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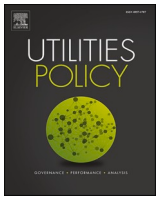

Full-length article

Structural, governance, & regulatory incentives for improved utility performance: A comparative analysis of electric utilities in Tanzania, Kenya, and Uganda

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ABSTRACT

Public utilities in most African countries have failed to deliver adequate, reliable, and competitively priced electricity to support economic growth and improve the welfare of their populations. Despite more than two decades of power sector reforms, outcomes have been varied and often disappointing. A comparative case study analysis of electric utilities in three East African countries (Tanzania, Kenya, and Uganda) explores the drivers of utility performance. Findings show that Tanzania Electric Supply Company Limited performed the worst. Kenya Power performed better, while Umeme is the most financially sustainable of the three utilities. However, this ranking among the three utilities is inconsistent across all performance measures. PSP is widespread and brings in much-needed investments in generation and distribution. Countries that restructured their power systems have reduced conflicts of interest, enabled deeper management focus, improved transparency and accountability, and built institutional capacity that translates into improved utility performance. One of our major conclusions is that despite improved governance in market-oriented power markets, consistent regulatory decision-making for cost-reflective tariffs and adequate indexation is still necessary to guarantee financial viability and sustainability.

1. Introduction

The power sectors in most African countries face an enduring problem of poor utility performance, i.e., electricity utilities have failed to deliver adequate, reliable, and competitively priced electricity to consumers. They have also failed to achieve financial viability to become creditworthy purchasers of power from Independent Power Producers (IPPs), let alone increase access to the large and unserved population (Eberhard and Dyson, 2019; Eberhard et al., 2016). This enduring problem constrains countries' economic and social development (IEA, 2019b). Power sector reforms encompassing corporatization, independent regulation, restructuring, PSP, and competition were adopted to tackle these performance challenges (Bacon, 1995b; World Bank, 1993). However, extant literature shows that outcomes have been mixed and often disappointing, mainly resulting in hybrid markets (Gratwick and Eberhard, 2008) that do not specifically address these failures and continue to persist. In addition, the degree to which power sector reforms were implemented has also varied, with some countries extensively adopting most of the reform steps across all dimensions, while others have exhibited an ambivalence towards the process, with reforms having stagnated midway (Eberhard et al., 2016) or implemented selectively, according to the ease of implementation, and others having halted the reform process (Foster et al., 2017). Despite scholarly documentation of sub-Saharan Africa's (SSA) power sector peculiarities, including by (Eberhard and Dyson, 2019; Eberhard et al., 2016; Eberhard et al., 2011; Jamasb and Llorca, 2018; Kapika and Eberhard, 2013; Vagliasindi and Besant-Jones, 2013), little is known about the factors explaining the differences in utility performance holistically. Statistical and econometric studies have also been shallow (Gassner et al., 2009; Urpelainen et al., 2017).

This paper explores the experience of power sector reforms and utility performance in three neighbouring countries in East Africa: Tanzania, which has seen very few reforms; Kenya, which has experienced partial unbundling and PSP; and Uganda, where the reforms have progressed the furthest, with full unbundling and extensive privatization. Reference is made to three case studies of electricity utilities: Tanzania Electric Supply Company Ltd (TANESCO) in Tanzania, Kenya Power and Lighting Company (KPLC[1]) in Kenya, and Umeme Ltd in Uganda. These three utilities represent a cross-section of the power sector and utility reform models, with different governance and

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[1] KPLC was rebranded as Kenya Power in 2011. For this thesis we shall maintain the name of KPLC for ease of understanding and harmonization.

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regulatory incentives for performance. TANESCO is a traditional vertically integrated state-owned utility; KPLC is an integrated transmission and distribution utility that has been separated from generation and has been partly listed on the Nairobi stock exchange, and Umeme, which has been separated from both power generation and transmission and was concessioned to a private investor and operator. It is currently listed on the Uganda and Nairobi stock exchanges. Both TANESCO and KPLC had private management contracts for limited periods.

The three East African countries make up the fastest-growing region on the continent with an average growth of 5% per annum, a positive contributor to the development of Africa overall. Kenya has the highest Gross Domestic Product (GDP) of US$ 101,279 million and GDP per capita of US$1,884, followed by Tanzania (GDP of US$ 70,281 million, GDP per capita of US$1177), and Uganda with the lowest GDP of US$ 27,444million and GDP per capita of US$ 908. In 2019, East Africa's Foreign Direct Investment increased from US$ 5 billion to US$ 11.5 billion in just a year (AfDB, 2019; EAC Secretariat, 2020).

We commence our inquiry by exploring the extant literature, which provides a novel typology of these reforms, and then examine the history and status of power sector reforms and their impact on utility performance. We examined the implementation of the standard reform model, its components (corporatization, regulation, restructuring, competition, and PSP), and the resultant outcomes. The article provides a primer for reforms in the region.

Tanzania, Kenya, and Uganda share corresponding colonial legacies as they all experienced British colonial rule and achieved independence relatively quickly in the 1960s. The three countries shared the characteristic of relatively small populations and low levels of economic development in the 1990s prior to the promotion of the standard model of reforms (Gore et al., 2019). All three cases were relatively weak to moderate states with low capacity for public service provision, low electricity access, and limited investments in the electricity sector. Kenya and Tanzania had started with moderately more electricity infrastructure serving the more expansive colonial administrative offices, residences, Indian ocean ports, and industrial and commercial sectors in the early 1950s compared to Uganda. Both TANESCO and KPLC had private management contracts for limited periods. Tanzania, Kenya, and Uganda are considered "early reformers" owing to their earlier adoption of power sector reforms in Africa. Their relatively long experience with reforms gives them a long track record of data to analyze. All three countries have witnessed relatively stable economic growth (GDPs) over the last ten to twenty years and have better-developed power sectors than their peers in sub-Saharan Africa, excluding South Africa.

Power sector reform theory is partly helpful in explaining the differences in utility performance, but this paper goes further to help explain how these reforms alter governance and regulatory incentives for improved performance. It also draws on other bodies of theory, namely principal-agent theory, to achieve a deeper understanding of the performance phenomena. Combining these two bodies of literature and theory with a multi-case study approach provides an analytical framework with rich insights, not only to answer the central question: why utility performance has differed in these three East African countries but also, more generally, around the linkages between power sector reforms and utility performance.

1.1. Enduring power challenges in brief

The Sub-Saharan Africa (SSA) region is faced with five enduring key power challenges: inadequate generation capacity; low access to electricity; unreliable supply; high cost of power, and poor performance of utilities, all of which have, in combination, constrained delivery of electricity services on a sustainable basis. The sections below give a brief description of each of these challenges.

1.1.1. Inadequate generation capacity

Sub-Saharan Africa's power infrastructure is considerably underdeveloped to match the electricity needs of its more than 1.2 billion people. Incidentally, the lack of electricity coincides with high levels of poverty and high population growth. With only about 120 GW (GW) of installed generation capacity for the 48 countries, the region compares much less to a single European country such as Italy, with 130 GW and a much smaller population of 60 million (IRENA, 2012; Power Futures Lab Database, 2020). The inadequacy of generation capacity is reflected in the uneven spread and concentration of generation capacity in a few countries, i.e. South Africa and North Africa (Eberhard, 2020). In 2017, 25 countries in the region had power systems smaller than 500 MW, and 11 countries had power systems smaller than 100 MW (IEA, 2019a). The inadequate electricity generation capacity constrains economic activity and human quality of life in the region, with numerous adverse effects (IEA, 2019b).

1.1.2. Low electricity access

On average, only 45% of SSA's population had electricity in 2018, far less than any other developing region (Blimpo and Postepska, 2017; IEA, 2019a). Only two countries on the continent, Mauritius and Seychelles, have near-universal electricity coverage. Six countries had access equal to or higher than 75%. Average access levels in rural areas are even lower at 35% (Eberhard, 2020; World Bank & AFD, 2019). Correspondingly, annual per capita electricity consumption averages only 375 kWh and falls to 153 kWh if South Africa is excluded (Trimble et al., 2016; World Bank & AFD, 2019). SSA is unlikely to realize the United Nations Sustainable Development Goal (SDG 7), that is, to ensure access to affordable, reliable, sustainable, and modern energy for all by 2030 (IEA, 2019b; International Energy Agency, 2019).

1.1.3. Unreliable supply

For many of those with a connection, the electricity supply remains unreliable and of poor quality. Power cuts and load-shedding are a frequent occurrence in many countries due partly to inadequate generation capacity but also to inadequate investments and maintenance in the network (Eberhard et al., 2016; Kojima et al., 2016). Recent data on Ease of Doing Business shows that fewer than one-third of firms sampled in 25 countries out of 29 have a reliable supply. More than two-thirds of firms experience electricity outages (The World Bank, 2018; World Bank, 2020a).

1.1.4. Power is costly

Faced with this situation, people and enterprises often have to rely on expensive diesel backup power generation to meet their electricity needs, costing some economies between 1% and 5% of annual GDP (Andersen and Dalgaard, 2013; Eberhard et al., 2016; Kojima et al., 2016). In times of crises such as drought, governments and utilities are compelled to contract expensive emergency short-term-lease power producers (EPPs) to bridge the supply-demand gap, with tariffs higher than US$0.25per kilowatt hour (Eberhard et al., 2016). Some countries do not have competitive and transparent procurement processes, and their poor investment climate, coupled with governance failures, has resulted in expensive generation plants (Eberhard and Dyson, 2019; Eberhard et al., 2016; Kruger et al., 2018), translating into high tariffs and cost of service. The cost of electricity (median tariff is US$0.15 per kilowatt hour) in Africa is among the highest in the world (Huenteler et al., 2017; Trimble et al., 2016), yet poverty levels are also highest in the region.

1.1.5. Poor utility performance

The above problems arise because of the poor performance of utilities. Technical inefficiencies are reflected in high losses implying that a significant proportion of the electricity that SSA utilities distribute is lost and cannot be monetized. The weighted average losses in SSA were 15% and rose to 23% if South Africa is excluded (Foster and Anshul, 2019;

Trimble et al., 2016), relative to the quasi-fiscal-deficits (QFD) international reference value of a well-performing power system for technical losses of 10% and non-technical losses close to zero. In SSA, only four countries (Botswana, Lesotho, Mauritius, and South Africa) have Transmission and Distribution losses of 10% or less (Trimble and Kojima, 2016). In addition, utilities are plagued by inefficiencies in capital expenditures (CapEx) execution, as projects experience massive cost overruns due to poor planning and sometimes corruption (Eberhard, 2020) which results in the high cost of service. The situation is further aggravated by the poor quality of service with a high-frequency system average interruption frequency (SAIFI) of 76 outages per year and a system average interruption duration index (SAIDI) of 5.5 h per outage (Kojima et al., 2016; Trimble et al., 2016). Poor reliability further leads to lower per capita consumption and lower sales and revenues for the utility (Andersen and Dalgaard, 2013), equivalent to US$ 82 billion a year, of which a significant portion is from sub-Saharan Africa (Rentschler et al., 2019).

However, commercial inefficiencies are reflected in poor billing and collections, resulting in a loss of revenue. Against a benchmark of 100% collection efficiency, a total loss of revenue to utilities in SSA amounts to about US$11 billion or 0.2% of the current GDP (Trimble et al., 2016). This cumulates into large debts and payment arrears, leading to chronic indebtedness, which further makes utilities financially unsustainable (Eberhard and Dyson, 2019).

Other commercial inefficiencies are reflected in underpricing or below-cost tariffs. Most utilities do not recover their operating and CapEx costs and require significant tariff increases if existing cost structures are maintained to achieve viability. The median level of underpricing at benchmark performance in SSA is US$0.04 per kWh sold, which compares to the median tariff of US$ 0.15 per kWh sold. Only three countries (Uganda, Seychelles, and Namibia) are at or above cost recovery revels (Trimble et al., 2016). Finally, utilities are beset by poor customer service revealed in disconnections, erroneous and delayed bills, slow complaints resolution rates, poor staff attitude, delayed connections, and inefficient technologies leading to low customer satisfaction and low willingness to pay.

Consequently, most incumbent electricity distribution companies (DisCos) are financially distressed and dysfunctional, i.e., utilities struggle to gain customer and investor confidence to attract equity and private capital since they do not have creditworthy balance sheets. The resultant revenue gap imposes an additional burden of subsidies on the already-strained fiscal resources of the government, a trend that has persisted in most SSA countries.

A response to these challenges has been utilizing power sector reforms involving corporatization, regulation, restructuring, competition, and PSP.

1.2. Linking power sector reforms to utility performance – the gap

Poor technical and financial performance was the defining feature of many African electricity supply sectors by the end of the 1980s and 1990s (Gratwick and Eberhard, 2008; Williams and Ghanadan, 2006). Drawing on the successful electricity sector liberalizations in the U.S and England, the World Bank began to promote, including in Africa, significant structural changes in developing countries' electricity sectors alongside the broader structural adjustment programmes for liberalization due to the growing dissatisfaction with the performance of state-owned vertically integrated electricity utilities (Besant-Jones, 2006; Foster and Anshul, 2019). Over time, the reforms advanced by the World Bank, International Monetary Fund (IMF), and other development partners came to be known as the 'standard model' and involved the establishment of an independent regulator, the unbundling of generation, transmission, and distribution, PSP, and competition. Despite many countries initially committing to the 'standard model', these reforms have progressed only partially and differently across the region, mainly resulting in hybrid power market structures, in which dominant incumbent state-owned utilities continue to operate alongside independent power producers (Gratwick and Eberhard, 2008). Some countries have also incorporated private management contracts or long-term concessions (Eberhard et al., 2017). These hybrid market structures have resulted in new governance and regulatory frameworks and have generated new operational and commercial issues that have impacted performance in one way or another. In addition, the reforms have sent different signals around incentives in the structural, governance, and regulatory frameworks of utilities, unlike what was initially envisaged in the pioneering standard model reforms.

However, the impact of these reforms on utility performance has been mixed, and the reforms are often not well understood. Several studies have been conducted to establish the reform impacts on performance, for example, (Jamasb et al., 2014; Polemis, 2016; Urpelainen et al., 2017; Zhang et al., 2008). However, these have mostly adopted an econometric/statistical approach and have been narrow in scope, often exploring relationships between a limited number of variables that do not give a complete picture or deep understanding and explanation of utility performance. However, the design of power sector reforms involves a range of interventions that play out in different ways depending on the political economy and country's context; these should be adequately taken into account.

This paper explores how the core reform steps of regulation, restructuring, competition and private-sector participation (PSP) impact utility performance. Specifically, we investigate the following questions: (1) Why does the performance of power utilities in developing countries differ so widely? In particular, how can we explain and understand the varied performance of power utilities in East Africa? (2) To what extent does principal-agent theory, combined with power sector reform theory, provide a useful analytical framework to improve understanding of the varied performance of utilities? (3) How do power sector reforms in differently structured power sectors alter structural, governance, and regulatory frameworks? (4) How do these reforms alter principal-agent relationships and incentivize performance improvement?

The paper continues with a presentation of the materials and methods in section 2, followed by a description of the theoretical and analytical framework in section 3. A comparative analysis of reforms and performance provides quantitative and qualitative results in section 4. The discussion and conclusions are presented in section 5.

2. Materials and methods

Our research utilizes a qualitative explanatory case study with embedded mixed methods of data collection (quantitative and qualitative) and analysis (Saunders et al., 2019) to investigate drivers of utility performance, governance arrangements, and principal-agency relationships. The overall research strategy is based on a holistic case study design involving multiple cases to extend the theory and knowledge (Eisenhardt and Graebner, 2007). The cases are good at revealing the complete picture, considering the context (Pettigrew,1985; Yin, 1994) and identifying causal links/operational pathways to the rich and in-depth information firmly rooted in the original evidence (Langley, 1999). They offer deeper insights into structural, governance, and incentive arrangements within utilities and can explain potential causal principal-agent pathways of institutional and organizational changes that are difficult to identify with econometric and statistical models that are limited by several variables (George and Bennett, 1997).

2.1. Data collection and analysis

Two methods of data collection were embedded within the case studies: Quantitative data collection was conducted first from secondary and primary data sources, including annual reports, sector-wide data, and multilateral development agency databases. The data was analyzed manually using Excel spreadsheets.

The qualitative phase involved qualitative document analysis (QDA)

of secondary data from the three case studies and involved 30 semi-structured and unstructured interviews in gaining deeper insights from interview participants. The qualitative document analysis (Bowen, 2009; Stritzke et al., 2021) was highly analytical and entailed filtering and selecting documents according to their relevance to deepen our understanding of utility performance metrics and to compare outcomes within and across cases. The documents contained specific key performance indicator indices, performance targets, applicable governance systems or strategies and instruments necessary to reveal causal pathways. The documents collected from 3 countries included contracts and agreements, regulations and licences, sector policies, annual reports, management reports backed by primary data, utility policy documents and board charters, company fact sheets, energy sector publications and reports, archival records, observational data from meetings as well as official medial publications from utilities and regulatory agencies. Document analysis allowed us to identify conceptual categories from the literature on power sector reforms and formulate emerging themes of the most influential factors on utility performance and their causal relationships with the outcomes (measured as KPIs). These relationships were further explored through semi-structured interviews both within and across cases. A purposive and targeted sample of 30 utility top executives (CEOs) and senior managers – high priority and highly knowledgeable interviewees who viewed the focal phenomenon of utility performance, governance, and incentives frameworks from diverse perspectives – was interviewed to obtain both retrospective and real-time accounts and reasons behind the utility performance phenomena, governance arrangements and principal-agency problems/relationships. Ten (10) interviewees at the head of the department level with 5–17 years' work experience were selected for each case study country (see Table 1). To limit information bias, a sample of two regulatory authority senior executives or managers helped validate the information utilities provided. It is unlikely that these various interviewees had engaged in convergent retrospective information sense-making or impression management. Combining these methods was necessary to allow for a direct assessment and data validation. The qualitative data were analyzed using NVivo software and triangulated (Guba and Lincoln, 1994).

Table 1
Number and Type of Respondents (RS) for semi-structured interviews.

No. of Interviews	Country	Type of Respondent (RS)	Level of seniority/ years of experience	Category of Respondent
10	Tanzania	TANESCO	4 RS more than 8 years 6 RS more than 10 years	Institutional
2	Tanzania	Electricity and Water Utilities Regulatory Authority (EWURA)	1 RS more than 14 years 1 RS more than 8 years	Institutional
3	Kenya	KPLC	8 RS more than 10 years 2 RS between 5 and 10 years	Institutional
2	Kenya	Energy Regulatory Commission/Energy and Petroleum Regulatory Authority (ERC/EPRA)	1 RS more than 17 years 1 RS more than 9 years	Institutional
2	Uganda	Umeme Ltd	6 RS more than 9–15 years 4 RS more 5–8 years	Institutional
2	Uganda	Electricity Regulatory Authority (ERA)	1 RS more than 8 years 1 RS more than 6 years	Institutional

3. Theoretical and analytical framework

Using the positivist[2] principal–agency theoretical lens (Eisenhardt, 1989), the analytical framework in the Fig. 1 above presents a governance structure that is used to explain the contractual relationships of various actors in the electricity sectors of the three case studies, as well as the structural and regulatory incentives on utility performance. This paper extends the positivist agency theory by describing in detail the nature of the contracts, their design and implementation effects on the performance of the utilities in East Africa.

The primary principals are the government (public) and private investors who enter a cooperative relationship via a concession contract premised on the implementation of power sector reforms and each with different sets of interest. The relationship is premised on a common goal – improving the performance of the traditional failed state-owned enterprise (SOE). The government's objectives in choosing among alternative forms of PSP are (a) economic efficiency to ensure that those who have a comparative advantage in managing the utility undertake it and that appropriate and innovative techniques of management and levels of effort are supplied in running the sector; (b) equity because the government desires to fulfill social objectives, such as service access, efficient usage, reliable supply of electricity as distributional benefits to the citizens (Sappington and Stiglitz, 1987), and (c) attract alternative capital for financing adequate investments into the sector, which eases the strain on its fiscal resources. In this way, the government expects to make a profit (rent) from its energy businesses. The government is represented and operates through the following entities: (i) the line ministry of energy, (ii) the support guarantor or implementing agency – usually the ministry of finance, (iii) the asset owner, (iv) the independent regulator, and (v) state-owned single buyer or system operator. The government expects the best outcome and will enter a delegation of ownership or services contract with the private sector to manage the utility. A contract is the key defining feature in this relationship (point A in the figure) and may take various forms. This paper does not intend to analyze minor sub-contracts to this model.

The other primary principals in this framework are the private investors, consisting of (i) equity providers, (ii) debt providers, (iii) retail stock exchanges, (iv) the IPP office, and (v) capital markets authorities (see Fig. 1). They provide capital and technical and managerial expertise in running the utility. Their primary objective is profit maximization, but the investors also want to improve the utility's performance. Private investors also seek ownership or lease rights of the utility. Under the PSP arrangements, investors are represented in the utility by a board of directors, in a relationship either as majority owners or have significant ownership in the utility (point B). The utility's board of directors are, hence, primary agents of private investors.

The relationship between the government and private investors (at point A) is defined in a contractual framework that takes the model of a performance contract, concession, or management contract – the primary contract (see Fig. 1). At the operational level, a series of contracts define the working relationships. The independent regulatory entity has contracts in the form of licences with the utility's investors/board of directors, while the single buyer/system operator utilizes power sales agreements (PSA) or power purchase agreements (PPAs) for transactions relating to investments in generation capacity expansion. The asset owner will have a lease and assignment agreement with the private investors, while the support guarantor – the ministry of finance, will have a support agreement with the private investors. The relationship

[2] The positivist theory of agency is more focused on describing the contractual and governance mechanisms that solve the agency problem, simply described as "why certain contractual relations arise" rather than on the *how* (Jensen, 1983, p. 326).

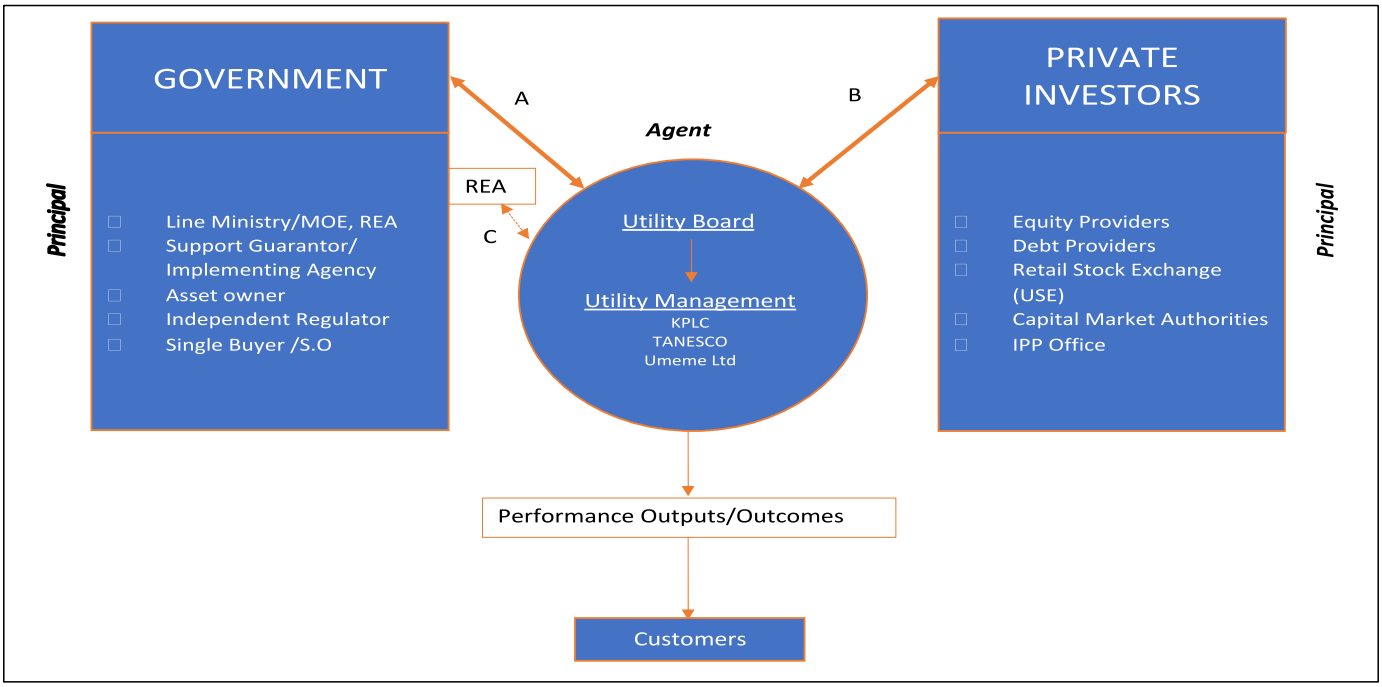

Fig. 1. The analytical framework. Source: Author's creation.

between equity and debt holders and the board of directors is defined in financing agreements as equity and debt covenants. Recent developments in the push for universal electricity access have also given rise to contractual relationships between entities charged with rural electrification (REA) and the utility, in the form of project implementation agreements/contracts (point C).

Within the utility, the main contract is between the board of directors, the managing director, and the latter's top executives by way of a service agreement. This contracting framework can then be cascaded downwards to staff, depending on institutional development, functions, and staff capacity. Utility managers should deliver services (outcomes) to consumers who, in return, pay for the services, thus creating revenue.

This overarching governance framework is broadly analyzed in terms of the tenets of principal–agency theory and the main drivers of delegation of tasks, including; (a) complexity of task under consideration, (b) risk aversion, (c) conflict of interest, (d) limited competition, (e) control, (f) transaction costs and how these relate to agency problems of information asymmetry, moral hazard, and adverse selection.

The link between reforms and performance is not always clear. Hence, this paper also explores the principal-agent theory, which helps us to delve into how these structural, governance, and regulatory reforms impact the relationship between principals (government institutions or investors) and agents (utility boards or management). Agency theory further helps us explore the behaviour and incentives accruing to principals and agents as motivation for their actions using a metaphor of a contract. Bringing these two bodies of theory together provides a potentially powerful analytical framework for comparing and understanding utility performance.

4. Analysis & results

4.1. Comparative analysis of power sector reforms and governance arrangements

The adoption of power sector reforms in the electricity sectors of the three case studies has had different impacts on the performance of their respective utilities. These reforms altered governance and regulatory arrangements, creating varying incentives for improved performance. This section provides a comparative analysis of the power sector, regulatory and governance reforms, and their impact on utility performance, for which we seek to answer the research questions posed above..

4.1.1. Corporatization

As the first step of the standard reform model, corporatization aimed to transform the utility into a state-owned enterprise (SOE) legal entity separate from the line ministry (government), with rights and obligations to transact independently under the regulatory structure of the Companies Act. Corporatization further aims to put state companies on a level playing field with private firms by removing barriers to entry, subsidies, and special privileges, thereby forcing SOEs to compete for finance on an equal basis and giving state managers the same powers and incentives as private managers (Shirley, 1999).

This corporate restructuring process alters the governance arrangements to directly mimic the private sector enterprise, although implementation might differ, ranging from situations where ownership may be mixed - as is the case in KPLC or even maintaining the existing political and hierarchical relationships (James, 2005), as is the case in TANESCO. Adopting a new organizational form can lead to a change in agency behavior because of the changed relationship between the central government and the new corporation and the changed agency-employee relationship that increases managerial autonomy and incentives. According to Talbot (2004), the corporatization phase is where most performance efficiency gains arise because managers expect to reap the rewards following privatization or autonomy. Interviewees in Kenya preferred corporatization because it offered "better prospects of incentive schemes linked to performance, better job security rather than outright privatization, and enhanced job salaries relative to public service remunerations". Corporatization and commercialization, therefore, lead to the realignment of incentives for managers and employees within the new entity, thereby resolving potential principal-agency problems associated with self-interest. For example, the composition of an independent board of directors is crucial in managing the influence of ministers by creating an 'arm's length' relationship between the government and the new corporation, thereby improving clarity in business decisions (Nelson and Nikolakis, 2012).

Corporatization, therefore, is expected to enhance commercial performance by improving clarity around business decisions and increasing managers' autonomy. Unfortunately, this is not the case in TANESCO, as these powers (autonomy) were retained by the government, unlike in KPLC and Umeme, which have diversity in ownership. The government of Tanzania still directly influences key operational, management, and technical decisions which undermine the techno-economic choices of the utility. As a result, governance arrangements continue to be largely opaque and appear to be broken, impeding the company's desired good management.

Governance arrangements are typified by enduring malfeasance, especially in procuring new IPPs and financial handouts to politicians and ministry technocrats. Despite efforts to put in place a performance contract (PC) to guide commercialization practices, the government still influences key provisions of the PC by inserting additional social or developmental obligations that are not directly related to the provision of electricity services, as is the case in Kenya's KPLC and, as a result, impose a substantial financial cost to the company's resources. Regrettably, the PC itself is poorly designed and does not provide any incentives for performance improvements.

4.1.2. Regulation

Regulatory reform involves the establishment of an autonomous entity with responsibilities for regulatory oversight and decision-making in areas such as licensing (market access), tariff-setting, and technical and service standards. Regulatory reform is concerned with defining the scope, authority, and methods used by the regulator to address privatization or PSP issues associated with incomplete information, monopolistic behavior, market uncertainty, and conflict of interest, protecting investors from unacceptable risks and the protection of consumers. It is also concerned with introducing efficiency, transparency, and fairness. Autonomy or independence is usually understood as independence in making regulatory decisions, which might only be overturned via a predefined appeal mechanism. All three case study countries have successfully established independent regulatory entities. However, in Kenya and Tanzania, the government (principal) has not fully delegated its oversight and supervisory role to the regulator (agent). Independence is considered essential to insulate the regulator and ultimately the utility (agent) from short-term opportunistic political interference and conflicts of interest that may threaten the achievement of the sector's long-term strategic objectives. However, in practice and our findings, complete independence has proved difficult to realize in the three countries. Governments still influence key regulatory decisions. For example, in Tanzania, tariffs were kept below cost-recovery levels when the 2012 and 2017 tariff reviews were overturned and, subsequently, the director-general was fired. Likewise, in Kenya, the former Energy Regulatory Commission/Energy and Petroleum Regulatory Authority (EPRA) has conducted only three tariff reviews in a 20-year period, despite the mandatory requirement to have the review done every three years. In both countries, political sensitivities (especially during election periods) have prevented tariff reviews from being conducted. In Uganda, political pressure has led to a revision of the tariff structure to provide cross-subsidies for the extra-large industrial customers. This act, however, is less financially harmful than the interferences in Kenya and Tanzania.

Interestingly, Tanzania's electricity act grants the Energy and Water Utilities Regulatory Authority (EWURA) powers to approve the initiation of procurement of power projects, unlike Kenya's EPRA and Uganda's Electricity Regulatory Authority (ERA). This provision is commendable as it seeks to discourage costly, unsolicited proposals that fall outside the master plan. As a result, the provision has helped EWURA to procure more small power producers more competitively. Unfortunately, regulation in all three case countries is still prone to high levels of information asymmetry and unobservable behaviour by the utilities (agents). This situation is particularly true of inefficient expenditures (CapEx and Distribution Operations and Maintenance Costs (DOMCs) and weak operational supervision resulting in enduring problems of limited access, poor reliability, and financial challenges for utilities, which ultimately increases the cost of electricity. In addition, since the leadership of independent regulatory agencies is appointed by the line minister of energy or the president, their independence can be compromised. Nevertheless, Uganda's ERA has achieved more legal, technical, and commercial independence and has been more successful than EPRA and EWURA, mainly because of government restraint in regulatory decision-making and ERA's ability to build capacity over time. This capacity has enabled the ERA to gain respect and credibility among public and private stakeholders.

In terms of costs, however, because utilities use complex, specialized equipment and assets to run the power system, which has limited alternative use, they face a high-risk exposure and are prone to expropriation once installed (Gratwick, 2007; Vagliasindi, 2012). Consequently, to attract investment in these assets (especially IPPs or concessions), the government must be able to commit itself to not exploiting the owners once they are in place. The institution of regulation helps to provide such commitment ability. Hence, regulators, in approving tariffs, should award fair rates of return to investors. In this way, the role of the independent regulator is to facilitate risk sharing in a manner that does not eliminate incentives for efficient performance. By defining the rate base on which a fair rate of return is allowed, independent regulators can penalize the utility for underperformance while, at the same time, ensuring that consumers share some of the burdens of unfavourable events that could not have been foreseen and avoided. Our empirical findings validate this logic in the case of Uganda's economic regulatory framework. In terms of improving the quality of service and productivity improvement, the *sunshine regulation* (naming and shaming) approach can be used to complement the pervasive rate of return regulation in SSA since it has the power to increase the threat felt by the utilities because their defects or deficiencies are exposed to the general public by the regulator (Simões and Marques, 2012).

4.1.3. Sector restructuring

Restructuring refers to "the movement along a spectrum towards full vertical and horizontal unbundling of the electricity sector (see Table 1 and 2). The starting point is typically a vertically integrated national monopoly utility, and the theoretical endpoint a fully restructured sector entailing vertical and horizontal unbundling of the generation and distribution tiers to create multiple companies operating in parallel" (Foster et al., 2017). Table 2 and Fig. 2 below compares restructuring progress in the three case studies.

The rationale for unbundling is that some parts of the electricity value chain are open to competition (such as generation) while others (such as the transmission and distribution wires) tend to be a natural monopoly (see Table 3). The retail aspect of distribution is also potentially competitive, where traders or sellers of electricity may compete for customers. Vertical separation of the distinct market segments is believed to guard against cross-subsidization between competing and regulated businesses and to minimize discrimination and conflict of interest practices such as denial of access to networks, procurement of new capacity, and dispatch prioritizations.

Unbundling introduces several agency relationships aimed at improving efficiencies and better management of risks and uncertainties in the different segments to allow for the allocation of better-targeted incentives..

Evidence from our case study principal–agency analyses shows that managers in vertically integrated SOEs might focus on the objectives of politicians rather than on maximizing company efficiency. Unbundling also allows for enhanced corporate governance, easier institutional capacity-building,[3] and increased managerial focus, accountability, and transparency in each segment.

[3] Training management to meet or exceed the set performance targets, easier recruitment of new staff with relevant expertise.

Table 2
Comparison of restructuring reform adoption and progress.

	Model Classification	Defining Characteristics	Tanzania	Kenya	Uganda
1	Vertically Integrated	A single vertically integrated entity undertakes generation, transmission and distribution.	x		
2	Partial vertical unbundling	Either generation has been separated while transmission and distribution remain combined, or distribution has been separated while generation and transmission remain combined		X	
3	Full vertical unbundling	Generation, transmission and distribution have each been separated from each other			x
4	Full vertical and horizontal unbundling	Generation, transmission and distribution have each been separated from each other, and further generation or distribution tiers have been restructured into multiple entities			x

Despite multiple policy pronouncements that Tanzania would restructure its power sector, TANESCO has remained a traditional vertically integrated monopoly, although a handful of IPPs has been allowed to enter the market. Compared to Kenya and Uganda, which have separated generation from transmission and distribution, Tanzania's electricity supply industry manifests a significant conflict of interest as the vertically integrated state-owned enterprise (SOE) continues to procure new generation capacity (competing with IPPs) directly.

In Kenya, restructuring has enabled market entry for more IPPs, contracted by KPLC. Subsequently, 17 IPPs have been operational, and 25 are in the pipeline with approved PPAs. Kenya is one of the few countries in Africa with a surplus reserve margin in generation capacity. In contrast, Uganda has undertaken the most extensive form of full vertical unbundling and has subsequently been able to attract the highest number of IPPs (38). This development is partly because of increased transparency, competition, and elimination of the conflict of interest in new generation capacity acquisition enabled through separation from the transmission system operator.

Bizarrely, the recent push by President Museveni – who originally championed power sector reforms in Uganda and now wants to re-bundle generation, transmission, and distribution as a public company to achieve a USc 5/kWh industrial tariff will most certainly reverse the financial viability, efficiency, and investment gains realized over the reform period. Considering that the average cost is USc13/kWh and the generation tariff alone is much higher at USc 8/kWh, such desired drastic reductions in the tariff will require unsustainable subsidies; mere rebundling will not deliver these expectations. Instead, the focus should be on addressing the servicing of loans for transmission and the expensive Chinese hydro plants (Isimba and Karuma), plus building governance and leadership capacity in existing institutions and

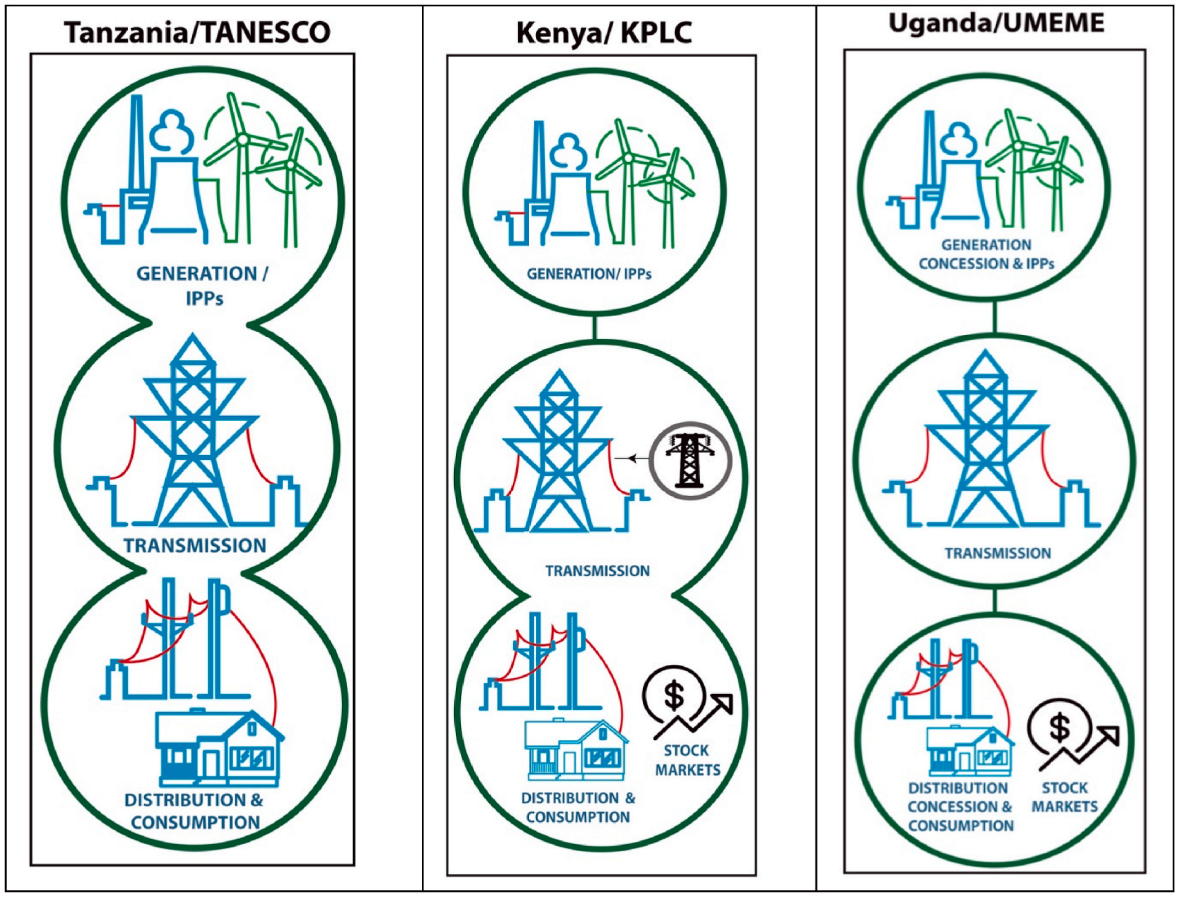

Fig. 2. Current Status of Reformed Power Structures in Tanzania, Kenya, and Uganda **(print in color)**.

providing the necessary performance incentives. Evidence from Tanzania's TANESCO, South Africa's Eskom and global reform experience shows that vertically integrated public utilities have poor incentives for improved performance, and Uganda should not walk this path.

4.1.4. PSP

PSP was recommended as an alternative market intervention to counteract the pre-reform inefficiencies and poor performance associated with SOEs. PSP was encouraged to shift investments and create managerial incentives towards profits, cost control, strict budgets, customer orientation, better revenue collection, and ultimately minimizing state subsidies (Bacon, 1995a; Gassner et al., 2009). It was further envisaged that PSP would facilitate a faster expansion and efficient growth of the electricity system, especially in generation. The private sector is known to minimize cost overruns and provide strong expertise and financing ability, especially for projects that require substantial up-front sunk investments (Martins et al., 2011). In instances where tariffs were below cost, PSP would help to increase them to optimal levels. PSP can be in the form of IPPs, management contracts, leases, concessions, or divestiture.

PSP and privatization efforts in developing economies typically result in the transfer of ownership (whole or partly) from the state to new owners. PSP arises out of the high-risk aversion of the principal in managing utilities or bearing the high cost of investment needs. PSP helps to solve the principal-agent problem by realigning incentives so that the private owners claim the residual benefits.

According to an interviewee in Kenya, "PSP further helps to cut agency problems of vested interests and networks of political patronage that prevent many utilities from providing optimal electricity services".

PSP in Tanzania, Kenya, and Uganda has been implemented differently and to varying degrees along several dimensions, including scope, segment, and coverage, depending on the host country's degree of preference (see Table 3).

Uganda has gone deepest into the adoption of PSP, reflected in its numerous IPPs, a 20-year private distribution concession, and publicly listing its stock on the Uganda and Nairobi securities exchanges. Listing altered governance incentives and created entry of 'quasi-ownerships' by private shareholders. Kenya comes second with a significant number of IPPs and also has PSP in the form of stock listings in two of its market-oriented utilities (KPLC and Kenya Generation Company Ltd (KenGen)). KPLC was also once operated under a management contract with Manitoba Hydro. In contrast, Tanzania has the lowest level of PSP in the form of two IPPs, and its utility TANESCO remains publicly owned and managed. TANESCO, too, had experience with the NETGroup management contract between 2002 and 2006. All three countries have public rural energy or electrification agencies, but they also have active PSP in off-grid and solar home-business models, including pay-as-you-go and mobile phone payments systems.

A respondent in Uganda argued that "PSP in the distribution segment brings obligations to grow shareholder value through distribution of mandatory dividends (bi-annually). This incentive compels us as private agents (either through concession or stock listings) to focus on improving technical and financial performance or face penalties, which may be financial or legal". Consequently, the empirical analysis shows this to be one of the motivations for improved performance in Uganda.

4.1.4.1. IPPs. Uganda stands out in the uptake of PSP in the form of IPPs (over 38) in the East Africa region (second to South Africa continentally), followed by Kenya (17) and Tanzania, with the fewest (4). Uganda also hosts the largest hydro IPP in East Africa – the 250 MW Bujjagali plant. Uganda provided a robust regulatory, incentive, and de-risking framework, creating a conducive and predictable investment climate that attracted a raft of international developers within a shorter time (pace) compared to Kenya and Tanzania. Uganda has subsequently built the reputation and credentials for IPP investments within a restructured electricity sector where many said unbundling was not wise. For a long time, Kenya's robust planning linked to least-cost power development plans (LCPDPs), transparent competitive processes, and timely procurements has enabled more PSP to acquire new generation capacity, helping to reassure the security of electricity supply.

Table 3
Forms of PSP and levels of adoption.

	Model Classification	Sector Structure Characteristics	Tanzania	Kenya	Uganda
1	Public ownership	All generation and distribution companies are under public ownership and management	x		
2A	Some degree of PSP in generation only	At least one generation company has been privatized, or there is at least one public-private partnership for power generation, typically as an *Independent Power Producer*. The precise extent of PSP in generation can be gauged by calculating the share of installed generation capacity under private control. There is no PSP in the distribution.	x		
2B	Some degree of PSP in distribution only	At least one distribution company has been privatized, or there is at least one public-private partnership for power distribution, typically a management contract or concession. The precise extent of PSP in distribution can be gauged by calculating the percentage of distribution companies in the country under private control. But there is no PSP in the generation segment			x
3	Some degree of PSP in both generation and distribution	At least one generation company and at least one distribution company have been privatized or have some form of PSP		x	x
4	Some degree of PSP in transmission or distribution through capital markets	At least one generation company or at least one distribution company has been privatized or has some form of PSP through a rights issue (IPO) and is listed on the stock exchange		x	x

In contrast, TANESCO remains state-owned with minimal allowance for PSP in generation. Excluding disputed emergency power plants, only four IPPs remain, of which only two, Songas 189 MW and Mtwara 12 MW open cycle gas turbine (OCGT) gas plant, are operational. Despite Tanzania being an early leader and pacesetter in IPP investments in SSA, the country has recorded no new IPPs in the last decade, owing to a lack of structural reforms. Previous experience in procurement of IPPs was disastrous because they were poorly planned, poorly negotiated (directly and non-transparently), and poorly managed – resulting in a colossal loss of revenue, time, and image.

4.1.4.2. Management contracts. Both Kenya and Tanzania had periods of private management contracts. Results from the analysis in this paper indicate significant performance improvements relative to the pre-reform periods (Kenya before 2006 and Tanzania before 2002), relating to reductions in system losses, increased revenue collections, increased connection numbers, innovations for reliability improvement, and increased capacity-building in Kenya. Despite its short spell, the management contract propelled KPLC onto a sustainable path for continuous performance improvements. Likewise, the management contract for TANESCO achieved increases in revenue collections, loss reduction in its first phase, and a reduction in government arrears. Although it was less fortunate in improving technical indicators owing to limitations in technical turn-around activities, its two phases from 2002 to 2006 registered financial success unlike before. While the management contracts were not renewed in both cases, they introduced incentives that facilitated improvements in technical and commercial performance relative to prior periods and demonstrated the benefits associated with PSP.

4.1.4.3. Concessions. While some proponents of the standard prescriptive model advocated for outright divestiture and privatization of profitable segments of the power supply industry, Uganda adopted a moderate form of PSP as a 20-year concession. Uganda was the first country in anglophone Africa to award a distribution concession and is still the only one of the three in the case study. The concession is a deeper level of PSP that grants 'quasi-ownership' and 'rights to operate' distribution assets to private investors. By undertaking this bold decision, Uganda has the most extensive form of PSP, which has helped to improve the performance of the previously failed electricity sector. The concession has been enhanced with the listing of Umeme on the Uganda and Nairobi securities exchanges, further allowing private shareholding through a rights issue.

4.1.5. Competition

Competition reform introduces wholesale and retail markets to increase consumer benefits, including lower electricity prices and access to a broader range of retail services and attracting private investments. When multiple companies compete for consumers, a market discipline is established, resulting in pressure to keep costs low-to-efficient levels and to innovate regarding service quality. It also helps to reveal the best option among competitors and reduce the uncertainty associated with the agent's performance because competitive markets provide more information about the company's environment as they seek to increase market share. As a result, shirking (moral hazard) is easier to detect, and managers' performance can be measured with higher precision (Vagliasindi, 2008).

The above analysis helps answer the first subsidiary question and demonstrates how structural reforms and governance frameworks in differently structured power sectors have changed incentives and impacted overall utility performance (see Table 4).

Table 4
Comparison of competition levels in Tanzania, Kenya, and Uganda.

	Model Classification	Defining Characteristics	Tanzania	Kenya	Uganda
1	Monopoly	A single company has responsibility for generation, transmission, distribution, and retail sales	x		
2	IPPs	As a monopoly above but private independent power producers (IPPs) are allowed to compete *for* the right to generate power	x	x	x
3	Single-Buyer Model	A single wholesale power trader that may be (i) a transmission entity, (ii) a distribution entity, or (iii) a combined transmission and distribution/retail entity, as long as it has no direct interest in generation. The single wholesale-power trader purchases power from all generators and sells to all distributors as well as any to large wholesale customers		x	x
4	Bilateral Contract with Third Party Access	A transmission operator or some other entity acts as a single buyer of power for the majority of retail customers while allowing large customers to purchase power directly from various generators – by wheeling power through the grid on a non-discriminatory basis		x	
5	Wholesale Competition	The power market of multiple generation companies sells competitively in a power exchange or directly to distribution companies and other large customers, supported by an independent system operator or market operator. Small captive customers can buy only from their local distributor			
6	Retail Market Competition	As above, but allowing all customers (large and small) to purchase power directly from retail companies, entailing prior vertical unbundling of distribution and retail companies, with distribution companies providing open access wheeling services to numerous power retailers			

4.2. Comparative summary of reforms across Kenya, Tanzania, and Uganda

Whereas the standard model was recommended as a one-size-fits-all index or scorecard, its variants have since emerged as a hybrid reform model in various developing regions, including East Africa. The Table 5 below summarizes the extent of power sector reforms in the three countries.

4.3. Comparative analysis of operational performance

The sections below present a comparative assessment of the five enduring power challenges to provide a deeper understanding of performance trends and solutions used across the cases to generate generalizable results.

4.3.1. Access to electricity

Tanzania's electricity access rates have remained low owing to the persistent power supply constraints and fragile financial performance of TANESCO, coupled with weak governance arrangements. The establishment of the Rural Energy Agency (REA), coupled with government and donor funding, has expanded electrification efforts. TANESCO has, on average, connected about 215,000 dwellings per annum since 2012. The combination of TANESCO and REA connections has more than doubled its access rates from 18% in 2010 to about 35% in 2018. Recent advances in solar off-grid systems, reductions in connection charges, and a political push from the government for universal access by 2040 have provided further impetus. Despite this progress, Tanzania's access rates are much lower than its neighbor Kenya.

Kenya has recently performed the best of the three case studies, increasing access from 25% of the population in 2013 to 75% in 2018. Progress is attributable to a combination of factors: a strong grid connection push through the Last Mile Connectivity Project; continuous support by the government for decentralized systems expressed through exemption from import and value-added taxes for solar products. Furthermore, a mature mobile payment infrastructure has enabled innovative business models and payment mechanisms to emerge. These factors allowed the country to increase grid connections by one million households per year and to provide more than 700,000 households with access to electricity through decentralized systems by 2018. KPLC has utilized its internal finances (including commercial loans) and a blended credit facility (Stima Loan) from the utility pension fund to provide connections. Although KPLC's average number of annual connections has declined to about 570,000 in recent years, it is still the highest in the region. KPLC's efforts were complemented by the government's mobilized funding of up to US$700 million for infrastructure expansion. Unfortunately, this ambitious project has dented the financial health of KPLC. Had it not been for the government's imposition of costly and ambitious connection targets, KPLC's financial performance would have remained sufficiently stable, although the downside is that electrification rates would have remained dismally low. There is, therefore, a trade-off to achieving growth in access rates.

Uganda, by contrast, has performed the poorest of the three case studies in access - 22% and lower connection numbers averaging 75,000 per annum. The low connection rate is attributed to the design of the concession that limited Umeme's operational areas to a maximum of 1 km geographical radius around the existing grid, as well as from weak connection targets, especially in the initial six-year period. Connection targets, as a trade-off for reducing energy losses were later dropped in the 2012–2018 tariff review period, which further removed incentives for access. The targets, not surprisingly, were reinstated in 2019. While the REA has tried to invest in grid expansion using public and donor funding and has handed over commissioned infrastructure to Umeme, very few connections on these power lines have followed, which is another weakness of the concession. While power sector reforms have successfully introduced governance arrangements that have catalyzed financial viability through the concession model, a lack of equivalent focus on access has been its central oversight and drawback. Despite the populist-natured electrification promised by President Museveni's government (Trotter and Maconachie, 2018), recent reports by the World Bank have further recommended the merger of distribution cooperatives and that the best option is to have one national distribution utility to drive access and financial sustainability (The World Bank Group, 2019). However, this World Bank report in itself does not assess the actual cost of generation and transmission cost of service and yet has been misconstrued by the President, cabinet, and other interest groups to advocate for the rebundling of the power sector to achieve a USc 5/kWh industrial tariff promised by the President. However, considering that the average cost is USc13/kWh and the generation tariff alone is much higher at USc 8/kWh, such desired drastic reductions in the tariff will require unsustainable subsidies; mere rebundling will not deliver these prices. A key lesson from this experience is that substantial subsidies, government funding, and private capital are required if Uganda is to replicate what Kenya and Tanzania are doing. Figs. 3 and 4 show a comparison of connections as a proxy of access rates in the three countries.

It is apparent from the above analysis that progress in electrification is mainly independent of the standard reform measures – such as corporatization, regulation, unbundling, PSP, and competition – and requires additional policy, planning, institutional, and funding interventions.

4.3.2. Adequate and reliable supply

Kenya stands out as the leader in the region with the highest installed

Table 5
Comparison of Reforms - Leading Performers Regarding Extent of Adoption **(print in color)**.

	Reform Actions	Tanzania	Kenya	Uganda
1.	Corporatization	↓	↑	↑
2.	Regulation	↑	↓	↑
3.	Unbundling/Restructuring	↓	↑	↑
4.	PSP			
a)	IPPs (BOO, BOOT)	↑	↑	↑
b)	Management Contracts	↑	↑	—
c)	Concessions	—	—	↑
d)	Stock Listings	—	↑	↑
5.	Competition	↓	↑	↑

Extensive-in-reform action (leader)
Moderate-reform action
Least-reform action

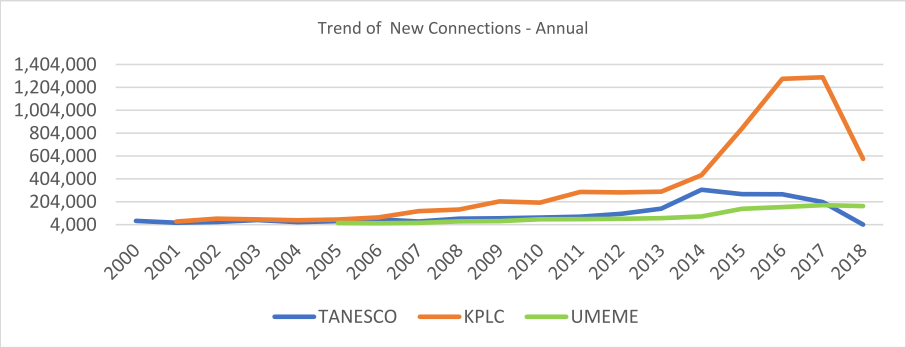

Fig. 3. Comparison of new connections – Annual.

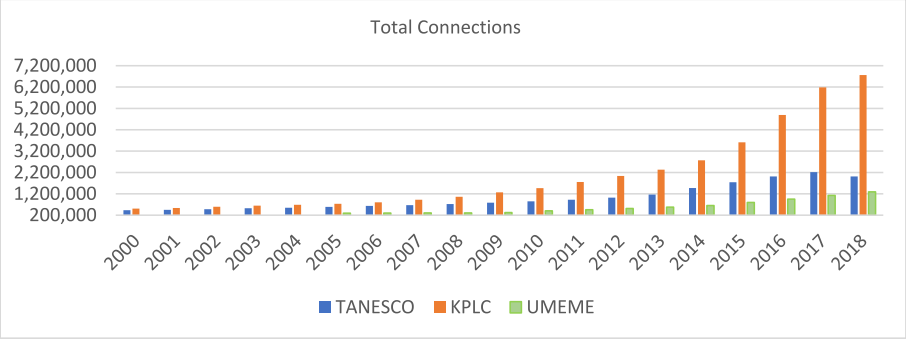

Fig. 4. Comparison of growth in total connections.

generation capacity (2712 MW) and a larger surplus reserve margin, reflecting assurances for security of supply into the future. The country has a well-established procurement framework and is currently in a fortunate position to have excess supply, an outcome of its earlier structural reforms separating KenGen from KPLC, creating a favorable investment climate. The KPLC has also built institutional capacity for system planning that has been the bedrock of timeous and competitive procurement of new capacity. KenGen has also leveraged its private equity to boost its financial record in mobilizing commercial loans and bond finance. The combined result has been the tripling of Kenya's generation capacity since the 1990s and the realization of a reserve margin of 47% by June 2020. Kenya also has an additional 25 IPPs with approved PPAs of a combined capacity of about 4000 MW in development. Kenya's security of supply has also been enhanced by significant diversification of the energy mix through donor-supported programs that provided financial enhancements and de-risking arrangements for its geothermal resources. Geothermal has, to date, become the country's largest energy resource of about 828 MW, the largest in Africa. Wind has emerged as another energy resource, indicating a shift from the traditional hydro sources. Renewable energy contributes 72% of Kenya's power, including geothermal, hydro, wind, and solar. Recent political directives to renegotiate existing and pipeline PPAs to reduce the cost of electricity by 33% by December 2021 (Government of Kenya, 2021) threaten investor confidence in the sector.

Tanzania, which has abundant energy resources, including natural gas, continues to struggle to provide energy security to spur the growth of its economy or to match the needs of its large population. Whereas the country had, in the 1990s, registered considerable progress in expanding its power system, backed by donors, and reaching the 1-GW (GW) mark by 2006, investments in the past decade have slowed, as promises of reforms have failed to materialize and donor support has been withdrawn. Despite Tanzania initially opening to PSP, a lack of capacity, poor planning practices, and abandonment of sector master plans – to pursue politically influenced uncompetitive bids for the emergency power plants in times of drought, unlike in Kenya, resulted in non-transparent, non-competitive, directly negotiated procurements of expensive IPPs and emergency power plants (EPPs), shrouded in corruption that dented the country's investment profile and left a lasting impression on the private sector. Subsequently, IPPs have been limited to a contribution of only 300 MW new capacity – half of which has since been decommissioned. The recent informal government policy shift from IPPs to the public expansion of generation capacity through TANESCO as the primary investment vehicle has crowded out PSP, even when the utility continues to be financially distressed and unable to raise the required capital. The ongoing Chinese development of the Mnazi Bay gas field may offer relief but will require funding from TANESCO, too. Unfortunately, the utility is financially incapable of raising funding. While the government has sanctioned the construction of the 2.1 GW Rufiji/Nyerere Hydro Power Project, it remains to be seen how high its total costs will be and the implications for end-user tariffs. What is clear is that Tanzania's current electricity supply remains unstable, inadequate, and insecure and unable to keep pace with demand growth at almost 6% annually.

Uganda currently has the lowest installed capacity of the three countries (see Fig. 5), coming off a low base after prolonged civil strife in the 1970s and 1980s that adversely affected economic activity and the pace of industrialization. However, with the advent of a stable political regime and power sector reforms, including unbundling of the power market and opening of the sector, there has been a fast-paced attraction of 38 IPPs, many of which were contracted through the Global Energy Transfer Feed-in Tariff (GETFiT) programme. Despite this achievement, Uganda, like Tanzania but unlike Kenya, continues to rely on directly negotiated deals for its large publicly funded projects, especially the Chinese-funded 600 MW Karuma and 183 MW Isimba hydropower projects. While these and others in the pipeline seem to have secured Uganda's power supplies for the near future (as peak demand is nearly half of installed capacity in the LCPDP base case up to 2027), there is enduring concern about the lack of capacity in the Ministry of Energy

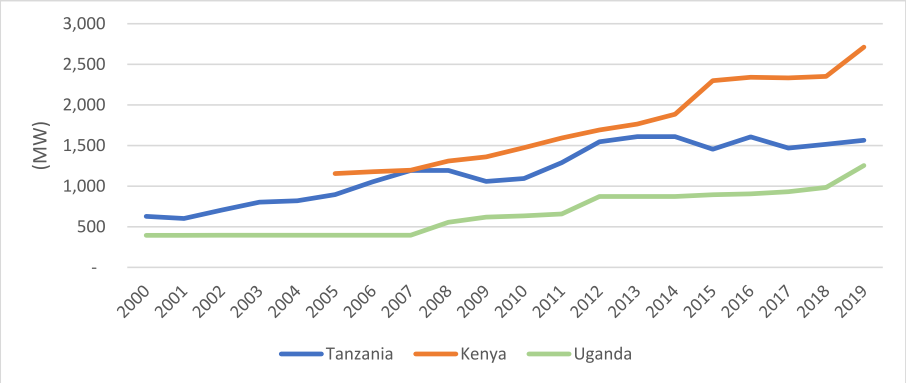

Fig. 5. Installed generation capacity (MW) comparison.

and Mineral Development to conduct timely competitive tenders for future projects – for which any delays may see the country reverting to use of costly emergency power. Sector coordination challenges persist, affecting timeous planning and initiation of procurements, let alone gaining sector consensus on the optimal choices of projects to undertake. Uganda has a suppressed demand that has not yet been quantified but could outgrow electricity supply capacity considering the country's population growth (3% per annum). Despite these challenges, Uganda's transmission company provides an independent and unconflicted platform for contracting new power and for providing non-discriminatory access to the grid. This feature of the Uganda power system is one of the reasons Uganda has successfully attracted IPP investments.

Two major lessons can be drawn from the above analysis: (i) a clear regulatory framework for procurement and licensing of IPPs is crucial for increasing energy security; (ii) structural reforms are also effective in facilitating investment in power generation and bringing in IPPs, thus contributing to adequate and reliable supply. However, they must be complemented with transmission and distribution investments.

4.3.3. Efficiency (Revenue collection Rates and loss reduction)

A comparison of loss reductions and revenue collection rates (see Figs. 6 and 7) shows that KPLC and Umeme have been performing exceptionally well compared to TANESCO, although KPLC stands out as the leader for consistently achieving collection rates close to, or at 100%, over the period. The commercialization reforms introducing performance contracts in 2004 drove collection rates from 81% to 99% in 2005. Subsequent reforms pioneered during the Manitoba Hydro management contract in 2006 improved collections to 100%. The period under the management contract saw KPLC invest significantly in technology, build staff capacity, and expand customer outreach in revenue collection programs. Innovative mobile payment platforms, such as 'M-Pesa,' augmented its revenue collection efforts. However, government non-payment of utility bills in recent times threatens to reverse this performance.

In Uganda, structural reforms, and management improvements in the Umeme concession, initially driven by external management experts, coupled with regulatory targets and the introduction of strict budgets, resulting in better cost control and focus on revenue collections, which increased from 80% in 2005 to 99% in 2011. Collection rates have since been maintained close to, or at, 100% assisted through technologies: prepaid metering; automated meter-reading (AMR). Umeme also utilized its concessional accounting, legal rights, and tariff formulae to exercise offsets against bulk supply tariff revenues due to Uganda Electricity Transmission Company Limited (UETCL), thus recovering energy arrears from government institutions.

In contrast with Umeme and KPLC, TANESCO's collection rates have fluctuated, indicating challenges in its revenue cycles. The NETGroup management contract increased collection rates in the first year from 85% in 2001 to 95% by 2002 using a combination of negotiated payback of public arrears from the government, the introduction of debt collectors, and disconnection campaigns. With the end of the private management contract in 2006, these measures were, however, not sustained. Regulatory pressure, TANESCO's partnership with banks, and adopting the online government platform (GePG) have helped raise collection rates. Collection rates above 100% in 2013 are due to one-off direct government transfers for accumulated arrears, while those in 2016 are due to the forced payment of Zanzibar Electricity Corporation's (ZECO's) arrears sanctioned by President Magufuli (ESI Africa, 2016, 2017) without whose intervention it would have been nearly impossible for TANESCO to recover the arrears (TShs 85 billion or US$ 38 million) on its own. ZECO charges a lower retail tariff relative to the bulk supply tariff charged by TANESCO, thus creating a revenue gap. Despite the revenue collection efforts, TANESCO remains burdened with substantial debt obligations and energy arrears of over TShs 300 million.

Regarding energy losses, TANESCO's performance has fluctuated between 28% and 18% due to a combination of enhanced investment

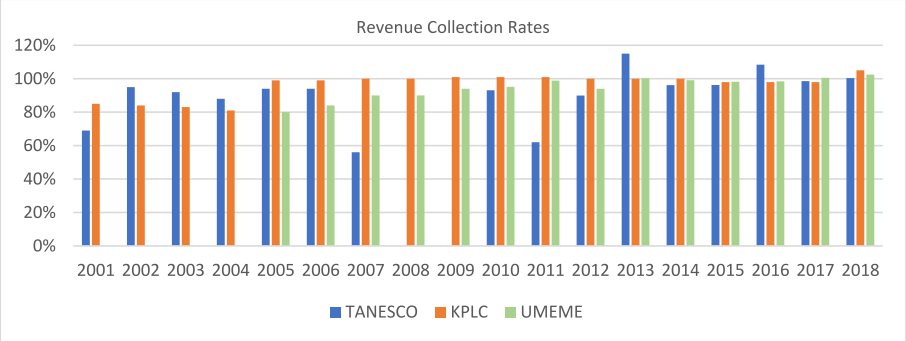

Fig. 6. Comparison of revenue collection rates.

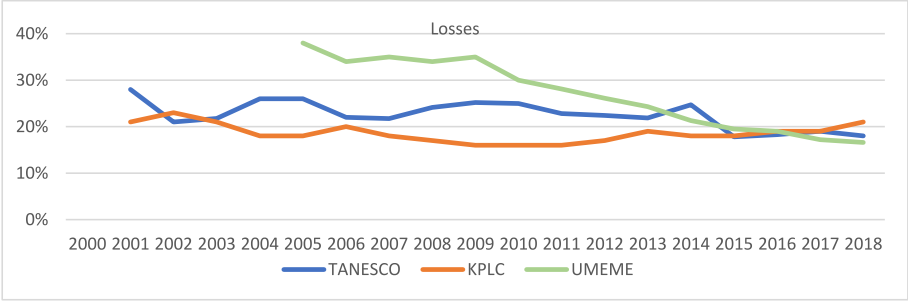

Fig. 7. Comparison of losses performance.

initiatives in the network driven by the regulator (EWURA).

For a long time, KPLC maintained lower losses than TANESCO and Umeme until 2015 (18%). Subsequently, with the aggressive implementation of the last mile connection programme (LMCP), KPLC's losses started to rise, reaching 21% in 2018 because of increased power theft and technical losses from long transmission and distribution lines and unoptimized transformer loads. Increasing losses have compounded the financial decline of the utility. Previous commercialization reforms, introduced by the Manitoba Hydro management contract in 2006, led to an immediate reduction in losses from 20% to 17% by 2008, indicating the positive benefits of PSP. In contrast, Umeme, which started from a higher level of losses at 38% in 2005 and struggled to reduce losses in its first six years, has recorded the largest loss reduction in a shorter period. Regulatory incentives for loss reduction have underpinned Umeme's gains.

4.3.4. *Affordability*

Tanzania has the lowest tariffs relative to its peers, Kenya and Uganda, with average retail tariffs of US$0.08 per kWh, but these are not cost-reflective. Affordability does not appear to be a concern in Tanzania, partly due to the incorporation of lifeline subsidies into the tariff, making the cost of subsistence consumption of 30 kWh affordable with electricity expenditure of just 2% of the gross national income (GNI) by the bottom poor 40% of the population (ESMAP, 2018). Average annual electricity consumption per capita has increased steadily to about 147 kWh by 2016, although it is still far short of the upper bound for lower-income countries – of 490 kWh per capita per annum. In addition, electricity connection costs are heavily subsidized by the government and donor funding. The downside to these subsidies is that tariffs have been set far below cost-recovery levels and have stagnated over time with no tariff reviews implemented in recent years – which has adversely affected payments to IPPs and the profitability of the off-taker TANESCO.

Historically, KPLC's tariffs have mainly been cost-reflective, helping to finance the numerous IPPs and keeping the sector financially viable. However, recent reversals of tariff reviews threaten this viability and cost reflectivity. Despite the relatively high cost of electricity, the cost of the subsistence volume of 30 kWh per month is below the 5% threshold of the budget of the poorest 40% of households. This result is due to the restructuring of the tariff levels that increased lifeline rebates up to 100 kWh and government and donor subsidies for lower connection costs occasioned through the Last Mile Connectivity Programme.

Uganda tariffs have been set to cost-reflective levels, helping Umeme to achieve financial viability and sustainability. This situation has meant a trade-off in affordability levels for domestic consumers, as the poorest 40% of the population needs to spend over 7% of their income on the subsistence consumption level of 30 kWh per month. The fourth and fifth quintile customers can afford the high tariffs. Connection costs are the highest in Uganda, averaging over US$200 for a no-pole service connection and US$750 for a one-pole service (ERA, 2020; Umeme, 2021).

Assessing the affordability of electricity tariffs as a measure of the effectiveness of utilities providing services to customers is complicated by the issue of regulation and whether tariffs have been set at cost-reflective levels. TANESCO's performance looks good in the above Fig. 8, but, as the analysis shows, its tariffs are not cost-reflective, and its financial sustainability is threatened. The affordability of electricity is affected by the least-cost generation and efficiency of the distribution utility. However, regulatory decisions also impact electricity prices, which has been the major factor impacting prices and lifeline tariff support for low-income households, where cross-subsidies may support these tariffs. EPRA and EWURA have provided the highest lifeline tariff thresholds of 100 kWh per month and 75 kWh per month, respectively, to support affordability objectives. Uganda's ERA has the lowest lifeline of 15 kWh. Affordability in Uganda remains a challenge despite more efficiencies registered due to a smaller customer base.

4.4. *Financial sustainability*

Financial stability is assessed by examining the utilities' ability to generate sufficient income covering OpEx and total CapEx, including a return on the new and replacement value of existing assets to allow for growth while maintaining efficient service levels. The comparative analysis utilizes the profitability, solvency, and liquidity ratios that help us gauge the utilities' financial performances in the long and short term and examine relationships among the ratios. The chosen ratios explain the three utilities' efficiency in deploying their assets to work and address financial risks resulting from the company's choice of how to finance the business using either debt or equity for its sustainability into the future.

The debt service coverage ratio (DSCR) measures an entity's ability to produce enough cash to cover its debt payments. The desirable ratio is above 1; lenders usually prefer values above 1.2 or 1.3. The interest coverage ratio, also known as income gearing, is used to determine how easily a company can pay its interest expenses on outstanding debt, and the preferred ratio is 1.5 or greater. The quick ratio (acid test) measures liabilities that fall due within the year with cash balances and assets that should turn into cash within the year (current assets excluding inventory) and is used to assess an entity's ability to meet short-term liabilities. The desirable level is 1. The current ratio is a ratio of current assets to current liabilities.

The comparison of solvency, liquidity, and profitability ratios shows marked differences in the performance of the three utilities. Umeme has the most favorable trend in its DSCR (see Fig. 9), Interest coverage ratio, and net profit margin. Umeme's DSCR is consistently above the target of 1.2 during the period due to a favorable 20% return on investment, boosting its revenue streams. From 2015 onwards, Umeme's DSCR dropped, owing to increased borrowing (US$235 million on Facility A and B) to finance its capital investments and the effects of amendment Number 5 – write-off of UShs 111.5 billion for the combined provision of growth factor revenues, Tax IN receivables, and tribunal appeal costs receivables. KPLC also has a favorable DSCR trend (Fig. 9), which is consistently above the target of 1.2, except for 2015 (lowest at 1.08) and more recent years when challenges associated with universal access

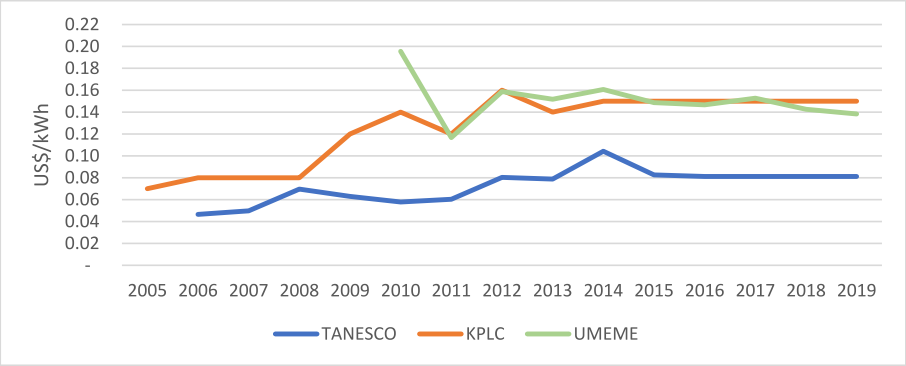

Fig. 8. Comparison of average retail tariffs in nominal terms.

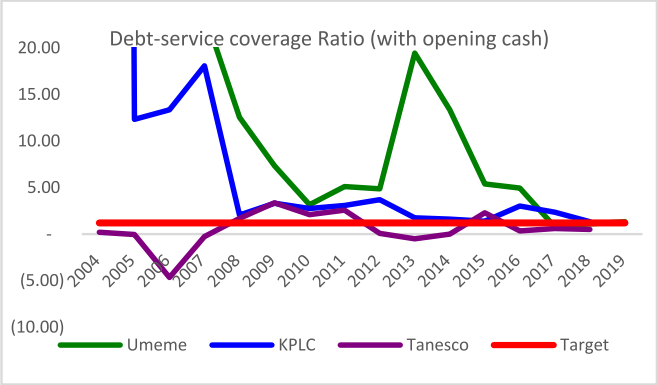

Fig. 9. DSCR (with opening cash).

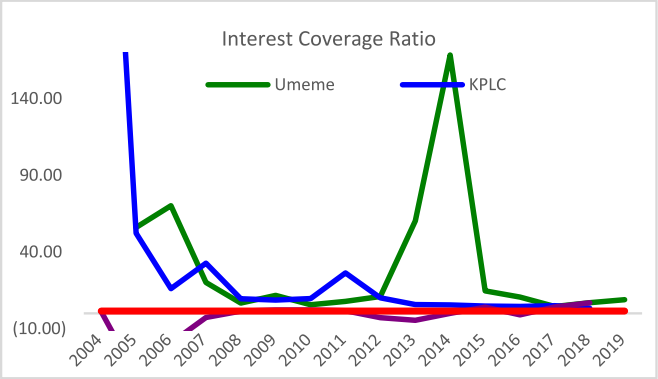

Fig. 10. Interest-coverage ratio.

programmes arose. In contrast, TANSECO has an undesirable DSCR trend that fluctuates below the target for most of the years assessed. Despite the debt relief offered to the company in 2005, where government debt was converted into equity, TANESCO's DSCR dropped to below target levels in subsequent years.

Governance arrangements also explain the differing DSCR ratios for the three companies. Because Umeme and KPLC are listed on the securities exchanges of Uganda and Nairobi, there is a heightened level of scrutiny placed upon the company regarding its financial performance with stringent compliance obligations to maintain profitability, solvency, and adequate working capital levels. Financial and managerial incentives increase its efficiency in cost control and revenue management, as the company's executives aim to increase shareholder value, while decisions to take on additional debt are thoroughly vetted to ensure that value is derived from the loans obtained, unlike in TANESCO - a public parastatal that often relies on inadequate subsidies from the government of Tanzania.

The interest coverage ratio shows the declining trend for Umeme between 2015 and 2018 due to drawdowns on facility A and facility B loans in 2016 and bridge financing in 2017, coupled with a write-off of regulatory receivables under amendment 5. For KPLC, the decline is attributed to increasing short-term debt for the Last-Mile Connectivity Programme (see Fig. 10).

The liquidity ratios for all three utilities are deteriorating and are not favorable, although Umeme performs closer to the target, as shown in Figs. 11 and 12 above. This finding implies that, for this period, the utilities' liquid assets were insufficient to meet their short-term obligations. Nevertheless, profitability ratios (net profit margin after tax) show Umeme consistently outperforming its peers (Fig. 13) due to incentives embedded within the concession and the tariff increases.

In general, KPLC and Umeme have performed much better financially than TANESCO, and Umeme has generally performed better than

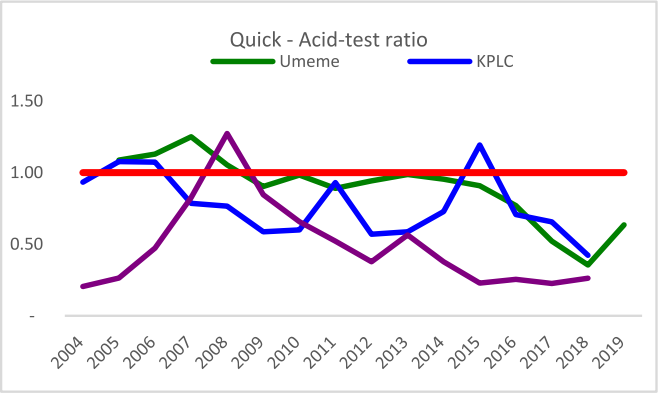

Fig. 11. Quick ratio (acid-test).

KPLC.

The third subsidiary question is answered by the above operational performance analytical framework that explains how the performance of the power utilities in Tanzania, Kenya, and Uganda differs. The subsidiary question further seeks to unearth whether other important determinants of performance are examined in the following section.

5. Discussion and conclusions

The paper has reviewed the empirical and theoretical literature on linkages between electricity sector reforms, governance arrangements, and technical and operational performance, assisted by employing principal–agency theory, in the three case studies: Tanzania, Kenya, and Uganda. A comparative assessment of performance provides a deeper

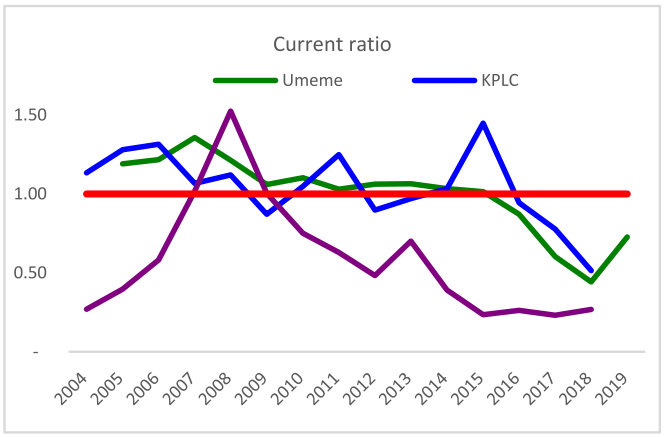

Fig. 12. Current ratio.

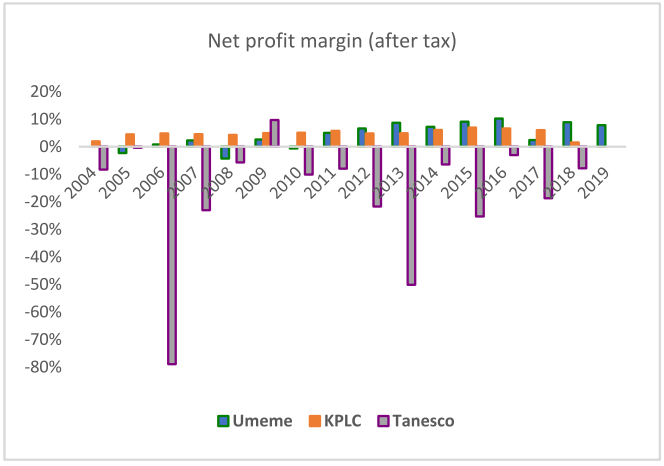

Fig. 13. Net Profit Margin After Tax. Source: Author based on TANESCO, KPLC & Umeme Annual Reports.

understanding of the context and motivation for reforms and has shown different levels of progress in implementing reforms with varying performance outcomes. From the empirical findings herein, we draw the following conclusions and reasons why the three utilities have performed differently.

- **The overall conclusion on the effect of the extent and depth of reform** is that the countries that made efforts to design inclusive reforms and get the buy-in of key stakeholders were more successful in the adoption, depth, and extent of the reforms. In particular, Uganda and Kenya have had much more successful reforms than Tanzania. While there are similarities in some aspects of reforms, there are also stark differences resulting in superior performance.
- **Irrespective of the country's starting conditions, the pace, timing, and speed of adoption of reforms are partly dependent on the country's commitment and desire to reform,** as demonstrated by the fast Uganda experience. Uganda also had a weaker electricity infrastructure system that was poorly managed and affected by long periods of civil war.
- **The existence of an independent regulator is essential, but its independence needs to be protected, and it needs to be capable.** Regulatory independence that facilitates cost-of-service studies establishes adequate revenue requirements, increases tariffs to cost-reflective levels, and implements tariff methodologies consistently helps to build sufficient revenues and financial viability for utilities like Umeme relative to TANESCO and KPLC. Government restraint and support are needed, especially from the executive arm of government and the line ministry of energy, to achieve such viability,
- **Unbundling helps to remove the conflict of interest, create management focus, easier institutional capacity-building, and improve utility performance.** Unbundling allows for enhanced corporate governance, accountability, and transparency in each separated segment. Because of increased managerial focus and dedicated teams, unbundling increases specialization in task execution, mitigates risk, reduces information asymmetry, and highlights concealed conflicts of interests (such as insider trading). There is greater visibility of staff contributions to overall company performance, making it easy to detect and limit staff (agent) shirking.
- **PSP in generation is now widespread, bringing in much-needed investment; best outcomes in the quantity of investment and competitive prices; best outcomes through the timeous translation of least-cost plans into international competitive bids or auctions.** Private capital in Kenya and Uganda has helped to relieve governments of subsidies that previously strained their treasuries.
- **PSP in transmission and distribution is still limited.** KPLC and Umeme's experience demonstrates how stock-exchange listings create additional incentives for improved performance by allowing in more private equity for investments in network expansions and operations. However, a vast infrastructure funding gap remains for extending electricity to unserved populations in the relevant countries.
- **Competition reforms have not diffused much given limited electricity infrastructure, inadequate technical capacity for power-planning linked to time, competitive procurement of new generation capacity and the enabling technologies to facilitate wholesale and retail trade in spot markets.**
- **Private concessions provide deeper incentives for improved performance.** The experience of Uganda shows that concessions are more powerful performance drivers than management contracts or performance contracts, especially regarding incentive allocation and financial sustainability. They also offer clearer pathways to sustainable investment decisions for PSP and ultimately filter into better performance outcomes.
- **Strong management incentives are critical for the success of any utility and their impact on performance.**
- **The stock market listing provides a strong impetus for strict compliance with market regulations and covenants of debt or equity providers.** Listing introduces discipline and intense scrutiny, accountability, and transparency in reporting, with various levels of checks to ensure there is a sustained trend in performance.
- **At an operational level, conventional reforms are insufficient.; additional incentives are needed to reduce losses and improve reliability, billings, and revenue collections.** These incentives and penalties should be appropriately incorporated into concession agreements or performance contracts, and regulatory frameworks/targets and cascaded down to management and staff. Stretch targets enable the regulator to improve supervision and monitoring and limit information asymmetry in reporting. Because the regulator has powers to approve the targets, they can direct the utility to focus on priority developmental objectives.
- **Widened access to electricity is generally independent of the standard model power sector reforms and requires additional interventions for success, such as electrification targets, better spatial planning, dedicated funding, and dedicated institutions. Some of these could also be integrated into the design of concessions.** In addition, an enabling regulatory framework for market entry for renewables and off-grid electricity technologies, including mini-grids and home solar systems, has helped to increase access rates in Kenya and Tanzania.

In sum, achieving financial viability and sustainability remains critical to creating bankable balance sheets that will attract private

capital for system expansion, access, and overall economic development. Despite governance efforts being put in place, utilities continue to struggle to achieve financial sustainability. Consistent regulatory decision-making for cost-reflective tariffs and adequate indexation helps to achieve financial viability and sustainability. Governments should not deplete utility financial revenues by imposing costly development programmes – such as the universal access programme in Kenya, without providing matching subsidies to cover the viability gap.

Uganda's recent push to re-bundle generation, transmission, and distribution as a public company to achieve a USc 5/kWh industrial tariff will reverse the financial viability, efficiency, and investment gains realized over the reform period; mere rebundling will not deliver these prices. Instead, the focus should be on addressing the servicing of loans for transmission and the expensive Chinese hydro plants (Isimba and Karuma), plus building governance and leadership capacity in existing institutions and providing the necessary performance incentive.

Uganda has proved that concessions, if well designed to suit local country conditions and when well managed and consistently supported by all stakeholders, can be successful in turning around utility performance. Uganda should stringently revise the current concession to ensure it delivers efficiencies and development objectives rather than outright cancellation.

In Kenya, the principal's continued interference has adversely affected KPLC's liquidity ratios to the extent that the utility has breached its debt covenants. The regulator, too, has been undermined by the government issuing directives including to halt or postpone tariff reviews which have caused a decline in profitability and financial performance. It is therefore vital that the relationship between principal and agent is well understood, and when the agent is well-incentivized, performance improvements are possible. However, performance improvements can be reversed when the principal undermines or muddies those incentives through conflicting political interventions.

Tanzania's extensively broken governance structure in the energy sector, institutional failures, lack of incentives, systemic political interference, and ambivalence toward reform, coupled with a financially broke utility, will not deliver the necessary investments and services to match its growing demand population for the foreseeable future. Enhanced corporatization, regulation, restructuring, competition, PSP and related reforms are essential if the sector is to attract private investment and achieve SDG 7.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

References

AfDB, 2019. East Africa economic outlook 2019. In: Africa Economic Outlook Report. Retrieved from. https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/2019AEO/REO_2019_-_East_Africa_.pdf.

Andersen, T.B., Dalgaard, C.J., 2013. Power outages and economic growth in Africa. Energy Econ. 38, 19–23. https://doi.org/10.1016/j.eneco.2013.02.016.

Bacon, R., 1995a. Appropriate restructuring strategies for the power generation sector: the case of small systems. In: World Bank Industry & Energy Department. Retrieved from. http://documents.worldbank.org/curated/en/990541468767055999/pdf/multi-page.pdf.

Bacon, R., 1995b. Privatization and reform in the global electricity supply industry. Annu. Rev. Energy Environ. 20, 119–143 https://doi.org/165.0.104.178.

Besant-Jones, J.E., 2006. Reforming Power Markets in Developing Countries: what Have We Learned? Retrieved from. http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2007/03/07/000310607_20070307122641/Rendered/PDF/380170REPLACEMENT0Energy19.pdf.

Blimpo, M.P., Postepska, A., 2017. Why is household electricity uptake low in sub-Saharan Africa? Why Is Household Electricity Uptake Low in Sub-Saharan Africa? 1–41. https://doi.org/10.1596/33109.

Bowen, G.A., 2009. Document analysis as a qualitative research method. Qual. Res. J. 9 (2), 27–40. https://doi.org/10.3316/QRJ0902027.

Eberhard, A., 2020. Power investment trends and challenges in sub-Saharan Africa. In: Power Futures Lab. Graduate School of Business, University of Cape Town.

Eberhard, A., Dyson, G., 2019, September 25. Revisiting Reforms in the Power Sector in Africa. African Development Bank Group, p. 72. Retrieved from. https://www.afdb.org/en/documents/revisiting-reforms-power-sector-africa.

Eberhard, A., Rosnes, O., Shkaratan, M., Vennemo, H., 2011. Africa's Power Infrastructure: Investment, Integration, Efficiency. https://doi.org/10.1596/978-0-8213-8455-8.

Eberhard, A., Gratwick, K.N., Morella, E., Antmann, P., 2016. Independent Power Projects in Sub-saharan Africa: Lessons from Five Key Countries. https://doi.org/10.1596/978-1-4648-0800-5.

Eberhard, A., Gratwick, K.N., Morella, E., Antmann, P., 2017. Independent power projects in Sub-Saharan Africa: investment trends and policy lessons. Energy Pol. 108, 390–424. https://doi.org/10.1016/j.enpol.2017.05.023.

Eisenhardt, K.M., 1989. Agency theory: an assessment and review. Acad. Manag. Rev. 14 (1), 57–74.

Eisenhardt, K.M., Graebner, M.E., 2007. Theory building from cases: opportunities and challenges. Acad. Manag. J. 50 (1), 25–32. https://doi.org/10.5465/AMJ.2007.24160888.

ERA, 2020. The New Electricity Connection Charges. Retrieved December 10, 2020, from. https://www.era.go.ug/index.php/media-centre/what-s-new/348-the-new-electricity-connection-charges.

ESI Africa, 2016, October 31. Tanzania: Parliament Orders Gov't to Settle Electricity Debt. ESI Africa. Retrieved from. https://www.esi-africa.com/news/tanzania-parliament-orders-govt-to-settle-electricity-debt/.

ESI Africa, 2017. Zanzibar Begins Paying Tanesco Outstanding Power Bills. *ESI Africa*. Retrieved from. https://www.esi-africa.com/regional-news/east-africa/zanzibar-begins-paying-tanesco-outstanding-power-bills/.

ESMAP, 2018. Regulatory indicators for sustainable energy. In: Documents and Reports. https://doi.org/10.4135/9781446219478.n3.

Foster, V., Anshul, R., 2019, September 10. Rethinking Power Sector Reform in the Developing World. World Bank, p. 356. https://doi.org/10.1596/978-1- 4648-1442-6. Understanding Poverty.

Foster, V., Witte, S., Banerjee, S.G., Moreno, A., 2017. Charting the Diffusion of Power Sector Reforms across the Developing World. Retrieved from. https://esmap.org/charting-the-diffusion-of-power-sector-reforms-across-the-d.

Gassner, K., Popov, A., Pushak, N., 2009. Does Private Sector Participation Improve Performance in Electricity and Water Distribution? https://doi.org/10.1596/978-0-8213-7715-4.

George, A.L., Bennett, A., 1997. Process Tracing in Case Study Research, pp. 104–105. October.

Gore, C.D., Brass, J.N., Baldwin, E., MacLean, L.M., 2019. Political autonomy and resistance in electricity sector liberalization in Africa. World Dev. 120, 193–209. https://doi.org/10.1016/j.worlddev.2018.03.003.

Government of Kenya, 2021. Report of the Presidential Taskforce on Power Purchase Agreements. Retrieved from. https://www.bowmanslaw.com/insights/energy/kenya-kenya-energy-sector-update-presidential-taskforce-releases-its-recommendations/.

Gratwick, K.N., 2007. Independent Power Projects in Africa: Balancing Development and Investment Outcomes (Doctoral Thesis). University of Cape Town.

Gratwick, K.N., Eberhard, A., 2008. Demise of the standard model for power sector reform and the emergence of hybrid power markets. Energy Pol. 36 (10), 3948–3960. https://doi.org/10.1016/j.enpol.2008.07.021.

Guba, E., Lincoln, Y., 1994. Competing Paradigms in Qualitative Research.Pdf.

Huenteler, J., Dobozi, I., Balabanyan, A., Sudeshna, B., 2017. Cost recovery and financial viability of the power sector in developing countries. In: A Literature … (No. WPS8287). Retrieved from. http://documents.worldbank.org/curated/en/970281580414567801/pdf/Cost-Recovery-and-Financial-Viability-of-the-Power-Sector-in-Developing-Countries-Insights-from-15-Case-Studies.pdf.

IEA, 2019a. Africa energy outlook 2019 – analysis scenarios. In: Africa Energy Outlook 2019. Retrieved from. https://www.iea.org/reports/africa-energy-outlook-2019#energy-access%0Ahttps://www.iea.org/reports/africa-energy-outlook-2019%23africa-case.

IEA, 2019b. Tracking SDG 7: the Energy Progress Report. Retrieved from. https://trackingsdg7.esmap.org/.

International Energy Agency, 2019. World energy outlook. Retrieved from. https://www.iea.org/topics/world-energy-outlook.

IRENA, 2012. Prospects for the African Power Sector. Scenarios and Strategies for Africa Project, p. 60.

Jamasb, T., Llorca, M., 2018. Power Sector Reform and Corruption: Evidence from Sub-saharan Africa. Retrieved from. https://www.repository.cam.ac.uk/handle/1810/274670.

Jamasb, T., Nepal, R., Timilsina, G., Toman, M., 2014. Energy Sector Reform, Economic Efficiency and Poverty Reduction. Retrieved from. http://www.uq.edu.au/economics/abstract/529.pdf.

James, W., 2005. The impact of corporatisation and national competition policy. An exploratory study of organizational change and leadership style. Leader. Organ. Dev. J. 26 (4), 289–309. https://doi.org/10.1108/01437730510600661.
Jensen, M.C., 1983. Organization theory and methodology. Account. Rev. 58 (2), 319–339. https://doi.org/10.2139/ssrn.94036.
Kapika, J., Eberhard, A., 2013. Power-sector Reform and Regulation in Africa: Lessons from Kenya, Tanzania, Uganda, Zambia, Namibia and Ghana. Retrieved from. http://www.gsb.uct.ac.za/files/Powersector.pdf.
Kojima, M., Zhou, X., Han, J.J., Wit, J. de, Bacon, R., Trimble, C., 2016. Who uses electricity in Sub-Saharan Africa? Retrieved from. http://documents.worldbank.org/curated/en/967821470756082684/pdf/WPS7789.pdf.
Kruger, W., Eberhard, A., Swartz, K., 2018. Renewable Energy Auctions: A Global Overview. Retrieved from. http://www.gsb.uct.ac.za/files/EEG_GlobalAuctionsReport.pdf.
Langley, A., 1999. Strategies for theorizing from process data. Acad. Manag. Rev. 691 (4), 691–710. https://doi.org/10.5465/AMR.1999.2553248.
Martins, A.C., Marques, R.C., Cruz, C.O., 2011. Public-private partnerships for wind power generation: the Portuguese case. Energy Pol. 39 (1), 94–104. https://doi.org/10.1016/j.enpol.2010.09.017.
Nelson, H.W., Nikolakis, W., 2012. How does corporatization improve the performance of government agencies? Lessons from the restructuring of state-owned forest agencies in Australia. Int. Publ. Manag. J. 15 (3), 364–391. https://doi.org/10.1080/10967494.2012.725323.
Pettigrew, 1985. https://ifipwg82.org/sites/ifipwg82.org/files/Pettigrew.pdf.
Polemis, M.L., 2016. New evidence on the impact of structural reforms on electricity sector performance. Energy Pol. 92 https://doi.org/10.1016/j.enpol.2016.02.032.
Power Futures Lab Database, 2020. Prospects for private power investment in sub-Saharan Africa in the new decade electricity access remains a challenge in SSA. Energy and Economic Growth (EEG) (February).
Rentschler, J., Kornejew, M., Hallegatte, S., Obolensky, M., Braese, J., 2019. Underutilized potential: the business costs of unreliable infrastructure in developing countries. In: World Bank Policy Research Working Paper (No. 8899). Retrieved from. http://documents1.worldbank.org/curated/en/336371560797230631/pdf/Underutilized-Potential-The-Business-Costs-of-Unreliable-Infrastructure-in-Developing-Countries.pdf.
Sappington, D.E.M., Stiglitz, J.E., 1987. Privatization, information and incentives. J. Pol. Anal. Manag. 6 (4), 567–582.
Saunders, M., Lewis, P., Thornhil, A., 2019. Research methods for business students. In: Qualitative Market Research: an International Journal, 8. https://doi.org/10.1108/qmr.2000.3.4.215.2.
EAC Secretariat, 2020. EAC trade and investment report 2020. In: Annual Report. Retrieved from The East African Community website: https://www.eac.int/documents/category/trade-investment-reports.
Shirley, M.M., 1999. Bureaucrats in business: the roles of privatization versus corporatization in state-owned enterprise reform. World Dev. 27 (1), 115–136. https://doi.org/10.1016/S0305-750X(98)00130-2.
Simões, P., Marques, R.C., 2012. Influence of regulation on the productivity of waste utilities. What can we learn with the Portuguese experience? Waste Manag. 32 (6), 1266–1275. https://doi.org/10.1016/j.wasman.2012.02.004.
Stritzke, S., Trotter, P.A., Twesigye, P., 2021. Towards responsive energy governance: lessons from a holistic analysis of energy access in Uganda and Zambia. Energy Pol. 148, 111934 https://doi.org/10.1016/j.enpol.2020.111934.
Talbot, C., 2004. Executive agencies: have they improved management in government? Publ. Money Manag. 24 (2), 104–112. https://doi.org/10.1111/j.1467-9302.2004.00402.x.
The World Bank, 2018. Doing Business-2018 Report. World Bank, pp. 1–312. https://doi.org/10.1596/978-1-4648-0351-2.
The World Bank Group, 2019. Uganda distribution sector diagnostic review and directions for future reforms for long-term sector development and acceleration of electricity access expansion. In: The National Audit of Violence (2003 - 2005). Kampala, Uganda.
Trimble, C., Kojima, M., 2016. Making Power Affordable for Africa and Viable for its Utilities. Retrieved from. https://openknowledge.worldbank.org/handle/10986/25091.
Trimble, C., Kojima, M., Perez-Arroyo, I., Mohammadzadeh, F., 2016. Financial Viability of Electricity Sectors in Sub-saharan Africa: Quasi-Fiscal Deficits and Hidden Costs. Retrieved from. https://openknowledge.worldbank.org/handle/10986/24869.
Trotter, P.A., Maconachie, R., 2018. Populism, post-truth politics and the failure to deceive the public in Uganda' s energy debate. Energy Res. Social Sci. 43, 61–76. https://doi.org/10.1016/j.erss.2018.05.020. May.
Umeme, 2021. Umeme Standard Connection Charges. Retrieved June 5, 2021, from. https://www.umeme.co.ug/what-you-need-to-get-connected.
Urpelainen, J., Yang, J., Liu, D., 2017. Power sector reforms and technical performance: good news from an instrumental variable analysis. Rev. Pol. Res. 35 (1), 1–33. https://doi.org/10.1111/ropr.12275.
Vagliasindi, M., 2008. Governance arrangements for state owned enterprises. In: Policy Research Working Paper, 4542. The World Bank, p. 36. March.
Vagliasindi, M., 2012. *Power market Structure and Performance*. (WPS 6123) Policy Research Working Paper. Private Sector Development Department, World Bank, Washington, DC.
Vagliasindi, M., Besant-Jones, J.E., 2013. Power Market Structure: Revisiting Policy Options. World Bank, Washington, DC.
Williams, J.H., Ghanadan, R., 2006. Electricity reform in developing and transition countries: a reappraisal. Energy 31 (6–7), 815–844. https://doi.org/10.1016/j.energy.2005.02.008.
World Bank, 1993. The World Bank's Role in the Electric Power Sector: Policies for Effective Institutional, Regulatory and Financial Reform. World Bank Policy Paper, Washington, DC. Report No. 11676.
World Bank, 2020. Doing Business 2020, 6. https://doi.org/10.1596/978-1-4648-1440-2.
World Bank, & AFD, 2019. Electricity access in sub-Saharan Africa: uptake, reliability, and complementary factors for economic impact. In: Africa Development Forum. https://doi.org/10.1596/978-1-4648-1361-0.
Yin, 1994. https://journals.sagepub.com/doi/abs/10.1177/109821409401500309?journalCode=ajeb.
Zhang, Y., Parker, D., Kirkpatrick, C., 2008. Electricity sector reform in developing countries: an econometric assessment of the effects of privatization, competition and regulation. J. Regul. Econ. 33 (2), 159–178.