin et al. (2019), however, emphasised that policies should focus more on addressing risk and return relationships simultaneously. Furthermore, the authors state that generic instrument design features have an impact on investment risk if designed in such a way to reduce RE project risk while improving project returns. Policies should, in any event, align with the country's energy policies to be effective (Gatto & Drago, 2020).

Political risk, bribery and corruption

Political risk plays an important role in encouraging private sector participation in the RE sector, according to Elie et al. (2021). Political risk on investment returns emanates from political corruption and bureaucratic inefficiency (Elie et al., 2021). Lee and Xiao (2021) highlighted that from the basis of political influence on corporate finance behaviour, REIPPs need to be cognisant of how political risk affects capital structure decisions. (PeiZhi & Ramzan, 2020) argue that for an organisation to identify and select an appropriate capital structure, in response to the type of political risk correctly, risk should be identified per country. PeiZhi further states that political risk affects optimal financing decisions differently per country.

2.2 Financial strategies applied in the REIPP capital structure.

The potential impact of climate change on the global community is currently receiving notable attention. At the recent Glasgow Climate Change Conference, global communities committed to tackling climate change by pledging financial support for emerging markets to adapt to climate change (Dominic et al., 2021). Dominic et al. (2021) posit that emerging markets are still faced with a funding gap which wealthy countries made a commitment to close by 2023. According to

the United Nations climate change white paper, climate finance was proposed as part of the financial strategy to address the funding gap in emerging markets. Climate finance consists of public, private and alternative sources of funds directed at emerging markets. This type of funding is facilitated through financial mechanisms such as the Global Environment Facility and Green Climate Fund. Moreover, this financial mechanism is liable to the Conference of the Parties (COP), under which certain criteria for funding, policies and programmes to be prioritised are decided and designed. Prasad and Sud (2021) argue that regardless of good intentions by the COP to bridge the funding gap, this funding mechanism failed to deliver on its previous promises to support emerging markets on sustainable development programmes and to favour the interest of contributing countries, inter alia, The United States of America (USA), China, the United Kingdom (UK) and Germany, therefore, an urgent need for alternative funding solutions at both the global and national levels, exists. Prasad and Sud (2021) further propose that new financial mechanisms at the global and multiple national levels be introduced with a focus on capacity and creativity.

In South Africa's case, the world's richest countries (Germany, the UK, the USA, France and the European Union) pledged \$5 billion towards transforming the energy sector (Zhang et al., 2021). This pledge consists of loans and interest-free grants (Zhang et al., 2021). South Africa, however, indicated that the pledge had to be in accordance with its current national goals to reduce the current debt of \$27 billion faced by Eskom (Winkler et al., 2021). Furthermore, the pledge ought to be structured in such a way that most funds had to be in the form of grants with loans made up of concessionary rates. Michaelowa et al. (2021), nevertheless, argue that the South African government does not provide clear guidance on how transition and funding will be managed and channelled to small-, medium-, and micro-enterprises and communities and the role of financial institutions such as the African Development Bank, Development Bank of Southern Africa and Industrial Development Corporation. Historically, South Africa and other Sub-Saharan African countries channel energy funds through IPP programmes without a proper management framework. Consequently, misallocation and a lack of accountability and transparency (Elsner et al., 2021). is inevitable. Fagbemi et al. (2021) argues that misallocation and lack of accountability prevailing from country political institutions driven by corruption in Africa limit economic transformation.

Countries in emerging markets have adopted several policy instruments to bridge the funding gap for energy projects. It is, however, equally important for policymakers to align policy instruments with country energy policies to create a sustainable energy sector in accordance with the country's economic conditions (Johnsson et al., 2020). Johnsson et al. (2020) assert that emerging markets are characterised by financial- and economic instability amongst others.

3. Discussions

3.1 Impact of financial securities on the capital structure of REIPP

Capital structure contributes to company success or failure over time (Mathur et al., 2021). How companies decide on capital structure and the combination will positively or negatively influence

how their profitability and market value perform over time (Derbali, 2022). This study focuses on the incorporation of blended finance, which consists of different risk profiles, to minimise the cost of capital while encouraging small IPP and private and public participation in the energy sector. Blended finance consists of financial securities characterised by favourable market terms and conditions on the capital structure to reduce the cost of capital (Attridge & Engen, 2019). This study further employs a strategic combination of different risk-return profiles of capital with those that do not require high returns, or no interest reduces risk. Blended finance encourages public and private investment by improving the risk-return relationship and mitigating perceived risk in areas that investors would consider risky (Rode et al., 2019).

Combining capital with different risk profiles encourages public involvement and private investment to accelerate financing in emerging markets (Attridge & Engen, 2019). In their study on the development of the impact of blending and associated quantitative and qualitative risk, Küblböck and Groh (2019) concluded that blending does not necessarily encourage activities and programmes beneficial to poor communities. The study also noted that in some cases, projects might not be aligned with the country's future plans and policies as a result of a failure to incorporate stakeholder participation and accountability measures. Hürlimann et al. (2020) researched the valuation of RE investments, focusing on key drivers impacting the proportion of debt and the equity ratio for IPP companies. The authors suggest that capital structure has several implications for the future cash flow of RE projects, of which variability is provided by the weighted average cost of capital (WACC). Ehlers et al. (2020) researched demand side management (DCM), focusing on how to measure the feasibility of financial instruments. The study drew attention to traditional capital structure theory by stating that the lower the WACC is, the greater the net present value of RE projects. Additionally, the study concluded that by achieving low WACC, IPP companies could service other project-related commitments.

Irawati et al. (2019) researched the role of loan quality, focusing on the relationship of financial performance. The study concluded that it is important for the IPP company to decide on an appropriate funding instrument which minimises WACC while enhancing future value as per traditional capital structure theories. Steffen's (2018) study draws attention to Miller and Modigliani's (M M) theory on capital structure. The study stated that, given a perfect market, how a project is funded is not relevant to its future value. Muhammad et al. (2020) researched timing behaviour and how it affects capital structure decisions. The study argued that considering emerging economies' market conditions, MM theory is not relevant in emerging economies as a basis to evaluate company capital structure owing to market instability. Ganiyu et al. (2019) investigated Nigerian company performance and capital structure. The study suggested that capital structure should be examined from the emerging economy context without tampering with the economic imperfections which characterise operating conditions. Martinez et al. (2019) reviewed capital structure theories and suggested that other traditional capital structure theories, such as trade-off theory and market timing, be considered to provide in-depth insights into financing decisions in emerging markets owing to their ability to adjust to dynamic situations characterising emerging economies. The study also drew attention from earlier traditional theories. The study concluded that regardless of trade-off and market timing theories providing insights into emerging

economies' capital structure, they are not flexible and must be modified to accommodate emerging economies' dynamics, which differ from developed markets. Nguyen et al. (2019) conducted a study to test capital structure theories with a specific focus on Vietnamese listed organisations. Empirical tests revealed that most Vietnamese companies prefer the trade-off theory as opposed to other theories. The study noted that insufficient evidence is available to support the efficiency of other theories, such as the pecking order theory when deciding on the financing structure for Vietnamese companies. Ganiyu et al. (2018) focused on capital structure with a specific focus on emerging markets and noted that studies conducted previously on capital structure theories do not consider agency cost theories between principals and agents, especially during the construction phase of the project to minimize risk on RE projects from an emerging economies perspective. Doğan and Acar (2020) reviewed agency theory and concluded that it plays an important role, as it brings out agency costs, negatively affecting WACC as agency costs rise. The debt level also grows resultant from WACC increases. Consequently, the optimal structure will be at a lower optimal level.

3.2 Capital market conditions and the capital structure of the REIPP

Simatupang et al. (2019) investigated the determinants of capital structure with a specific focus on the pecking order and trade-off theories. The authors concluded that a company will always raise funds internally for new projects from retained earnings to avoid default risk as opposed to external funding. If the necessity arises to raise external funds, debt is preferred over issuing new security. The study also noted that the pecking order theory contradicts MM's perfect market theory. It suggests that, given asymmetric information between internal- and external parties, managers prefer internal funding first and debt over issuing new stock. Tripathi (2019) investigated the Indian automobile sector with a specific focus on the agency theory. The author concluded that agency theory brings with it agency costs, arising from conflicting decisions between stakeholders and agents when opting for debt as a source of funding. Delis et al. (2020) investigated enforcement actions by banks on loan structures. The study noted that in most cases, banks impose restrictions on loan agreements to safeguard their investments and to restrict management's actions, resulting in limitations on target gearing ratio and limited operating freedom. Rajverma et al.'s (2019) study on capital structure with a specific focus on ownership structure and cost of equity supports Delis et al. (2020) who concluded that conflicting interests between debt providers, managers and principals can result in agency problems, the cost, of which, will reduce free cash flow over time.

MM theory further assumes that the market value of an organisation is affected by operating income apart from the risk attached to funding instruments. Recent studies by Sumiati et al. (2019) show that a company can, however, influence its value by stretching its capital structure between debt and equity to reach an optimal ratio to improve its outlook. Conversely, Ganiyu (2019) argues that the agency cost model, extending from the dynamic trade-off theory by Jensen and Meckling (1976), can be applied to emerging markets, especially in Africa, owing to imperfections which characterise the markets. Emerging markets are characterised by several market instabilities, such as the failure of the banking sector to act as an intermediary, resulting in expensive credit funding

and a lack of innovative funding instruments geared towards infrastructure development projects, as highlighted earlier in the study. Recent studies by Pandey and Sahu (2019) show that limiting debt funding can significantly and positively impact performance. Increasing the degree of leverage can, conversely, affect performance, adversely. Kudtarkar (2020), in support of Pandey and Sahu (2019), argues that a company should get funding through equity, especially for a new project, to avoid default in case of a project failure. Santoleri et al. (2020) argue that equity funding is favoured in the case of investment in intangible assets and can internally generate growth opportunities, especially in a situation where asymmetric information and agency costs are high. Thus, Fliers (2019) argues that decision makers' objective should be to target the debt-equity ratio with the main objective of preserving financial flexibility.

In support of the pecking order theory, Fu and Smith (2021) argue that ascribable to market dynamics, organisations tend to deviate from their optimal capital structure temporarily, and in due course, they gradually gravitate towards the optimum level of working capital. Several studies such as Liaqat et al. (2021) suggest that, given emerging economies' market dynamics, capital structure should be based on the correct combination of debt and equity, considering the cost and benefits of each funding instrument. In support of the trade-off theory, Ronic and Amadi (2021) suggest that companies should strive for an optimal capital structure minimising the cost of capital while enhancing the value of organisations and capitalising on the advantages of using selected funding instruments, such as tax shields. Butt (2019) argues that the trade-off theory consists of a single optimal leverage ratio, and the benefits and costs of equity and debt funding are traded. According to Jarallah et al. (2019), the trade-off theory, is however, inconsistent with other theories when analysing organisations' external funding following risk adjustment. Jarallah et al. (2019) further stated that companies turn to issue equity when risk increases and issue debt, following risk decreases.

3.3 Banking sector conditions suitable for the optimal RE IPP capital structure

Traditional theories define the optima capital structure as the best mix of debt and equity funding which minimises the cost of capital while enhancing the organisation's value. Nevertheless, each funding option comes with advantages which addresses funding needs for energy projects and drawbacks associated with servicing of the funding, as highlighted earlier in the study.

As a result, the pecking order theory states that given a lack of internal funding, companies should opt for debt funding. Yet, in the presence of asymmetric information, banks turn to put measures in place to minimise adverse selection discounts (Vives, 2019). In support of the MM theory of perfect markets with the absence of agency costs and taxes, the trade-off theory states that banks will always issue financial instruments which minimise the cost of capital to achieve optimal capital structure, as results prefer to issue a combination of debt and equity. Since emerging economies are characterised by imperfect conditions and high levels of asymmetric information, banks turn to using screening and monitoring strategies to alleviate the problem. Bank capacity and incentives to screen and monitor borrowers, differ (Havrylchyk & Verdier, 2018). Large commercial banks can screen borrowers more effectively than small banks (Havrylchyk & Verdier, 2018).

3.4 Effect of RE on IPP in emerging markets

According to (Morgan and Patomäki, 2021) COP 21 agreement by parties to the United Nations Framework Convention on Climate Change (UNFCCC), accelerated the need to promote further investment in RE. Morgan and Patomäki, 2021, further stated that, this actions would strengthen and promote much needed capacity for SMEs to directly engage in the energy transformation, although this increase in investment depends on the cost of capital particularly in emerging market. According to (Brealey et al. 2020) cost of capital provides an analytical standard to assess the risk return relationship which ultimately affects RE pricing and IPP ability to service the debt.

4. Conclusions

Current funding structures fail to incorporate other financial instruments which attract the lowest interest, denominated in local currency, to fund RE projects in emerging economies. Emerging economies' capital markets and the banking sector are poorly developed. Kariuki (2018) argue that conversional financial institutions are still at early developmental stage in emerging markets, therefore, the limited availability of financial instruments for RE projects. Accordingly, bridging the funding gap in terms of RE projects remains a necessity in emerging markets.

An appropriate funding structure should incorporate grants, community investments in the form of land as part of equity and government surety bonds in the capital structure for RE IPP project initiatives in emerging economies. This combination comprises financial instruments offering tax shields and a mixture of debt and equity with resultant lowest WACC, and the funding structure within optimal capital structure by replacing more expensive equity with cheaper debt to lower the WACC. It balances the leverage level by taking advantage of the pros and cons of debt and equity. The consistency with the trade-off theory principles supports the proposed funding structure for REIPP in emerging markets. The study provides local community organisations with alternative models for community involvement in RE projects. It contributes to the capital market and banking sector with conditions to be considered when small IPP companies decide on the funding structure for RE projects.

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