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Critical success factors for private investment in the power sector of Sub-Saharan Africa

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ABSTRACT

The power sector of Sub-Saharan Africa has become a significant consideration for economic growth and meeting the demands for a rapidly growing and urbanising population. This region's power supply deficit has subsequently been a key contributor to lower economic growth witnessed in recent years. With the responsibility, especially form a financing perspective, for the development of power infrastructure moving away from governments to the private sector, it has resulted in a fundamental structural change in this region's power sector. Despite ever increasing involvement from private investors in the development of the power sector, clear directives and guidelines to improve investment success and increased private investment participation in the region have not been adequately defined.

In view of addressing the defectiveness of a conclusive framework of the critical success factors for private investment in the power sector of Sub-Saharan Africa, the objective of this research was to formulate a suitable framework to be used by private investors and regulatory bodies alike. This research was strongly underpinned by a comprehensive literature review to outline the framework and its constructs. Furthermore, primary data was collected from respondents who were actively involved in the power sector of Sub-Saharan Africa to expand existing frameworks and considerations by incorporating the insights gained from the respondents.

The research has conclusively defined the critical success factors for private investment in the power sector of Sub-Saharan Africa and formulated it into a practical framework. Consensus about these critical success factors suggested that investment performance and participation would improve if these factors are adhered to.

KEYWORDS

Private Investment, Independent Power Producer, Power Sector, Regulatory Reform, Sub-Saharan Africa

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

Name: Brendan Marais

Signed:

Date: 7 November 2016

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GLOSSARY OF TERMS

AFUR	:	African Forum for Utility Regulators
ANOVA	:	Analysis of Variance Statistical Test
CDM	:	Clean Development Mechanism
DBSA	:	Development Bank of South Africa
DTI	:	Department of Trade and Industry
EBIDTA	:	Earnings Before Interest, Taxes and Amortisation
EIA	:	Energy Information Administration
EIUG	:	Energy Intensive User Group
EPC	:	Engineering, Procurement and Construction
FDI	:	Foreign Direct Investment
GDP	:	Gross Domestic Product
IEA	:	International Energy Agency
IMF	:	International Monetary Policy
IPP	:	Independent Power Producer
IRP	:	Integrated Resource Plan
LSD	:	Least Significant Difference
MIGA	:	Multilateral Investment Guarantee Agency
NERSA	:	National Energy Regulator of South Africa
ODF	:	Official Development Funding
OECD	:	Organisation for Economic Cooperation and Development
OEM	:	Original Equipment Manufacturer

O&M	:	Operating and Maintenance
PACP	:	Presidential Action Committee on Power
PPA	:	Power Purchase Agreement
PPI	:	Public Private Investment
PPP	:	Private Power Producers
PRI	:	Political Risk Insurance
REFIT	:	Renewable Energy Feed-In Tariffs
REIPPPP	:	Renewable Energy Independent Power Producer Procurement Programme
ROCE	:	Return on Capital Employed
ROE	:	Return on Equity
RONA	:	Return on Net Assets
SOE	:	State-Owned Enterprise
SPV	:	Special Purpose Vehicle
SSA	:	Sub-Saharan African
UNFCCC	:	United Nations Framework Convention on Climate Change
WEF	:	World Economic Forum

CHAPTER 1:

INTRODUCTION TO RESEARCH PROBLEM

1.1 Introduction

Electricity has become a fundamental consideration for economic growth and augmenting quality of life, nevertheless, inadequate electricity supply is a reality for many Sub-Saharan African (SSA) countries, as explained by Castellano, Kendall, Nikomarov and Swemmer (2015). This region's electricity supply deficit is an underpinning challenge for countries to sustain growth of its gross domestic product (GDP) and delivering on its social obligations, and calls on governments and investors to develop the capacity of the power sector (Castellano et al., 2015).

According to the International Monetary Fund (IMF) (2008), the electricity supply deficit could be attributed to the disparity in the rapidly increasing demand for electricity and the satisfactory development of electricity supply infrastructure. Electricity demand in this region was primarily driven by a period of sustained, above average, GDP growth, as a result of increased industrialisation, agricultural and other economic activities present in this region, as suggested by Findt, Scott and Lindfeld (2014) in the 2014 Sub-Sahara Africa Power Outlook report, prepared by KPMG. In addition, the growth in GDP has led to a significant increase in urbanisation, compounding the per capita demand for electricity. Kim (2015) advocated that the demand on the power sector would continue to increase on the back of continued economic growth expected in this region and subsequent increasing levels of urbanisation.

Meeting this additional demand would require significant capital investment, and as a result of insufficient public funds and retracting official development funding (ODF) to finance power infrastructure development, governments are becoming more dependent on private investment according to Gutman, Sy and Chattopadhyay (2015). Gratwick and Eberhard (2008) proposed that the demand for additional generation capacity and limited power reform has given rise to the development of hybrid power markets, mainly due to Independent Power Producers (IPPs) entering and competing in these markets. Despite the fact that this market structure has become popular in SSA, it does present a number of regulatory and risk bearing implications which need to be addressed in order to increase private investment in the power sector of SSA, whilst nurturing a sustainable power sector in this region.

Given the significant role that private investment is playing in the development of infrastructure in SSA, there was enthralling motivation to further the definition of the critical success factors for private investment in this region's power sector. Literature presented multiple considerations for investors concerning infrastructure development in this region, but it was deficient in actual quantification and concise agreement of these success factors, specifically related to the power sector. Inevitably these critical success factors emphasised in this research would constitute the basis for a framework for private investment in this region's power sector as well as a guide for regional governments and regulatory bodies alike to develop the private investment landscape in order to improve investment performance and participation.

1.2 The background of the problem

Since the mid-1990s SSA has sustained strong economic growth, and continued this trend for the past two decades, driven primarily by sound macroeconomic policies and favourable external conditions, as suggested by the IMF's 2015 Regional Economic Outlook report (International Energy Agency, 2014). However, economic growth in this region has decreased from approximately 7 percent to 3.4 percent in 2015 according to the World Bank (2016). Inter alia the sharp decline in oil and other commodity prices, inadequate electricity supply was a significant contributor to lower economic growth levels in this region. Given how the current economic performance was impacted by the electricity supply deficit, the problem was further compounded by the fact that infrastructure development in this region was primarily financed through public funds. However, since 2010, the SSA region had been running largely at a fiscal deficit (International Monetary Fund, 2008), which deprived fiscal space for infrastructure development in this region. Underpinned by the lack of public funds, infrastructure development relied more on external financing, but external financiers, especially the likes of ODFs, have been tightening financing conditions, amid the large fiscal deficits in these regions and the tough global financial conditions, leaving these economies vulnerable to potential further reductions in external financing (International Monetary Fund, 2008).

Despite strong growth in private public investment (PPI) since the 1990's, private investment was still centred on the largest regional economies, namely, South Arica, Nigeria, Kenya, Tanzania and Ghana (Gutman et al., 2015). Historically, private investment in this region was primarily to support the telecom sector, and accounted for

about 64.1 percent of investment during 2005-2013, while electricity only accounted for 18.6 percent. Gutman *et al.*, (2015) argued that going forward, the challenges to overcome to increase private investment beyond the telecom sector needed to be identified if private investment was to play a greater role in the development of the power sector of SSA.

With the onslaught of IPPs in SSA, Eberhart and Shkaratan (2011) noted that this hybrid power model, whereby public and external financing amass the capital required with electricity infrastructure development posed a number of challenges for private investors. This become especially relevant when markets become saturated, leading to conflicts as to how new build opportunities will be allocated between the incumbent state-owned enterprise (SOE) and IPPs. This highlighted that regulatory reform and supporting policy was probably one of the biggest challenges to overcome in the quest for a sustainable power sector in SSA.

Albeit, private investment playing a significant role in the development of the power sector, the risk associated with these investments were substantial as the success rate of power projects in this region was approximately 30 percent, as pointed out by a report by The Swedish International Development Cooperation Agency (2015). Muzenda (2009) further highlighted a number of challenges in a report for the NEPAD-OECD African Investment Initiative, like the high costs associated with the preparation of these projects and the risks pertaining to private investment in this sector. Often the revenue generated from these infrastructure developments did not even cover costs as electricity tariffs were not always market related, and low income consumers did not provide much guarantee of electricity offtake, due to the elastic nature of the demand for electricity for these consumers according to Fraser (2003). Aguiar (2005) added that currency exposure compounded the risk of the return on the investment, given that most of the private investments were secured in foreign currency.

In an attempt to address the drivers and considerations for private investment in this region, Underhill (2011) suggested a framework for private investment in the power sector; however, it failed to conclusively define the critical success factors for private investment in the power sector in SSA. Although many frameworks exist, like that proposed by Underhill (2011), there is a compelling case to further develop these frameworks by conclusively defining the success factors specifically related to private investment in the power sector of SSA to ultimately increase private investment in this

region while ensuring a sustainable power sector to support economic and social development.

1.3 Research objectives

In view of the background outlined, it was important to define the critical success factors for private investment in the power sector of SSA with the purpose of increasing private investment in the region, while forming a basis for countries to adopt to bring about the necessary regulatory reform. Therefore, the objectives of the research were as follow:

1. Identify the critical success factors for private investment in SSA's power sector, given the augmentation of hybrid power markets.
2. Determine the correlation between the critical success factors and the success of private investment in SSA's power sector, in terms of investment performance and investment participation in the region.
3. Define a conclusive framework for private investment in SSA's power sector to improve private investment in this region and to form the departure point for regulatory reform.
4. Provide guidance to the African Forum for Utility Regulators (AFUR) to improve private investment in SSA's power sector.

1.4 Research scope

The scope of this research revolved around private investment in the power sector, specifically focussing on the SSA region. The research aimed to identify and conclusively define the critical success factors that would improve investment performance and participation in this region's power sector.

Experiences and insights from stakeholders, who were actively involved in the private investment landscape in the SSA power sector, were considered to supplement existing investment frameworks that were presented in the available literature in order to develop a framework that can be adopted by investors and regulatory bodies alike. The framework would also constitute the departure point for regulatory reform in this region's power sector.

1.5 Research motivation

The rationale for this research stemmed from the fact that although many investment frameworks exist in current literature, it is generally presented as a generic set of considerations, opposed to region specific and quantified investment parameters. This rationale was further strengthened by the need for private investment for the development of the power sector in SSA (Gutman, Sy, & Chattopadhyay, 2015), together with the low success rate of investments in SSA (Swedish International Development Cooperation Agency, 2015), suggesting that current considerations and practices have been omitting critical determinants for successful investments.

The knowledge gained from this research is expected to benefit not only private investors, but also regulatory bodies and the wider community of SSA, given the despairing need to develop this region's power sector and the dependence on private investment to realise this development. The critical success factors can be an invaluable tool to improve the investment performance and participation in this region, through an organised approach in the development and structuring of these investments. Furthermore, these critical success factors can also pave the way to a power sector reform, by ensuring that the development of this sector is conducive for private investment, as well as the nurturing of a sustainable power sector. Therefore, a compelling case is presented for the formulation of such a framework, constituting the critical success factors for private investment in the power sector of SSA.

1.6 Structure of this research report

The research methodological approach, as illustrated in Figure 1, was adopted from a research project by Dedasaniya (2013) that presented a logical and practical means of structuring the research report. It systematically related the relevant research requirements and activities with each other in the process of addressing the research objectives.

The structure of this research report, outlined in Figure 1 was based on the following aspects:

- Identification of the research problem,
- Defining the research scope, relevant sectors and stakeholders, and focus of analysis,
- Research framework, outlining the research map, work plan and analyses,

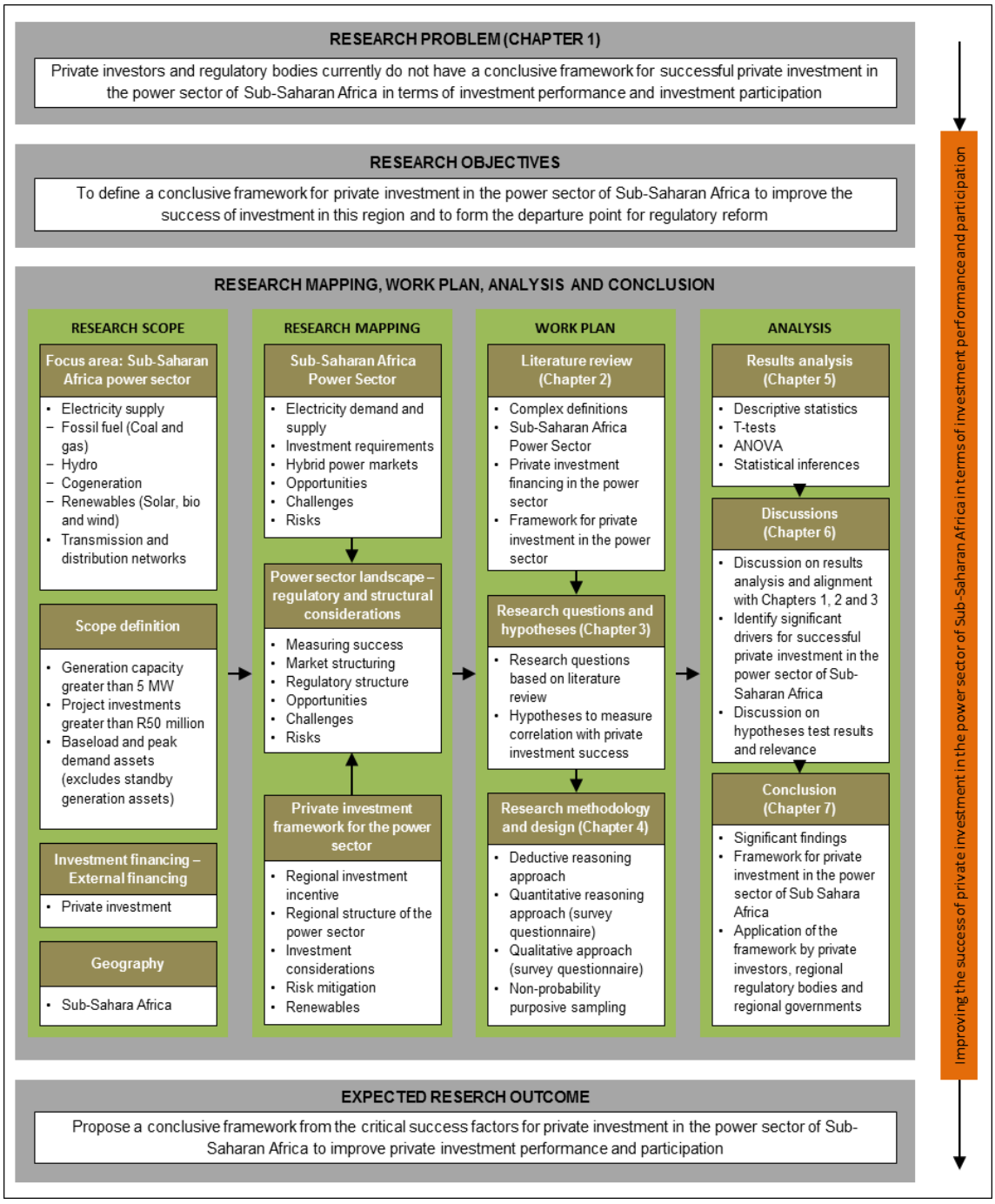


Figure 1 – Structure of the research report (Dedasaniya, 2013)

- Relevant literature review concerning the research topics,
- Identification of the research questions grounded on the literature review,
- Hypotheses motivated analyses based on a survey questionnaire,
- Statistical analyses to support the interpretation of results and findings,
- Formulation of a conclusive framework, based on the critical success factors for private investment in the power sector of SSA.

CHAPTER 2:

LITERATURE REVIEW

2.1 Introduction

Kebede, Kagochi and Jolly (2010) highlighted that in order to sustain economic growth in SSA, the development of a sustainable power sector in this region is a vital requirement. However, due to inadequate public funds, private investment is required in order to develop SSA's power sector (Gutman et al., 2015). Subsequently, this has given rise to the development of a hybrid power market structure, compounding the challenges usually expected with private investments in the power sector (Eberhard & Shkaratan, 2011). Albeit existing frameworks highlighting the private investment considerations concerning infrastructure development in SSA, like proposed by Underhill (2011), it was found that these frameworks represented a list of considerations opposed to a conclusively defined set of critical success factors pertaining specifcally to the power sector of SSA.

In view of the aforementioned summary of the existing literature, this chapter endeavoured to describe all of the elements related to the subject of private investment and the power sector of SSA. As a point of departure, this chapter defined the constituents of successful investments, whereafter power sector of SSA was investigated from structural and evolunary perspectives, with a particular focus on the deficient power sector reform. The literature review also delved into the risks and challenges generally experienced in this sector, along with possible mitigation actions typically applied. The various elements were further considered in amalgamated frameworks that aimed to provide a set of considerations for investors as proposed by a number of studies.

This literature review formed a vital contribution to the development of the research questions, as well as the development of the survey questions in the research tool, given the fact that a deductive approach was followed, as advocated by Welman, Kruger and Mitchell (2005, p. 28). The literature would also form the basis for the analysis of the findings from survey results, with the objective of formulating the critical success factors for private investment in the power sector of SSA that was theoretically underpinned and further expanded with the insights gained from stakeholders in the power sector of SSA.

2.1 Definitions of terms

2.1.1 Sub-Saharan Africa

The United Nations (2013) defined Sub-Saharan Africa (SSA) as all African countries except northern Africa, though Sudan is included SSA region, totalling 49 countries in this region. The division between northern Africa and SSA could be attributed by Arab states of northern Africa forming part of the Arab nation, which had vastly different political and economic characteristics than that of the SSA region, which rendered these regions incomparable.

2.1.2 Power sector

According to Górniak and Kossowska (2013), the power sector could be broadly summarised as the production and the trade of electricity. They highlighted that the power sector consisted of professional and industrial segments, where professional segments were solely responsible for the production, transmission and distribution of electricity. Conversely, industrial segments primary purpose was not to fulfil the role of the professional sector; rather, this segment produces electricity as a secondary product of their main activity, for example cogenerating industries. A third segment in the power sector must also be noted whereby electricity is produced and consumed at the same location, typically referring to electricity self-sufficient industries.

However, for this research, the power sector was defined as the production, transmission, distribution and trade of electric power, suitable for meeting the demand of industrial, commercial and domestic consumers. Production of electricity may be derived from conventional fossil based fuels like, coal, oil and gas, but this research will also include renewable energy sources, including solar, hydro, wind, biomass and geothermal. In addition, the stakeholders involved in the activities of producing and supplying the electricity shall form part of the power sector.

2.1.3 External financing

Dobrovolosky (1951) defined external funding as the amount of funds required, debt or equity, obtained in the period in question from outside sources. The debt or equity can materialise in three forms, namely official development funding (ODF), private public investment (PPI) and official Chinese development funding. Private public investment or simply, private investment shall be considered the subject for the purpose of this research.

2.1.4 Successful private investment

Investments' performance is primarily measured against the returns that these investments realise for the investor. According to Ward and Price (2006) three key measures for measuring investment performance are proposed. Return on net assets (RONA), return on the total capital employed (ROCE) and return on equity (ROE). From a purely financial perspective, the performance of private investments in the power sector of SSA was evaluated against the performance measures put forward by Ward and Price. However, a holistic measure of private investment in this region's power sector would also have to consider aspects that affect the sustainability of this sector. Therefore, the notion that investment success was purely considered from a financial perspective was not sufficient considering the holistic requirements of this region's power sector. Section 2.3 elaborates on these indicators in more detail.

2.1.5 Investment risk

Hilmarsson (2010) noted that one of the key challenges facing emerging markets power sector is the mitigation of the risk associated with these projects. Investments in the power sector are usually large, capital intensive and long-term (10 – 25 years) to realise equitable returns. Although the returns on power sector investments can be substantial, so is the risk of incurring significant losses. For this reason this research investigated the mechanisms of dealing with the risk associated with power sector investments in SSA, and are elaborated in more detail in Section 2.6.

2.1.6 Independent power producer

According to the U.S. Energy Information Administration (2016), independent power producers (IPPs) are defined as either corporations, persons, agencies, authorities or any other legal entities that own and operate electricity generation facilities with the purpose for the primary purpose of selling electricity the public, or any other off taker. IPPs are generally not considered to be an electricity utility. Despite this simplified definition of an IPP, the structures that these entities may adopt do vary and is explained in more detail in Section 2.4.3.

2.2 The key drivers for private investment in the power sector of SSA

The African Development Group (2011) painted a dire picture of SSA's power sector: "Africa's chronic power problems have escalated into a crisis affecting 30 countries.

This tolls heavily on economic growth and productivity". Given this austere condition of the power sector in this region, the following literature sought to determine the drivers for investment in the power sector of SSA.

2.2.1 Electricity demand outlook for SSA

Essentially the demand drivers for electricity in this region could be summarised by the follow two key factors:

1. The current electricity supply deficit as a result of the electrical infrastructure not being able to meet the region's electrical demand.
2. Economic activity in the region demanding greater electricity supply capacity, supported by strong domestic demand from a growing middle class, as a result of rapid urbanisation and an increased global demand for African resources (Kim, 2015).

The conundrum faced by this region is the fact that the demand for electricity is fuelled primarily by the increased economic activity and urbanisation of the population as noted by Wolde-Fufael (2009); however, economic growth and urbanisation is dependent on a sustainable power sector. Given the aforementioned, the region's GDP growth declined from 6.2 percent in 2009 to 3.4 percent in 2015 according to the World Bank (2016) of which inadequate electricity supply was a significant contributor, among other factors. With the SSA economy expected to grow at an average rate of 4.6 percent between 2010 and 2040, it is estimated that the demand for electricity will increase to approximately 1,570 TWh (Castellano, Kendall, Nikomarov, & Swemmer, 2015).

2.2.2 Electricity supply requirements and investment needs

The situation described in Section 2.2.1 estimated that the supply deficit in SSA is approximately 70GW and that the generation capacity will need to increase to 385 GW by 2040 (Castellano, Kendall, Nikomarov, & Swemmer, 2015). In order to realise this expansion in supply capacity the total average investment in the power sector was estimated to be $46 billion per year, including transmission and distribution infrastructure upgrades (International Energy Agency, 2014). With the electricity supply situation defined, Boston (2013) suggested that it only address one factor of a sustainable energy system, namely energy security. Price affordability and environmental sustainability are additional considerations and can potentially impact

the investment requirements for this region. Price affordability can be addressed through improved process efficiencies, the use of different generation technologies, abundant and low cost energy sources, as well as leveraging factors like procurement contracts. However, with regards to environmental sustainability factors, it can potentially either increase or decrease the investment needs depending on the technologies pursued, or capitalising available incentives as pointed out by Eberhard and Shkaratan (2011).

As mentioned in section 1.2, infrastructure development was previously primarily financed by government funding, but since the 1990s, governments' reliance on private funding to finance infrastructure projects have been ever increasing as suggested by Kouassi and Pineau (2011). Despite the increasing demand for private participation in infrastructure projects, investors have not been adequately responding to this need, primarily as private investors more easily invest in a country where governments investment were increasing, a phenomenon known as crowding in, however, with the lack of government investment, it appears as if commitment is absent, resulting in a perpetuating dilemma where private investment is even further deterred. Compounding the problem of private participation in government infrastructure is the imbalance of power and interest. This is one of the reasons Africa has not seen the power sector reform that was originally anticipated. Mebratu and Wamukonya (2007) explained that the general power sector reform follows four distinct phases. The first phase sees the commercialisation and corporatisation of state-owned utilities, followed by various degrees of unbundling of the power sector. Upon successful unbundling, competition is usually introduced into the market, and finally, phase four sees the participation of the private sector. However, there was not a single country in SSA that has actually pursued this approach to a power sector reform; there were only isolated instances where countries embarked on limited reform activities. Most countries where private sector investment was noticed were in the form of IPPs.

The case for private investors seem to be clear, both from the fact that the investment demand is evident, as well as the most commonly applied approach to be used in the structuring of these investment. The structure of these investments is discussed in more detail in section 2.4.

2.3 Indicators influencing decision making for private investment the power sector of SSA

Expanding on the model proposed by Boston for a sustainable electricity sector and considering the main objective of investors, which was essentially to generate returns on investments, Ward and Price (2006) recommended a number of financial indicators for measuring the performance and the subsequent lucratively of investments. Return on net assets (RONA) suggests the operating performance of the venture where the investment has taken place, and indicates the return generated by the funds used in the venture. This measure is essentially the same as the return on the total capital employed (ROCE). The third measure put forward is that of return on equity (ROE) that express the performance not only as a function of operating performance, but also by way of the venture's finance structure, which would impact the amount that the venture will pay towards tax. In SSA countries that have witnessed significant IPP developments, like South Africa, regulatory bodies, like the National Energy Regulator (NERSA), have intervened in the pricing structures of IPPs, by governing investor returns, as explained by Eberhard, Kolker and Leigland (2014). The renewable energy feed-in tariffs (REFITs) policy, approved in 2009 have capped investors to 17 percent after tax, and was fully indexed for inflation. As the aforementioned policy eluded to substantiate the 17 percent investment return threshold, it was considered important to determine the acceptable investor returns that would constitute a valuable input into the developing of similar policies throughout SSA. A definite factor to consider when power projects are evaluated is the size or generation capacity of the asset, as it directly influences the financial indicators. Beamon and Leff (2013) noted that the power generation unit costs decrease as the size of these generation units increase, which implied that the return the on investments are expected to increase proportionally with the size of the generation capacity of these investments. Therefore, it is to be expected that investors will demonstrate an affinity to larger investments.

Despite the financial indicators, investments should also be evaluated in the context in which they were made as proposed by the key elements for a sustainable energy sector (Boston, 2013). Boston (2013) proposed that energy security should form the departure point for a sustainable power sector, which implied that the region's objectives of meeting the targeted demand were achieved. South Africa's power sector was a good example; according to the South African Department of Energy (2014) the Integrated Resource Plan (IRP) firstly considered the energy requirements for the country, where after various scenarios were evaluated to optimise the balance between

energy demands, sustainability criteria, like emission reductions and job creation, and the cost of energy. Subsequently various generation capacities and technologies were considered to ensure that an optimal balance was achieved between the aforementioned criteria. With the IRP representing the backbone of South Africa's electricity expansion plan, it also mandated the Development Bank of South Africa (DBSA) to ensure that private investments are developed according to the guidelines of the IRP. Albeit these additional criteria to be considered, one must be cognisant of the fact that private investments will only continue to operate and adhere to the criteria as long as returns on the investments were realised.

Although price affordability was a key consideration for consumers, especially in view of the previously mentioned elastic nature of electricity consumption in emerging economies, it was also a critical factor that would determine investment sustainability, as the investor incentive decreased with lower tariffs, as suggested by Atmo and Duffield (2014). Therefore, tariff affordability requires careful consideration in order to improve the prospects of private investment. The price affordability of electricity needs to be determined, and at this stage can be envisioned that electricity tariffs would be measured against the cost of not having electricity (Atmo & Duffield, 2014).

Athar and Kahn (2010) pointed out that environmental sustainability considerations may even be an investor incentive. Power generation is synonymous with greenhouse-gas emissions, and many mechanisms exist to financially incentive investors to limited emissions. Financial incentives can either take on the form of penalties, where emitters are taxed on emissions, or investments can be structured to utilise mechanisms to generate additional income for the investment by reducing emissions, of which the most commonly used mechanism is that of the United Nations Framework on Climate Change's (UNFCCC's) clean development mechanism (CDM). Thus, investment returns can either be sacrificed in the event of penalty imputations or additional revenue can be generated through mechanisms, like the CDM. Provided the financial and sustainability indicators highlighted in this section, it was still unclear if investors were actually aligning with sustainability indicators, in the interest of being responsible corporate citizens, or did they align with sustainability agendas in order to merely maximise shareholder value. In view of this subject not being addressed wholly in the literature, the research aimed to acquire primary data from respondents related to the private investment fraternity in the power sector of SSA.

Although the preceding section (Section 2.2) highlighted a significant need for power infrastructure expansion in SSA for the foreseeable future, as well as the role the envisaged role of private investors in realising these developments, alignment between capacity expansion requirements and private investors' actual position on their involvement appeared to be unclear. Therefore, the research aimed to determine if private investors were united with the power generation expansion agenda of SSA.

2.4 Power sector structure implications for private investors in SSA

2.4.1 Private investment in the power sector of SSA

Private investment in SSA has been growing steadily at more than 9.5 percent from 2002 to 2012 (Gutman *et al*., 2015), but it had been primarily focused on the telecom sector and accounted for approximately 65 percent of the private investment in SSA. Despite the telecom sector constituting the largest portion of the private investment in this sector, private investment in the power sector is however the fastest growing sector in the wake of regulatory reform and a strengthened case for power projects in this region. Albeit growing private investment in SSA's power sector, investments tend to be biased towards power generation opposed to transmission and distribution systems, which could be attributed by IPP developments. Grimm, Martin, Schmidt, Weibelzahl and Zöttl (2016) argue that this bias towards investment in generation capacity as opposed to transmission capacity was due to most industrialised countries' transmission networks remaining regulated, while investment in generation capacity was driven primarily by market demand; thus, the investment decision resided with different entities. It must be noted that this observation was based on the notion that the power market was indeed liberalised and unbundled, which is not entirely the case for SSA power markets. Thus, the bias of private investment towards generation capacity opposed to transmission capacity in SSA cannot be conclusively defined, as the underpinning reason for this observed bias in liberalised markets was not present in the SSA power market.

Notwithstanding the preference for private investors towards generation capacity opposed to transmission capacity, Gutman et al. (2015), suggested that "pockets" of infrastructure investment existed in SSA, centred on South Africa, Nigeria, Kenya, Tanzania and Ghana. In view of these countries attracting large private investment flows, it should represent critical reference cases as to what makes them more

attractive for investors, and should be a valuable input into the identification of the critical success factors for private investment in the power sector of SSA.

2.4.2 Hybrid power sector markets

It is clear that in order to meet the electricity capacity expansion in SSA, all means of financing needs to be deployed. Inter alia, the involvement of private investment in the power sector can manifest in two main forms, namely, private investment in SOEs or through private power producers that operate either to supply electricity to the grid or to dedicated electricity off-takers. Depending on where a country finds itself in a power marketplace reform, each of the aforementioned investment activities fulfil a rightful need, but each also presented their own problems.

A study by Fritsch (2011) on the comparative financial analysis of electricity utilities in West Africa, found that most of these utilities in this region either realised loss or marginal ROEs and ROCEs. He attributed this to the fact that utilities needed to improve their earnings before interest, taxes and amortisation (EBITA) through mechanisms like tariff adjustments, operating efficiencies, reduced dependence on oil prices volatility, etc. The problem related to SOEs operating under these conditions, is that it presented very little investor incentive to participate in investments of this nature, which could explain a tendency for investors to avoid investments in SOEs.

Private power producers (PPPs) or IPPs produce electricity as private entities and either sells electricity directly to power off-takers or to SOEs, which is the revised model from the model that was advocated in the 1990s, consisting of the utility unbundling and privatisation and followed by wholesale and retail competition as explained by Gratwick and Eberhard (2008). This resulted in the formation of hybrid power markets, where the incumbent SOE remained the designated single-buyer of electricity from IPPs, while SOEs remain intact and continue to being the prevailing market player; private sector, namely IPPs, compensate for the generation capacity deficit on the part of governments and SOEs (Gratwick & Eberhard, 2008). Although this model was widely adopted in SSA, it comes with a number of regulatory challenges that directly impacts the investment performance of these entities. Challenges become all the more evident in cases where the market become saturated and IPPs need to compete with SOEs. This inherently leads to complications concerning the prioritisation of capacity utilisation and capacity expansion, as in both cases, stakeholders are in contention to achieve their return on investments. In view of the significant role that

IPPs has to contribute to power landscape, it necessitated that the technicalities surrounding IPPs be discussed in more detail.

2.4.3 Independent power producers (IPPs)

Enthused by the fact IPPs had become the widely adopted model for private investment in the power sector of SSA, driven by the need for additional generation capacity and halted power sector reform, it warranted that the structure and characteristics of this model be explained. Woodhouse (2005) proposed that there are essentially three types of entities that are referred to as IPPs and illustrated in Figure 2. The first of which he labelled as State "IPPs", are state dominated entities that operate under the facade of a private entity, and competes with true IPPs. These entities acquired this enterprise label in order to benefit from favourable taxes and other preferential treatment if they could be viewed as IPPs. These plants are often administrated by "dual firms", which are generally the result of a country's power reform process. There appears to be a resemblance with the practice of private investors investing in SOEs to supplement an infrastructure funding gap, resulting in the formation of an enterprise referred to as a State IPP. These enterprises were

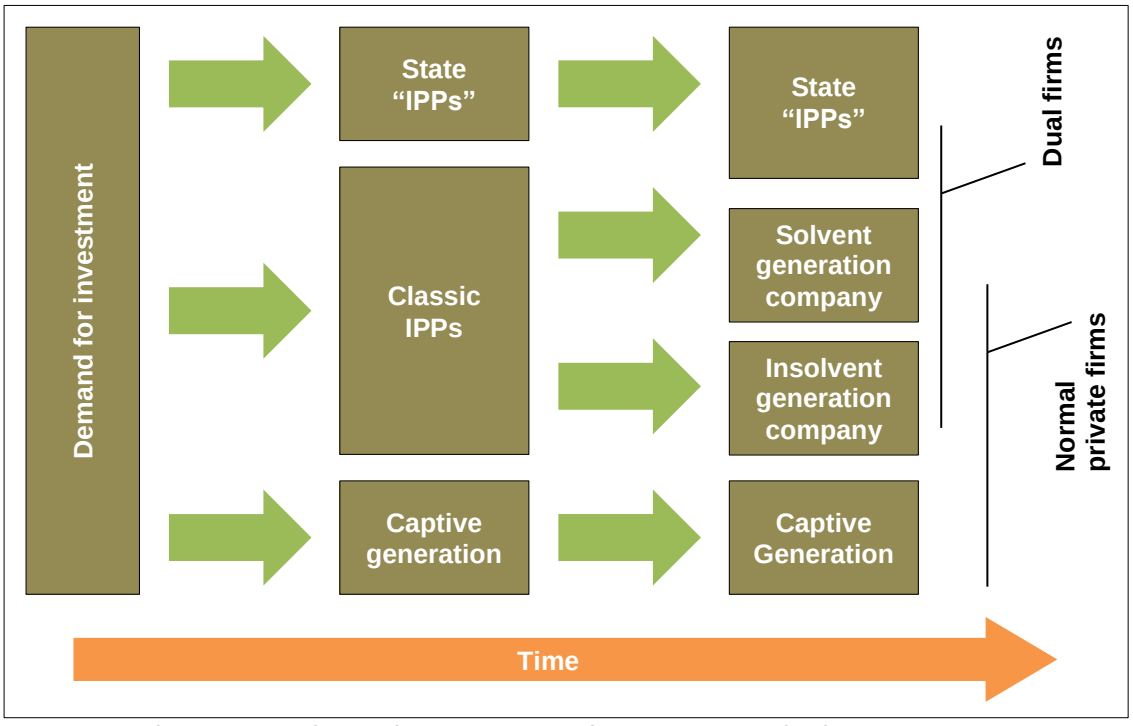


Figure 2 – Independent power producer structure in the power sector

effectively still owned and controlled by the state, which transgress the definition of an IPP. Thus, for the purpose of this study these types of IPPs were not considered, and were merely seen as private investment in SOEs.

Captive generators, as indicated in Figure 2 refers to private electricity generators that are not connected to the grid, and in numerous countries are regulated under the same laws that govern IPPs that that are connected to the gird; subsequently, these entities are also referred to as IPPs. Developers of these types of IPPs usually work with a single buyer or power off-taker, or the electricity generated may even be for self-supply in the case of cogeneration plants. Enforcement of the contracts is usually far simpler and easier to manage. It is common to find that many industries pursue this mode of power generation, especially in remote areas or where the risks associated with security of supply are considered to be large.

Lastly, Figure 2 refers to “classic IPPs”, which sells electricity under a long-term offtake agreement or contract, and is generally referred to a power purchase agreement (PPA). Here the power off-taker is primarily a state-owned electricity utility, but in many instances off-takers may also include private distributors or large private users, such as industries. Figure 2 continues to illustrate the natural progression of IPPs to power generation companies with the passing of time, usually associated with the reform of the power sector, but this resided outside of the scope of this research, as the focus would be limited to IPPs.

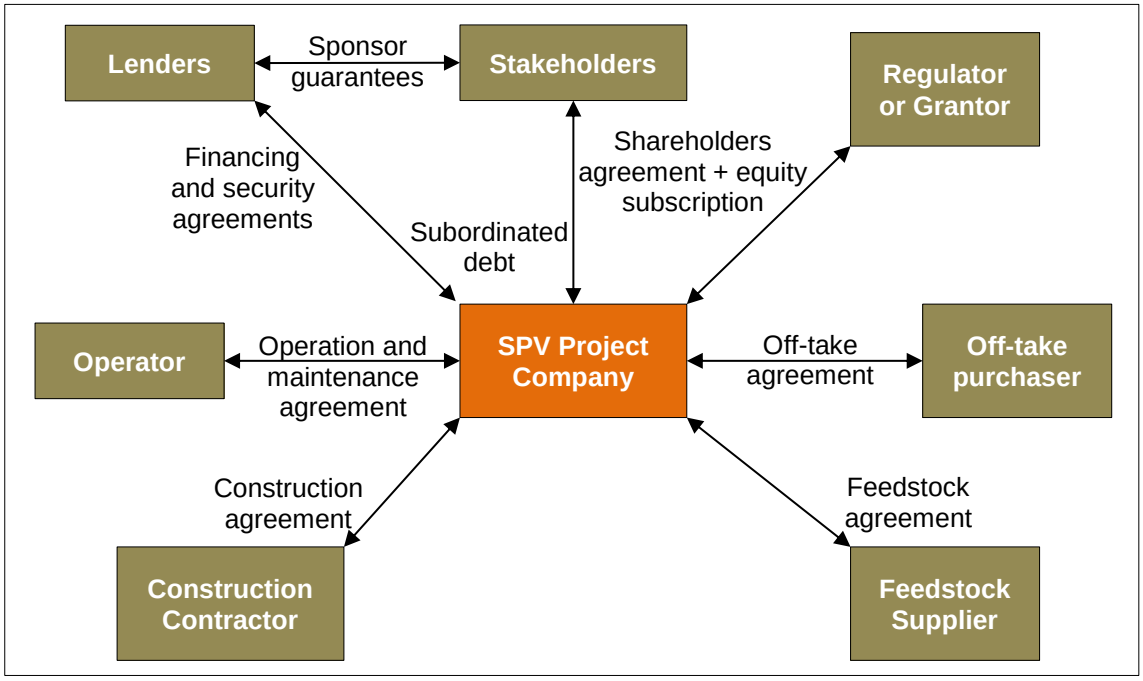


Figure 3 – Typical structure of an IPP SPV (Terblanche, 2013)

Funding of these classic IPPs are usually done on a project finance basis, usually by means of a special purpose vehicle (SPV) that owns and operates the IPP, of which

the typical structure of such a SPV is illustrated in Figure 3. The entity secures equity from foreign and domestic investors and debt can be raised from a number of commercial or public lenders, on the basis that the IPP is expected to generate revenues. Furthermore, these entities tend to be highly leveraged, with debt accounting for as large as possible portion of the project finance as can be tolerated by the debt providers. Due to the high risk associated with these projects, debt providers seek to minimise the risk by securing long-term PPAs, with government backing (sovereign guarantees), along with a range of additional arrangements to segregate projects from the impulses of government decision making and any other unanticipated changes in the operating landscape. The entity is then expected to be profitable if the minimum terms were met. Minimum terms are usually architected by the developers with minimum offtake and tariff provisions in place. Risk is usually confined to a limited number of stakeholders that would indemnify investors from losses as a result of risks realised from relevant stakeholders and as a result many contracts are tabled in order to manage risk

In view of the IPP generating revenues in a local currency, and with many of the cost constituents like equipment, energy sources and capital denominated in hard currency, investors are sensitive to the allocation of currency risks, but different mechanisms to address this are available, albeit the contentious nature of these mechanisms (Woodhouse, 2005). With regards to managing disputes, IPPs usually rely on international arbitration to settle differences in order to avoid biases and impulsive behaviours of domestic courts. These aids were supposed to direct responsibility for political risk to the stakeholder most capable to pacify political risk, supposedly host governments; although in reality it is found that risk is usually abided by the party least able to avoid it allocated to it.

Due to the dynamic, and very often, unique landscapes in which IPPs are established, a number of approaches can be followed in order to structure the pricing or tariffs for the electricity supplied by the producer to the power off-taker. According to Linden, Kalantzis, Maincent and Pienkowski (2014), the most commonly applied method for remuneration of electricity generation and supply, and where applicable, the cost of distribution, a cost-plus approach is followed to determine electricity prices and tariffs. Essentially this pricing approach equals the total costs of electricity, plus a profit margin.

On the contrary of the aforementioned pricing structure Reynolds (2009) suggested that competitive markets are efficient and economically optimal, resulting in market driven (or market based) pricing realising lower costs compared to most other pricing structures in the market. Essentially, an IPP would be supplying electricity at a spot market price.

Despite the efficiencies that may reside in an efficient power market, Woo, King and Chow (2006) noted the retreat of the merchant power sector due to practical problems associated with financing IPPs under these conditions as well as market constraints. This has resulted in more utilities turning to affiliates to contract long-term power generation. Using the preceding reference of market-based pricing, Mäntysaari (2015) pointed out that the choice between long-term and short-term (or as referred to as market-based pricing) contracts depended on the structure of the market, which was greatly influenced by the unbundling of the market. He further argued that the liberalisation of power markets and the development of physical and financial trade aligned power contracts closer to traditional commodity contracts, but the differentiating factor resided in the fact that power supply contracts are essentially contracts for the provision of services, and that the services nature was clearer to see when the duration of the contract was long. This was grounded on the basis that expected complexity of long-term contracts necessitated for the parties to regulate the modalities of their perspective obligations in greater detail. Therefore the long-term bilateral contracts are conventional regardless of the stages of progress of liberalisation.

The significant class of pricing structure is what Deng and Xia (2005) referred to as a tolling agreement. This pricing structure is usually applicable where the contract buyer reserved the right to take off the output of an underlying electricity generation asset by remunerating a predetermined premium to the asset owner. Typically, the power off-taker will be responsible for the supply of the energy source, for example natural gas, and the power generator is merely responsible for the conversion of the energy source to electricity for which the generator is remunerated accordingly.

With the structure of IPPs and their interaction with the wider power landscape defined, it was also key to comprehend the regulatory environment changes that were undertaken in order to assimilate and accommodate this “new” power entity into the power landscape. In view of Nigeria being the most advanced country in SSA with regards to a power sector reform, it warranted that a few important learnings from their power regulatory sector reform be highlighted. According to the Nigerian Bureau of

Public Enterprises (2011) government was considered the catalyst in the power sector reform; not only to initiate this process but also to inaugurate the necessary regulatory bodies and vehicles to facilitate the transition from a state dominated power sector to a liberalised and largely privatised sector. Organisations like the Nigerian Electricity Liability Management Company, to manage legacy liabilities and stranded assets, and the Nigeria Electricity Bulk Trading company, a SPV with a bulk purchase and sale mandate and PPA management obligation, were established to mobilise this power sector reform (Nigerian Bureau of Public Enterprises, 2011). Although government played a significant role in the initiation and support of this reform, it did not go about it in isolation. Ogunleye (2016) highlighted a critical success factor in this reform, namely the establishment of the Presidential Action Committee on Power (PACP), to drive the implementation of the reform process by eliminating red tape and unnecessary bureaucracy associated with government decisions involving the power sector reform. The unique thing about the PACP is that it brings together, for the purpose of collaboration, all key agencies and institutions that have a significant real and potential role to play in removing regulatory and legal challenges facing private sector involvement in power sector development and operations. The PACP is also tasked with responsibility for monitoring the conceptualisation, planning, and execution of short-term power generation, transmission, distribution, and fuel-to-power projects that would help expedite the speed at which the country would meet its targets.

2.5 Challenges for private investment in power markets

According to a report that was presented at the World Economic Forum (WEF) (2014) that was aimed to develop a robust investment framework in the evolving electricity system, it underlined six key investment challenges for electricity infrastructure projects.

Firstly, analysts portrayed a relatively negative outlook on this sector, driven primarily by the rapidly degreasing margins due to falling power prices (World Economic Forum, 2014). This argument was supported by Findt, Scott and Lindfeld (2014), in noting that electricity tariffs are often publically governed and not market-related. However, as mentioned in Section 2.4, IPPs in SSA do not necessarily operate in a spot market structure, but rather enter PPAs with power off-takers. Furthermore, it was highlighted that the most commonly applied method for remuneration of electricity generation was that of a cost-plus margin structure (Linden, Kalantzis, Maincent, & Pienkowski, 2014).

This would imply that in order to protect margins, IPPs either need to increase electricity tariffs or reduce the cost of producing electricity. Cost reductions can manifest either through cost reduction initiatives, like process improvements (Eberhard & Shkaratan, 2011) or also controlling the input costs associated with power generation. With fuel/energy sources being the primary operating cost, IPPs usually secure energy costs by means of tariff hedging (Reynolds, 2009). With the market structure being considered a significant determinant of long-term contracting of power offtake agreements (Mäntysaari , 2015), IPPs may be forced consider renegotiating these contracts if margins become under pressure which may influence the going concern of the entity.

Secondly, regulatory frameworks governing the power sector are inefficient and unstable. Equally destructive is the over-regulation causing distortion in the market, by not allowing market forces to prevail (World Economic Forum, 2014). Brew-Hammond (2010) recommended that energy and utility regulators deliver the necessary oversight of the market to ensure that policies are implemented effectively as to allow for a level playing field among the stakeholders in the power sector. Inefficiencies in regulatory frameworks may be linked to the mere complexity it presents to investor, and to illustrate the argument, the South African regulatory landscape is used as an example. Inter alia, Forlee (2007) highlighted at least ten legislative policies that need to be adhered to by power generators, which were summarised as follow:

- The Constitution of South Africa of 1996 that grants municipal entities executive authority and the right to administer “electricity reticulation”.
- The Eskom Conversion Act No.13 of 2001 that clarifies Eskom’s position as a public company subject to the Companies Act with all of its equity held by the government and directed by a Shareholder Compact. It also implied that Eskom is liable for the payment of dividends and taxes.
- National Energy Regulation Act No. 40 of 2004 that defines the composition, controls and purposes of NERSA. NERSA is mandated to regulate electricity, piped-gas and petroleum pipelines industries in South Africa.
- Electricity Regulation Act No. 4 of 2006 that defines the electricity regulatory functions of NERSA.
- National Nuclear Regulator Act No. 47 of 1999 that controls nuclear safety concerns.
- Public Finance Management Act No.1 of 1999 that provides the framework for Eskom’s reporting and accounting responsibilities to government.

- Municipal Finance Management Act No. 56 of 2003 that defines how municipal entities such as municipal electricity utilities should be managed.
- Local Government Municipal Systems Act No 32 of 2000 that includes sections on municipal administration of electricity reticulation and tariffs.
- National Environmental Management Act No. 107 of 1998 that provide the principles for decision making on matters affecting the environment.
- Air Quality Act No. 39 of 2004 that regulates air quality in order to protect the environment by providing realistic processes for the prevention of pollution and ecological deprivation.

Although some may argue that the aforementioned policies are evidence of a well-regulated power sector, it ominously increases the complexity associated with this sector as a result of a number of inter-governmental framework agreements that underpin this large number of policies regulating this sector. Many of the abovementioned policies are interconnected, which complicates the structuring of a SPV.

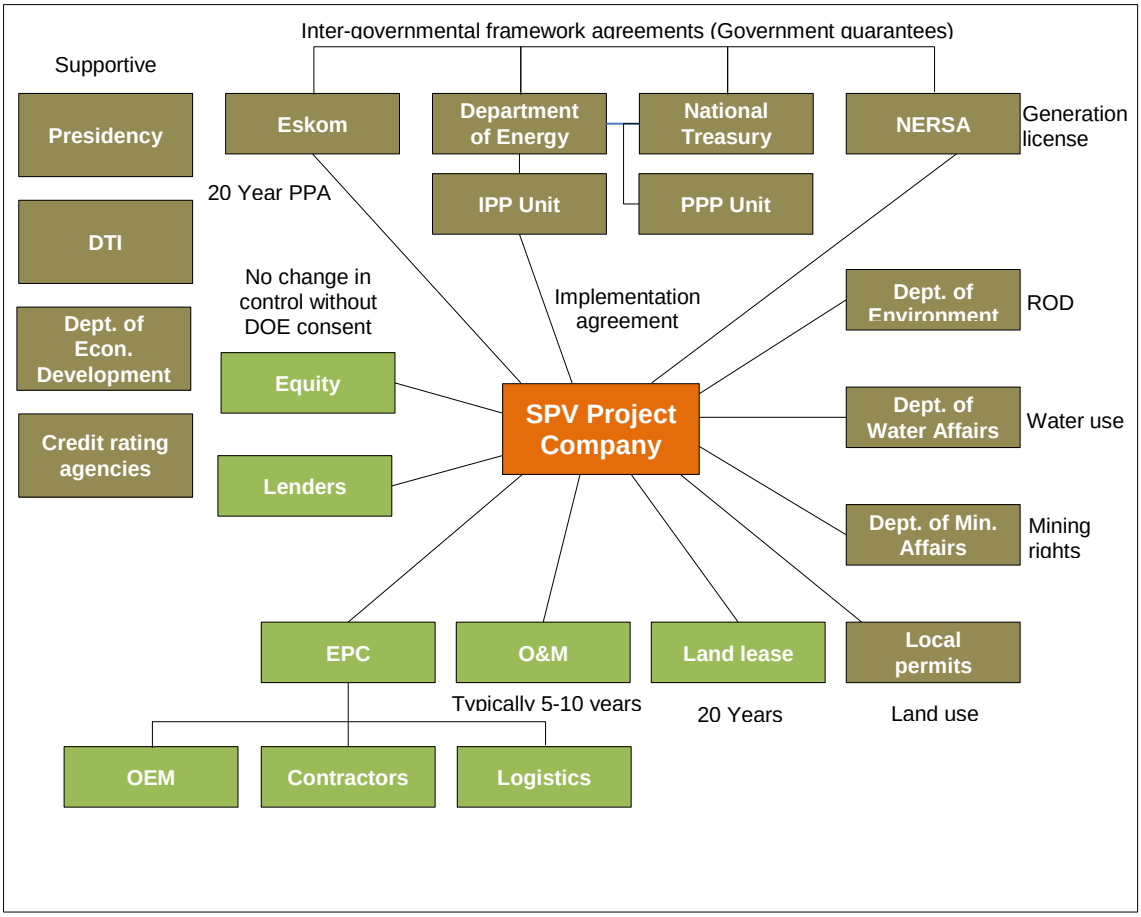


Figure 4 – Typical structure of an IPP SPV in South Africa (Terblanche, 2013)

Consequently it leads to an increase in the number of points of entry into the SPV that represents the IPP project. With reference to the typical IPP SPV structure illustrated in Figure 3, Figure 4 illustrates how this structure is complicated as a result of overregulation and unaligned polices, using the South African case again as an example.

The mitigation actions associated with regulatory frameworks can be considered to be similar to how regulatory reform could be realised in regions as described in Section 2.4.3. However, Section 2.4.3 highlighted that regulatory reform essentially resided with governments and regulatory bodies, but who consider inputs from private investors to ensure that regulatory reform was conducive for private investment. In this case, the emphasis is rather on the mitigation/response from private investors towards these regulatory concerns, which essentially only leave investors with the option to not invest in a particular market, join or assist regulatory bodies in developing regulatory frameworks – as seen the Nigerian example or requesting certain exemptions from certain regulatory requirements.

Thirdly, regulation has not evolved with the power sector, in terms of ensuring a mix of regulatory oversight and allowing market competition to prevail, despite some countries having indicated that it would restructure their power utilities to introduce competition and supporting increased sectoral efficiencies. Ultimately, regulation and market design should ensure security of supply, efficiency and sustainability of the power sector. Similar to the aforementioned point two, regulatory reform and development is essentially the responsibility of governments and regulatory bodies, notwithstanding the fact private investors and all other relevant stakeholders should be involved in this process to ensure alignment between the requirements of the various stakeholders. An example such a platform to unite relevant stakeholders to identify opportunities and collectively move power industry forward is the annual Africa Energy Forum (EnergyNet Limited, 2016). This forum is only an example of a large number of similar platforms that bring together the relevant stakeholders with the objective of address the challenges related to this sector. Seeing that participation in these types of forums are usually voluntary, private investors can assume a passive stance with regards to their involvement in developing regulatory processes, or even exit markets where regulatory frameworks are not aligned with investor expectations, but from a practical point of view this should be a very last resort, as private investments in the power sector usually relate to long tenures to maturity.

Fourthly, the risk and return profiles for investments are no longer clear, as the investment landscape is skewed towards incentivised technologies, leaving conventional investments, being unable to compete with incentivised investments, resulting in misaligned regulations that significantly increase the risk for private investment.

Fifthly, instability in the infrastructure supply chain, as technology providers develop equipment and processes based on their views of what is required in the industry, opposed to being led by functional policies that has resulted in suboptimal allocation of technologies in markets. According to Akash, Mamlook, Mohsen (1999) technology selection should primarily be based on a cost-to-benefit analysis. Subsequently, there are two components to that will drive the decision making process, namely reducing costs as far as possible while keeping benefits constant, or increasing benefits while maintaining costs. Costs can be reduced by opting for lowest cost generation technologies or offsetting costs by means of incentivising certain technologies or process. Underpinning to the benefits components is the generation or supply characteristics of the technology, but the benefits could be expanded to include factors like risk (usually associated with the maturity of the technology), emission footprints and technology support, to name but a few.

Lastly, the traditional business model for the power sector is changing as decentralised generation, climate change objectives and other socio-economic factors has become key drivers of the power sector (World Economic Forum, 2014). Pineau (2011) supported this notion by highlighting that the business of electricity no longer just concerns the security of supply, but also the need to consider improving financial and technical performance of utilities, increasing access to electricity, whilst promoting environmental sustainability.

2.6 Risk considerations for private investment in the power sector

In the context of investment financing uncertainty and risk are both critical considerations that may impact investment performance. Gross, Heptonstall and Blyth (2007) suggested that risks may range from the general, like macroeconomic, political and force majeure risks, to the more project specific risks, like price, technical, price and cost of capital risks. Different mechanisms exist to mitigate the risks associated with private investment in the power sector, like hedging electricity and fuel prices, entering long-term contracts to reduce the effects of price volatility (Fraser, 2003), and

risk mitigation instruments by organisations like the World Bank for investment in high risk regions (Hilmarsson, 2010).

Noothout et al. (2016) used developments in the renewable energy landscape as a foundation to highlight typical risks encountered in power projects. They identified nine key risk areas along with generally applied risk mitigation actions or strategies that could be considered in an attempt to minimise the effects of these risks on investments; these nine key risk areas are summarised below:

1. Country risks

Country risks typically include political, macroeconomic and any other risks specifically related to a particular country. Generally country risks negatively impact the cost of capital and financial support required to attract investors. However, if the benefits associated with additional power generation offset these higher costs, the general response would be to accept the risk and the financial consequences thereof. It must however be noted that according to the Multilateral Investment Guarantee Agency (2011) a significant increase of expropriatory actions by governments against foreign investors over the past five to ten years have been witnessed in SSA countries. In a response to the latter risk, investors are encouraged to make use of political risk insurance (PRI).

2. Social acceptance risks

In addressing social acceptance risks, the responsibility resides with both investors and governments, either through mitigating risks or following share strategies, while the responsibility should be assigned to the stakeholder that would be best suited to effectively manage the risks. From a mitigation perspective, actions would endeavour to address the root causes of the opposition, and would generally include actions like communication programmes, stakeholder management and participation processes, and smoothening of legal and regulatory processes. A share strategy on the other hand moves the responsibility from investors or project developers to governments, typically to take control of certain development activities like the acquisition of permits.

3. Administrative risks

To a large extent administrative and social acceptance risks are interconnected, of which the responsibility to mitigate these risks primarily resided with governments. Underpinning the mitigation of these risks requires well-structured and quality public administrative systems. As private sector, generally referring to IPPs, is becoming more integrated with built environment, the responsibility of governments and

regulatory bodies to manage the interaction between various policies like energy, climate and special planning policies are becoming more pertinent. Integration can be smoothened by governments making provision of guidelines and sharing of best practices with relevant stakeholders, education, training and informing civil servants involved in these administrative processes and establishing one-stop-shops for regulatory procedures.

4. Financing risks

Financial risks generally stem directly from the project structuring and may also be influenced by the country specific risks, as mentioned in point 1. With regards to the investor specific risks, several risk mitigation strategies can be applied, like fixing financial parameters in advance. To a large extent, this risk can be addressed by means of a well-structured and contracted SPV, as alluded to previously.

5. Technical and management risks

Technical and management risks are clearly within the realm of the investor and operator of the IPP. However, scope for government involved still exit, and from a policy perspective, governments can facilitate the development of the required knowledge base, skills, and experience within the region to effective deal with relevant technical and management risks. From an investor perspective the structuring of IPP SPVs are important to ensure that technical partners and engineering, procurement and construction (EPC) stakeholders are adequately held accountable by means of fixed and firm contractual agreements. For investors, this would constitute the main mitigation action to effectively address technical and management risks.

6. Grid access risks

Grid access is considered a fundamental requirement in the business model for IPPs, as no grid access implies now offtake of the power generated. In view of this investors and project developers, would strive for avoidance of grid access risk, seeing that this is one of the most crucial parameters to the business case. Again, this is a parameter that needed to be secured in the structuring in of the IPP SPV. In the event of captive IPPs, this risk is not prevalent due to a localised transmission system.

7. Policy design risks

Transfer strategies are the grounding philosophy of most policy support instruments. Risks during the operations phase of the investment/generation asset can be reduced if governments can provide security of returns to the investor, similar to the concept of government guarantees, as mentioned in Section 2.4.3.

8. Market design and regulatory risks

Addressing market and regulatory risks are far reaching and complex given the unique evolution of the power sector in SSA. This further complicates matters, as there are limited reference cases to assimilate any prior experiences from. Nevertheless, consensus about fundamental factors to address these risks are summarised below:

- A non-exclusive marketplace is to be nurtured, focussing on free access for investors, no market entry and exit barriers, relevant regulatory bodies and private non-state companies,
- Reducing revenue risk by providing necessary investor support during periods of unfavourable tariff prevalence, similar to government guarantees, as alluded to earlier,
- In the event of curtailment of the grid, compensation is to be provided to investors for the development of grid infrastructure. Since this mitigation measure is typically not the responsibility of investors, uncompensated grid-related curtailment of IPPs poses an unproductive risk and should therefore be avoided.
- The establishment and introduction of a neutral party to avoid and settle disputes on market functioning is a key functionality to be introduced in a region. This is especially important new forms of energy technologies are introduced in the energy system, which may result in conflicts between project operators and grid operators.

9. Sudden policy change risks

The best risks mitigation action in this case relates to avoidance of sudden policy changes by policy-makers. Investors can at least align themselves with known policies and for this reason there is broad consensus that policy instrument design calls for stable, predictable and enabling policy environments.

Considering that the abovementioned risks and mitigation strategies have been derived from the European experience, valuable learnings can be assimilated to the SSA landscape considering that the European power landscape has long been liberalised. On the contrary, stakeholders in the SSA landscape may want to adapt risk mitigation strategies in view of SSA not having undergone the same level as liberalisation as European regions.

2.7 Renewables

South Africa's renewable energy independent power producer procurement (REIPPP) programme has led the way for IPP involvement in the country and is internationally recognised for its success (Department of Energy, 2014). Pieters, Lotz and Brent (2014) suggest the reason for the success of the programme is as a result of alignment between the procurement requirements and that of investor requirements. Additionally, renewables provide a number of benefits like, possible revenue streams from carbon trading and localised generation (International Renewable Energy Agency, 2012). For this reason the popularity of adopting renewable energies as a means of power generation has increased in recent years, and therefore should be considered as a possible success factor for investment in the power sector of SSA.

2.8 Framework for private investment in the power sector of Sub-Saharan Africa

Considerations for investment in this region have been quoted by a number of sources, and typically include, project feasibility, given the higher development costs and the lack of basic infrastructure in region, country and political risk, profitability of these investments, and the legal and regulatory environment. In view of the typical building blocks for investment frameworks in the power sector, this section endeavoured to highlight a suitable framework that would present a departure point for a framework specifically related to private investment in the power sector of SSA

2.8.1 Existing framework

Underhill's (2011) experience in infrastructure investment has enabled him to differentiate key considerations for various types of infrastructure investments, like power, agriculture and transportation. Subsequently, he proposed the following main criteria for the development of framework for private investment in the power sector, which can be summarised as follow:

1. Investment attractiveness in a country or region
    a. Significant or increasing economic growth
    b. Improving social and political conditions
    c. Increasing privatisation and economic liberalisation
    d. Growing economic trade and demand for local goods
    e. Improving legal and regulatory systems

   f. Sustainable investment performance
2. Structural elements that define the power sector in a region
   a. Pricing models
   b. Structuring of the ownership in the power sector (IPPs, power deals, etc.)
3. Fundamental investment decisions to be considered:
   a. Regulated versus unregulated assets
   b. Contracted/hedged versus merchant/unhedged ownership positions
   c. Existing operating assets versus new build development projects
   d. Active ownership, including implementation of value creation plans versus passive ownership of bond-like streams
   e. Technology/venture stage investing versus real asset ownership
   f. Prioritising financial/investment objectives, like income generation, investment holding period, and inflation hedging
4. Investment risk
   a. Fuel prices
   b. Operating risks
   c. Fuel availability
5. The deployment of renewable energy technologies

Despite Underhill's (2011) comprehensive considerations for a private investment, which was generally aligned with recommendations from consulting firms like McKinsey & Company, Deloitte and KPMG, and other industry leaders like Eberhart, all of them have been unsuccessful in definably describing each of these framework constructs for the SSA region. Thus, it highlighted the need to use Underhill's framework considerations as a base to structure and quantify a framework for private investment in the power sector of SSA. Supported by the aforementioned considerations, the framework would essentially be outlined by the drivers for private investment as well as the indicators used to confirm the lucratively of opportunities, structural and regulatory considerations, investment challenges and risks, and addressing renewable energy sources in the power sector.

2.9 Comparative studies

Forlee (2007) cited the work done by Lamech and Saeed (2003) on a survey done for the World Bank, which involved 48 international firms in the power sector, with the objective of determining the decision making criteria or investing in a particular country.

Lamech and Saeed (2003) identified that that the following factors were considered the highest priorities for investor when assessing countries to invest in:

- A framework defining the rights and obligations of investors
- Payment discipline and enforcement concerning the remuneration for power supplied
- The availability of government or multilateral agency guarantees
- Independence of regulatory institution and processes from arbitrary government interference

The abovementioned priorities were consistent with the position of Underhill (2011) and Noothout et al. (2016), although it was not presented in the same well-structured manner. Furthermore a number of additional criteria that impacted success of private investments were also highlighted by investors (Lamech & Saeed, 2003):

- Cash flow requirements of the sector needed to be sustained by means of appropriate tariffs and discipline in remuneration,
- Adjudication of disputes and tariff adjustments to be administrated in a fair manner,
- Maintaining operational control and management freedom in operating of the generation asset,
- Sustained long-term contracts by means of appropriate regulatory commitment.

The following were however not considered to be important for investors in determining whether or not to enter a specific market (Lamech & Saeed, 2003):

- Vertical Integration
- Competitive selection process
- Domestic borrowing costs and tenors
- Transition to a competitive market structure

This study found that investors' priorities were centred on the ensuring healthy cash flows related to the investment and stability of the regulatory landscape. Both of these concerns directly impact the profitability and sustainability of the investment (Lamech & Saeed, 2003). The finding from this study is consistent with the general expectations of investments, suggesting the profitability and investment returns are the primary focus area for investors. Forlee (2007) however indicated that although this study highlighted key success considerations related to the investments in the power sector, it omitted to adequately address the investment landscape. Therefore, the research pertaining to the critical success factors for private investment in the power sector of SSA, needed to

intensify the focused and primary insights from stakeholders directly involved in the power sector of SSA.

2.10 Literature review conclusion

Given that the objective of this research was to define the critical success factors for the power sector of SSA, a guiding principle for the research was determining how successful investments were to be defined. Primarily investment success is measured against a number of key financial ratios, like ROE, RONA and ROCA, which essentially relate to the value driver indicators for the subject investment (Ward & Price, 2006). The definition of successful investments in the power sector was expanded to be more holistic in order to account for sustainable factors impacting the power sector, the environment and civil society (Boston, 2013).

With definition of how investment success in the power sector would be measured, substantiation of the investment requirements was determined, focussing on the main drivers for private investment in the power sector of SSA. Foremost, the current power supply deficit and rapidly increasing demand for electricity in this region underpinned the need for power infrastructure development. This rapidly increasing demand for electricity was being fuelled by increased economic activity in this region, resulting in a growing middle class and increased urbanisation, with increasing per capita electricity demand as a net an effect (Kim, 2015). Despite the current power supply deficit, the demand was expected to increase by an additional 1,570 TWh by 2040, which presented a significant need for power infrastructure development, with an anticipated annual investment requirement of approximately $46bn (Castellano, Kendall, Nikomarov, & Swemmer, 2015). Previously, infrastructure developments were primarily financed though government funds; however, with less fiscal freedom and tightening official development funding afforded to governments, governments are obligated to turn to private investors to close the funding gap (Kouassi & Pineau, 2011). Although this presented a significant opportunity for private investors, it did not imply that all regions were equally conducive for private investments, as it was noted that private investment in the power sector was localised to only a number of countries (Gutman, Sy, & Chattopadhyay, 2015). This finding suggested there was a need to identify what were the differentiating factors that made these regions so attractive for private investment.

The introduction of private investment into this region's power sector was unique in the sense that it leapfrogged the anticipated sector reform (Mebratu & Wamukonya , 2007), especially with the introduction of IPPs. This has given rise to an established hybrid power sector in this region, primarily driven the desperate need for private investment and halted power sector reform (Gratwick & Eberhard, 2008). Although, the immediate power supply requirements were partially addressed in the process, this market structure presented a number of complexities, especially from a regulatory perspective. It was also confirmed by Nouthout *et al.* (2016) that risks surrounding the regulatory landscape were considered a key issue for investors. For this reason, it necessitated that the structures surrounding these investments were investigated leading up to determining the structures that were considered favourable for private investors, which would be an important input in the development of the power sector reform required in this region. Woodhouse's (2005) proposition of the various IPP structures suggested that classical IPPs and captive generators would have to be considered for the scope of this research. These structures would also have to be supported by the necessary tariff structures, of which Linden *et al.* (2014) advocated that a cost plus margin tariff structure was generally the preferred approach followed. However, due to the unique setting in which investors find themselves, this tariff structure had to be confirmed during the course of the research. Many schools of thought suggests that an efficient market, or spot market, would result in the most competitive tariffs (Reynolds, 2009), but due to the deficient sector reform Woo *et al.* (2006) indicated that this tariff structure would result in several practical problems, especially related to the financing of the investments. In a response to the financing concerns, Mäntysaari (2015) proposed that long-term fixed contract tariffs should be the preferred tariff structure.

Albeit the challenges associated with the structuring of these investments and the associated complexities from financing and regulatory perspectives, investors also face numerous risks in this landscape, of which country political risks were identified as one of the most significant risks that investors had to contend with (Noothout, et al., 2016). Experience from the World Bank has identified possible mitigation strategies for most of the risks, but it was not conclusively related to SSA, nor the preferred approach applied by investors. In an attempt to further understand how challenges and risks could be addressed in this region, Nigeria was studied to identify the key success factors that have led to their successful sector reform. Nigeria attributed its success in this process to the platforms developed whereby regulatory bodies and official entities could engage with private sector to jointly develop the power sector to be efficient and encouraging for private investment (Nigerian Bureau of Public Enterprises, 2011).

Lastly, the literature also focused on existing investment frameworks that may be applicable to the power sector of SSA, as put forward by Underhill (2011) and Lamech and Saeed (2003). Although these frameworks presented a number of key considerations, it did not conclusively define each construct constituting the framework, and omitted several factors unique to the SSA region. Therefore, the deficiencies identified in these frameworks need to be defined along with the aforementioned factors that would constitute the critical constructs to an investment framework. The literature has shown that these constructs have also not been conclusively defined, which presented the case to for this research and with the inevitable objective of formulating a conclusive framework constituting the critical success factors for private investment in the power sector of SSA.

CHAPTER 3:

RESEARCH QUESTIONS AND HYPOTHESES

3.1 Problem statement

At present the critical success factors for private investment in the power sector of SSA were not properly defined in terms of improving performance and participation of related investments in this region. Furthermore, the existence of a hybrid power market structure, as a result of limited or uncharacteristic market reform in this region, inherently poses a number of challenges for investors and incumbent states in terms of prioritising asset capacity utilisation and policy setting. This has led to varying degrees of success of private investments and uneven investment across the region's power sector. Despite many generic investment considerations being proposed to investors, the relevancy and quantification of these considerations were still inconclusive.

3.2 Objectives of the research

- Define the critical success factors for private investment in the power sector of SSA to improve the success of investment in this region and to form the departure point for regulatory reform.
- Determine the correlation between the framework elements and the success of private investment in the power sector of SSA in terms of investment performance and participation.

3.3 Research questions

3.3.1 Research question one

What are the drivers for private investment in the power sector of SSA?

The literature review identified a number of key overarching factors that drive private investment in the power sector of SSA; however, these factors were represented as considerations rather than conclusive criteria to successful private investment in SSA. Thus, this question sought to conclusively define these drivers and identify additional factors that may have been considered in past research.

3.3.2 Research question two

What are the indicators influencing the decision for private investment in the power sector of SSA?

Given the large number of considerations and investment indicators available, this research question endeavoured to determine the indicators used by private investors whether or not to pursue private investment in the SSA's power sector, given the range of indicators available.

3.3.3 Research question three

How is the private investment landscape in the power sector defined from structural and regulatory perspectives for the top five largest private investment disbursed countries in SSA?

Brew-Hammond (2010) and a report presented at the WEF (2014) suggested that the investment landscape played a significant role in attracting private investors to a region as well as the success of these investments. Thus, this question strived to determine the structural and regulatory compositions from a private investor perspective.

3.3.4 Research question four

How are the challenges associated with private investment in power markets addressed?

The WEF highlighted six predominant challenges associated with private investment in the power sector of SSA. Given the hybrid market structure mentioned in Section 2.4.2 which compounds these risks, it is important to determine how these challenges have been addressed.

3.3.5 Research question five

How is risk and uncertainty limited for private investments in the power sector of SSA?

From the literature review it is clear that private investments in the power sector of SSA are usually fortified by risk that may include plant, market, regulatory and policy risks (International Energy Agency, 2007). The purpose of this question was to determine the to what extent risk is minimised for private investors.

3.3.6 Research question six

How has renewables impacted the private investment landscape in the power sector of SSA?

This question aimed to determine the impact of renewable energies on the private investment landscape in the power sector of SSA, in view of the South African REIPPP Procurement being applauded for the large number of projects that reached financial close in recent years.

3.4 Hypotheses

3.4.1 Hypothesis background

Given the major dependence on private investment in the development of the power sector in SSA, it was critical that the required investor incentive was established in order to improve the private investment performance and participation in the region. Thus, private investment participation in this sector would only improve if the landscape was conducive for successful private investment. Therefore, the following hypotheses are proposed to measure the correlation between the framework elements for successful private investment in the power sector of SSA and the investment performance and participation in the region.

3.4.2 Hypothesis one

Null hypothesis (1): H_0: p = 0, The critical success factors for private investment in the power sector of SSA are not effective in improving the performance of these investments.

Alternative hypothesis (2): H_1: p > 0, The critical success factors for private investment in the power sector of SSA are effective in improving the performance of these investments.

3.4.3 Hypothesis two

Null hypothesis (3): H_0: p = 0, The critical success factors for private investment in the power sector of SSA are not effective in improving investment participation in the region.

Alternative hypothesis (4): H_1: p > 0, The critical success factors for private investment in the power sector of SSA are effective in improving investment participation in the region.

CHAPTER 4:

RESEARCH METHODOLOGY

4.1 Research design

Welman, Kruger and Mitchell (2005, p. 52) defined research design as the plan and the process according to which research participants are obtained and information collected from to support the research questions. Zikmund (2003) further elaborated on the research methods used for descriptive and causal research to be considered for this research design, which included surveys, experiments secondary data and observation.

Zikmund (2003) highlighted that a descriptive study is founded on a preceding conception of the research problem. Given that this research builds on the proposed critical success factors for private sector investment in energy infrastructure in emerging markets (Underhill, 2011), a descriptive study was adopted for this research. According to Saunders and Lewis (2012, p. 105) the nature of this study warranted that a realism philosophy was to be adopted for this research as this philosophy stresses that objects exist independently of our knowledge of their presence.

According to Welman *et al.,* (2005) a deductive research approach refers to research where theoretical propositions are tested against empirical observation. Hence, a deductive approach was selected for this research.

Closed or pre-coded questions offered respondents to choose from a number of possibilities which made this a suitable method when the respondents' preferences needed to be assessed, for example, what the most applicable investment considerations are concerning regulated versus unregulated assets (Welman *et al.*, 2005). This implied that the data derived from these questions or statements be rendered nominal, qualitative data (Saunders & Lewis, 2012). The use of open-ended questions was employed in order to gather information that was not pre-empted by the questionnaire, like the level of economic growth that was required before private investment is to occur in a region. Accompanying the aforementioned, a five-point Likert scale was used to determine the level of contribution of various constructs to successful investments in the private sector of SSA. As per the technical classification of data, Likert scale data would be considered to be ordinal qualitative data, however,

Park (2005) justified that Likert scale data could be considered to be interval, quantitative data. There are prerequisite conditions that need to be adhered to before Likert scale data can be used for parametric analysis, which was discussed in more detail in Section 4.6.3. According to Saunders, Lewis and Thornhill (2009, pp. 184-185) the research choice was defined as mixed-model research given that quantitative data and qualitative data was used simultaneously, where the qualitative data is considered complementary to the quantitative data.

The survey was distributed electronically to selected individuals, who were deemed competent to complete the questionnaires. The questionnaires were presented in Excel 2010 format, with a maximum of 57 questions and statements. Respondents were requested to save their responses in the Excel 2010 files and return it to the researcher.

This method for data collection was substantiated by the fact that it was a practical means of gathering the required data, was inexpensive, and respondents need not require any special software packages to participate in the research. Non-response errors presented the most significant limitation to this research method given the large number of contacted respondents who omitted to complete the survey for many various reasons including current workloads and holiday periods in certain regions. An additional limitation to this method can be attributed to the fact that it relied on the respondents to independently complete the questionnaires. In order to minimise any ambiguity in the questionnaire, descriptive notes were included to provide additional information to the respondents.

4.2 Unit of analysis

The unit of analysis is defined as the level at which the investigation will concentrate, for example, organisations, departments, individuals or objects (Zikmund, 2003).

The unit of analysis relevant to this research was the individuals responding to the questionnaires. These individuals were considered stakeholders actively involved in the power sector of SSA, and were selected from different fraternities in this sector. In order to deepen the insight into the unit of analysis, the individuals were categorised by their role or contribution to the private investment landscape of the power sector in SSA.

4.3 Population, sampling and sampling method

Sounders *et al.*, (2009) define the population as the complete set of cases or members. The population relevant for this research was all private investor stakeholders in the power sector of SSA, which included all current and potential investors, developers, commercial financiers, governments and regulatory bodies.

Zikmund (2003) points out that the sample size is largely determined by the homogeneity of the population, suggesting that the for a desired confidence level, the sample size reduces as the population becomes more homogenous. Additionally, a minimum of 30 units was required in order to realise a statically significant sample (Zikmund, 2003).

A non-probability sampling method was used to conduct the survey, due to the practical complications that resided in defining the sample frame if a probable sampling method was to be used. Sounders *et al.,* (2009) suggested that a purposive or judgemental sampling method was used where the researchers applied his/her own discretion towards who would be the most suitable stakeholders to answer the research questions. In view of this, a comprehensive list of possible respondents was developed, by means of researching the relevant contact persons from a list of most significant private investments that were concluded in the power sector of SSA, as proposed by Eberhard, Gratwick, Morella and Antmann (2016, pp. 283-324). The members of the South African Energy Intensive User Group (EIUG) were also approached to participate in the research given their experience in the power sector of SSA. Lastly, the researcher's personal network of relevant stakeholders to participate in the research was also utilised to expand the number of possible respondents to the questionnaires. This method applied for data collection presented a focused, cost effective and convenient means to gather the data, albeit being time consuming whilst the mailing list was compiled.

The questionnaire was subject to a pilot test to ensure that all the questions were unambiguous, appropriate and that any possible errors have been corrected before it was distributed to the respondents of the questionnaire (Saunders & Lewis, 2012, p. 158). The pilot test was conducted with a number of energy specialists in the researcher's professional network, who had the relevant understanding of the private investment landscape in the power sector of SSA. Subsequently, the questionnaire was adjusted according to insights received before it was distributed.

4.4 Assumptions

The following assumptions were made in conducting this research:

1. Companies, listed or privately owned, who invested in power generation to offset electricity costs or to improve electricity self-sufficiency, were considered private investment in the power sector.
2. Only private investment in the power sector of SSA which relates to a capacity requirement in excess of 5 MW and investment amount in excess of R50 million were considered to decrease the possibility of accounting for small emergency generation units.
3. The projects were not executed in isolation, but interacted with the regulatory, physical and economic settings.
4. Such projects aimed to have sound business cases and were not merely pursued for corporate social responsibility initiatives; thus, such projects had a sound economic business case.
5. The population was adequately represented by the sample.
6. The respondents to the questionnaires presented true accounts of investment particulars to accurately represent past investments.
7. The requirements for reliability and validity were met through a sample size of 31.
8. Respondents were sufficiently acquainted with the subject matter, allowing them to answer the questionnaire without any ambiguity.

4.5 The research instrument

A self-administrated survey questionnaire was the primary method used to gather the data from 31 respondents, who were deemed suitable for this research, given their involvement in investments in the power landscape of SSA. The development of the questionnaire was guided by the framework proposed by Underhill (2011) who proposed a number of considerations related to infrastructure investment, specifically focussing on the power sector. Furthermore, the questionnaire was structured to logically align with the research questions and hypotheses presented in Chapter 3. Response input was primarily guided by a set of fixed-alternative questions, affording respondents specific limited-responses that represented their position the best concerning the subject in question and was generally presented in a multiple-grid format (Zikmund, 2003, pp. 338-366). Additionally, respondents were also presented with a limited number of open-ended questions with the objective of retrieving insights

from the respondents that were not restricted to alternatives presented by the researcher.

The described structure of the questionnaire ensured that respondents understood the research questions being investigated, making it easier for the respondents to complete the questionnaire. Concurrently, responses derived from a well-structured questionnaire facilitate the process of comparing, coding and interpreting the data as promoted by Grandmont, Goetzinger , Graff and Dorbecker (2010).

4.5.1 Survey questionnaire design

The survey questionnaire consisted of nine sections, and a total of 57 questions and statements identified from the available literature. Where the literature presented imprecise points of view pertaining to the presentation of the statements, open-ended questions were put forward to the respondents; however, majority of the questionnaire was either presented as determinant-choice statements or based on a five-point Likert scale, where “5” corresponded with “strongly agree” and “1” corresponded with “strongly disagree”. In order to improve the ease of reading the questionnaire, questions and statement were presented in a multiple-grid layout.

Section A (questions A1 to A4) aimed to define the demographics of the respondents. Section B (questions B1 to B11) related to the drivers of private investment in the power sector of SSA. Section C (questions C1 to C9) investigated the main indicators used in the decision making process whether or not to pursue investments. Section D (questions D1 to D9) presented statements related to the structural and regulatory landscape of the investment landscape in SSA. Section E (questions E1 to E4) was aimed at how investment challenges are addressed in this region, while Section F (questions F1 to F5) expanded on Section E by examining how risk and uncertainty problems are addressed. Section G (questions G1 to G5) investigated the impact of renewable energy sources on the investment landscape. Sections B to G were structured in such a manner as to best address the six research questions, as mentioned in Chapter 3. Section H (questions H1 to H6) and Section I (question I1 to I6) addressed the two hypotheses formulated in Chapter 3, which essentially endeavoured to confirm if a framework of critical success factors, as derived from Sections B to G, would increase investment performance and investment participation in this region’s power sector.

The survey questionnaire was targeted at respondents from five different sectors involved in private investments in the power sector of SSA. A large number of the respondents were identified by means of researching the project developers and financiers of the most significant power investments in SSA (Eberhard, Gratwick, Morella, & Antmann, 2016). Complementary to this, the members of the Energy Intensive User Group (EIUG) of South Africa were also included in this research due to the large number of companies that have invested in electricity generation.

4.5.2 Survey tool

The survey tool utilised for this research consisted of an email communication distributed the targeted respondents containing an outline of the objective of the study, a letter of consent and the survey questionnaire. Subsequently, the communication was distributed by means of a comprehensive mailing list that was developed comprising the respondents targeted for this research, as explained in the aforementioned section. The letter of consent (Appendix A) iterated the objectives of the study, an expression of the researcher to ensure that all data collected would be anonymous, and emphasising that participation was completely voluntary. The survey questionnaire (Appendix B) was presented in Excel 2010 format. Despite the popularity of online survey tools in recent years, Excel 2010 was the preferred tool, as experience has taught that many companies' internet security software prohibits respondents from accessing these online platforms resulting in respondents possibly being omitted from the research. The decision to make use of Excel 2010 instead of online survey tools increased the workload in terms of tracking and processing the data. However, to mitigate the manual management of the received data, an Excel 2010 spreadsheet was developed to collate the data from the respondents prior to the distribution of the questionnaires, which was also capable of presenting the data as per the researcher's requirements, in graphical and tabulated formats.

4.5.3 Survey pilot

The objective of pilot is to trial the questionnaire with a small group of respondents similar to those who will be participating the research to identify any deficiencies prevailing in the survey method and tool, prior to actual collection of data (Saunders & Lewis, 2012, pp. 148-149). In view of the aforementioned, the survey questionnaire was distributed to energy projects subject matter experts within the researcher's network, who were deemed suitable to participate in the survey pilot. The pilot

participants were provided with the cover letter and the questionnaire to be distributed to the actual research participants, along with an outline of the objectives of the research and requested to provide their inputs to ensure completeness and succinctness of the questionnaire. The feedback from the pilot respondents were used to make structural and content adjustments to the questionnaire. Upon incorporating the adjustments to the questionnaire and the letter of consent was the questionnaire deemed suitable for data gathering.

4.5.4 Accuracy, validity and reliability

Accuracy is especially important when descriptive research is conducted and is typically synonymous with survey research, as was the case with this research (Zikmund, 2003, p. 57). Given the importance of accuracy in research, Zikmund (2003, p. 337) simplified the concept by suggesting that accuracy refers to the information collected from the questionnaire being both valid and reliable, and can be influenced by the succinctness, construct and clarity of the questionnaire. Thus, to ensure accuracy, the questions and statements in the questionnaire were presented as simple and unambiguous as practically possible, and were structured in a logical arrangement that was aligned with the research questions and hypotheses. Each section of the survey questionnaire was introduced to the respondents to deepen their insight in the questions and statements presented to them.

According to Saunders *et al.,* (2009, pp. 317-373) the validity relates to the questionnaire's ability to measure what the research intended on measuring, while the reliability refers to the consistency of the questionnaire. The validity of the questionnaire was ensured by means of ensuring content validity and predictive validity of the data (Saunders et al., 2009). Content validity was guaranteed through the alignment of the questions with a comprehensive literature review. Additionally, the survey pilot also highlighted any deficiencies or construct related problems in the questionnaire. Predictive validity compared the ability of the data collected in the questionnaire to predict the outcome of specified criteria, by means of a statistical analysis, primarily testing for correlation. Internal constancy was the primary method of testing the reliability of the questionnaire. Sounders *et al.,* (2003) explained that this method involves comparing the consistency of responses across the questions and statements in the questionnaire. Internal consistency was measured by means of Cronbach's alpha, which is a statistical indicator for pairwise correlations between items as explained by Zaiontz (2013). Saunders and Lewis (2012, pp. 127-128)

expanded on the concepts of validity and reliability by highlighting the principal factors that may influence the research findings, which is summarised in Table 1, along with the mitigating actions taken during the research.

Principal factors threatening the validity of research findings and conclusions	
Factor	Actions taken
Subject selection	The sample representing the population was selected on the basis of actual experience with the subject. Participants' experience was vetted on the basis on their involvement the relevant projects.
History	The research was considered to be a cross-sectional study, implying that the subject was investigated at a particular point in time and could not be subject to events along a timeline that may impact the validity of the study (Saunders & Lewis, 2012)
Testing	The data collection process was administrated in manner that represented an anonymous nature, where most of the respondents were not personally acquainted with the researcher. Subsequently, the data collection was not emotionally influenced. Similarly, the research instrument was presented in a simple and unambiguous format that allowed for participants to easily respond to the questionnaire.
Mortality	The collection of data was not subject to a precise number of respondents; thus, if a number of the respondents were to exit their participation in the research, it would not significantly impact the results of the study, as long as the criteria for parametric analysis to be adhered to were met, as explained in Section 4.6.3. In addition, the mere fact that the study was cross-sectional in nature limits the probability that respondents would not be able to participate due to mortality reasons.
Ambiguity about causal direction	Due to the fact that this study involved a correlation analysis, whereby the cause and effect variables were measured simultaneously, ambiguity about the causal direction was indeed a concern. However, the ambiguity was minimised by ensuring that that research instrument was subject to pilot testing and by ensuring that the sample was sizeable as to allow for parametric analysis, specifically one sample T-tests, which endeavoured to identify unanimous relationships or then not.

Principal factors threatening the reliability of research findings and conclusions	
Factor	Actions taken
Subject error	The questionnaire responses could not be subject to measurement errors, like time of day when the questionnaire was administrated, as the constructs did not lend it to be affected by external impactors.
Subject bias	The questionnaire was administrated in neutral manner, without any leading statements that would lead the respondents to express biases.
Observer error	As the questionnaires were not administrated by means of personal interviews, the data was considered to be uninfluenced by the researcher's personal inputs.
Observer bias	The nature of the data prohibits the researcher from applying personal biases, as respondents had to select the appropriate responses from a set of statements or scales, eliminating the researcher's inputs in the development of the data.

Table 1 – Mitigating actions to ensure validity and reliability of research findings and conclusions (Saunders & Lewis, 2012)

4.6 Data analysis and interpretation

The data analysis process was essentially clustered in three phases, namely, the data collection and preparation, data examination and data analysis, as illustrated in Figure 5. The process was underpinned by a cross-sectional study approach, suggesting that the data related to this study was subject to a specific period in time and not being evolutionary of nature (Saunders & Lewis, 2012).

In endeavouring to address the research questions, the data analysis process consisted of the following analysis and tests: descriptive analysis, testing for differences, correlation coefficient tests, reliability (internal consistency) analysis – typically referring to Cronbach's alpha, and analysis of variance. All statistical analyses were conducted using Microsoft Excel 2010. The aforementioned statistical techniques were based on the types of data that were collected for this research, bearing in mind that quantitative as well as qualitative data was used during the research. Qualitative data was used to indicate rank respondents preferences in terms of the various constructs presented to them. Ranking was based on a frequency and median

analyses. Quantitative data was used to calculate the means for the various constructs to measure the importance of each of the constructs; thus, the greater the mean, the greater the importance of the construct. To further the quantitative data analysis, the difference between means were also measured, by means of a one-way analysis of variance (ANOVA), in order to determine if the difference between the sample mean and the hypothetical means (with reference to analysis Likert scale data) was statically significant.

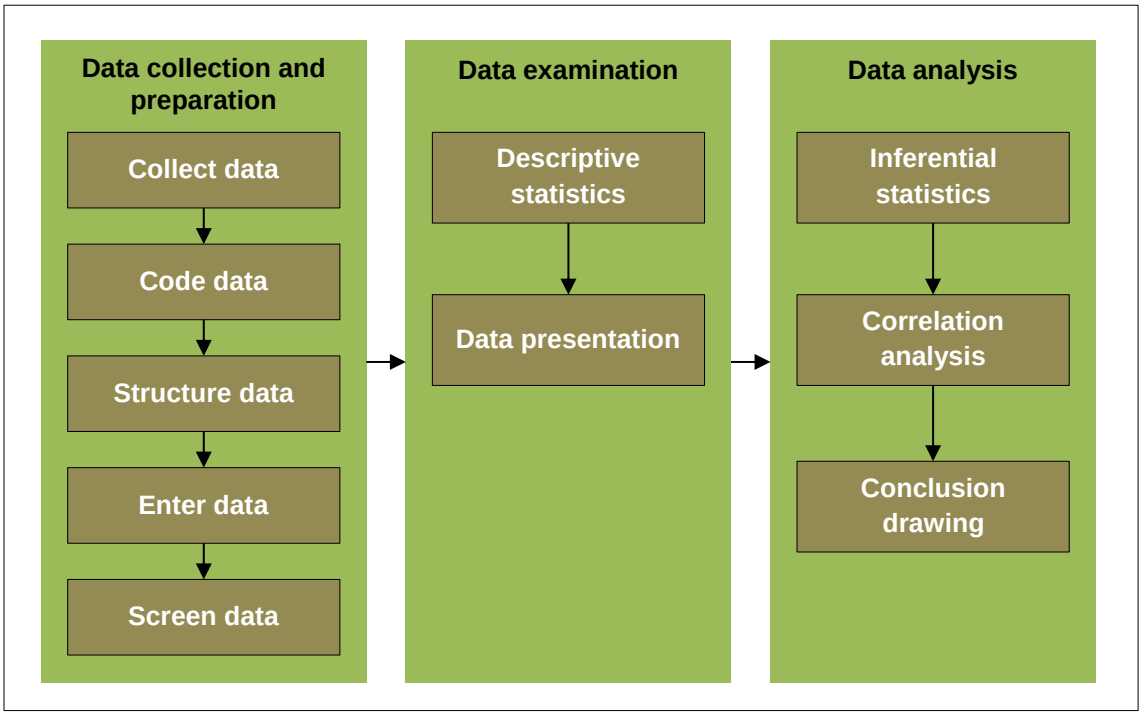


Figure 5 – Data analysis process

4.6.1 Data collection and preparation

Quantitative data and qualitative data were collected by means of a survey questionnaire, as alluded to in Section 4.5.2. The survey questionnaire was distributed to potential respondents from various sectors in SSA, which included financiers, project developers, advisory services, legal services and industrial stakeholders, and they were afforded 17 days to complete the questionnaire and return the data, in Excel format, to the researcher. A total of 31 responses were received. Despite majority of the responses received were from South African (currently residing, not necessarily native to South Africa), responses were also received from other SSA countries as well as countries outside of SSA; refer to Section 5.3 for the respondents' demographic information.

The data received from the respondents was coded as per the extract from the code book presented in Table 2; refer to Appendix C for the comprehensive code book used during the analytical phase of this research. According to Hesse-Biber(2010) a deductive coding style deemed appropriate, due to the distinct categories of data derived from the questionnaire, primarily guided by the research questions.

A1. Position	Code
Chief Executive Officer	1
Chief Financial Officer	2
Other C-Suite Officer	3
Project Developer	4
Private Investor	5
Project Manager	6
Power Regulator Representative	7
Government Official	8
Other	9

Response	Code
Strongly Disagree	1
Disagree	2
Neutral	3
Agree	4
Strongly Agree	5

B10. GDP Growth rate before investments are pursued	Code					
	0% to 1%	1% to 2%	2% to 3%	3% to 4%	4% to 5%	Other
	1	2	3	4	5	6

Table 2 – Coded data example; extract from Appendix C

Following the coding of the data, a master data file was created with the necessary structure of the data that was to be analysed. This entailed that every construct from the questionnaire was provided for in the master data file. Each construct was represented in the data file columns, while construct responses were captured as different line items, with each line item representing a particular responded. This master data file formed the basis for all statistical analysis that was conducted during this research.

With the structure created for the analysis, the researcher could easily continue entering the data into the master file. This process was facilitated by the fact that the questionnaires were in a fixed Excel 2010 format, and the researcher could effortlessly reference the gathered data from the questionnaires to be incorporated into the master data file. In order to improve the referencing of the questionnaire data, each data file was assigned a unique and systematic identification code, while simultaneously removing any identifiers to the individual respondents.

Upon incorporating the data into the master data file, each data entry was reviewed for completeness, and to identify obvious outlier data points as to ensure that these data points be scrutinised during the data analysis process. Similarly, missing data was dealt with on a case by case basis, but generally, wherever data was omitted by a respondent, that particular respondent's construct was removed from the analysis. This decision was grounded on the basis that in the worst case, only three constructs did not receive a response, implying that a data set from that questionnaire was still 94.4 percent complete, and the remainder of the data could still be used in the analysis, opposed to rejecting the entire data set on the basis of completeness.

4.6.2 Data examination

Upon completion of the data collection and preparation phase, as illustrated in Figure 5, the next significant phase in the data analysis and interpretation process was the examination of the data. This phase of the analysis concerned the development of the descriptive statistics and determining how the data was to be presented to facilitate the process of performing the necessary calculations from the data.

Data derived from the questionnaires was primarily quantitative data, given that the questions and statements subject to a Likert scale could be viewed as interval data. Similarly, data derived from open-ended questions were reduced to interval data sets as indicated in Appendix C. Wherever respondents were requested to choose an applicable response, for example, the type of risk mitigation options preferred by private investors, the data was regarded as nominal, and subsequently, qualitative data. The aforementioned classification of the data is an important prerequisite to guide the analysis of the data.

According to Torres-Reyna (2011), descriptive statistics concerns the portrayal or explanation of the basic features of the sample. Generally descriptive statistical analysis investigates the mean, median, mode, skewness and standard deviation of the data (Saunders & Lewis, 2012). However, the type of data collected determined the different statistical parameters that could be applied, as not all descriptive statistical parameters were applicable to quantitative data. Quantitative data was subject to all of the aforementioned descriptive statistical parameters, while qualitative data was only subject to the following parameters, frequencies, medians and modes.

Quantitative data was tabulated and each question and statement was presented with the appropriate descriptive statistical parameters, as well as the relevant statistical

correlation parameters, discussed in Section 4.6.3. Quantitative data was presented in both table and format and bar graphs.

4.6.3 Data analysis

According to Zikmund (2003), inferential statistics are used to make inferences about the sample or the population at large. However, due to the judgemental sampling method applied to populate the sample, one cannot make statistical significant inferences about the population, and are all inferences only applicable to the sample used during the research.

Tobertge and Curtis (2013) proposed on the basis of the Central Limit Theory, parametric analysis is allowed for Likert scale data and analysis of variance techniques include the t-test, ANOVA and regression procedures. Willet (2015) further expanded on the notion of analysing Likert scale data as interval, quantitative data, provided that the following conditions were satisfied:

1. The sample distribution is normally distributed. This can be achieved by ensuring that the sample is size is greater than 30, or in the event of a sample size smaller than 30, the data should appear to be normally distributed upon inspection.
2. The Likert scale should at least contain five ordinal levels.
3. There should be no extreme responses, but in this case, a five-level Likert scale automatically ensures that extreme responses are avoided.
4. The variance of the two samples compared should be approximately equal.

With the data derived from the survey questionnaires adhering to the aforementioned conditions, the Likert scale data was subject to a one-sample t-test where the mean of the statements was compared to the midpoint data of the Likert scale (Park, 2005).

Correlation analysis was used to investigate the relationship between the variables, and subsequently, the formulated hypotheses, as presented in Section 3.4, were subject to a correlation analysis to determine whether certain constructs the impact of certain constructs on private investment performance and participation in the power sector of SSA.

In order to ensure that the conclusions drawn from the data analysis were reliable, the internal consistency of the constructs was tested by means of the Cronbach alpha test. According to Zaiontz (2013), the average value of Cronbach's alpha should be between

0.6 and 0.8 to indicate acceptable reliability levels. The level of the reliability increases as Cronbach's alpha approaches one.

These correlations were measured against the critical success factors for private investment in the power sector of SSA and the performance and participation of these investments in this region.

4.7 Limitations of the study

Since the research canvassed a non-probability purposive sampling methodology, underpinned by the fact that the sample frame could not be accurately defined, the results could not be generalised for the entire population with any statistical significance. Despite substantial efforts to identify as many possible key stakeholders that would be able to participate in this study, participants could essentially only be identified on the basis of researching available literature on completed projects and leveraging of the researcher's personal network and relevant industry role players. This method of canvassing the sample would imply that new role players would be omitted from the study, as well as any role players that may have moved to different industries who have previously been active in this field.

A limitation resides in the methodology applied to collect the data by means of a survey questionnaire that primarily utilised a Likert scale and closed-ended constructs, in the form of response biases and nonresponse errors. According to Bertram (2007), response biases may result in distortion of Likert scales. Firstly, respondents tend avoiding extreme responses, leading to a central tendency bias. Secondly, respondents may agree with constructs in order to satisfy the researcher instead of truthfully responding to the constructing, resulting in an acquiescence bias. Lastly, responses may be biased to socially favourable options, subjecting the data to a social desirable bias. A nonresponse error was as a result of the number of potential participants who have failed to complete the questionnaire, for a various number of reasons, like availability, outdated contact details and unwilling participants (Zikmund, 2003).

The research did not attempt to be predictive of the level of private investment performance, as the objective was to conclusively define the criteria that would improve success of these investments, and not predict the investment performance.

In conclusion, the data derived from the survey responses were also dependent on the following:

- Experience and perceptions of the respondents
- Recency of respondents' involvement in investments, due to the dynamic nature of this landscape
- Complexity in developing and securing power investments
- Relationships between investors and regulatory entities, which may disguise complexities and actual procedures related to these investments.

CHAPTER 5:

RESULTS

5.1 Introduction

This chapter endeavours to provide an overview of the results gathered from the research instrument as well as a summary of the main findings from the analysis of the research questions and hypotheses, as presented in Chapter 3. Additionally, this chapter alludes to the consistency and characteristics of the data.

Included in this chapter is an analysis of the collected data, with the associated descriptive statistics and the internal consistency test results of the research instrument. The constructs related to the research questions, which rendered quantitative data, were subject to one sample t-tests to interrogate the sample means against a hypothetical mean, while associated qualitative data was subject to frequency analyses. The two hypotheses were tested by means of subjecting each sub-hypothesis to a one sample t-test, where after the main hypotheses were tested by means of Fisher's method for combined p-values. In view of the research sample being comprised of different sector stakeholders, ANOVA tests were conducted in order to determine if there were statistically significant differences between the sector means for the various constructs.

5.2 Response rate

A total of 31 responses were received that were deemed appropriate for the research. Two of the responses had a few incomplete entries, but due to the small number of omitted entries, it was decided that a suitable imputation method would be applied to avoid discarding the entire response from the respondent on the basis of a limited number of omitted entries. Shrive, Stuart, Quan and Ghali proposed that the question mean response be used to impute missing data entries (2006), subsequently, this method was applied to impute omitted Likert-scale data that had been omitted.

5.3 Demographics

Out of the 31 responses received the data provided in Section A was considered to be complete and deemed valid to elaborate on the demographic depiction of the sample used for this research.

5.3.1 Respondents sector association in the private investment landscape in the power sector of SSA

Figure 6 specifies the respondents' current association with the private investment landscape in the power sector of SSA. This differentiation in sectors was used as a delegation to determine if the relevant stakeholders were included in the research. Furthermore, this was used to determine if there were any statistically significant differences in the critical success factors among the various sector stakeholders involved.

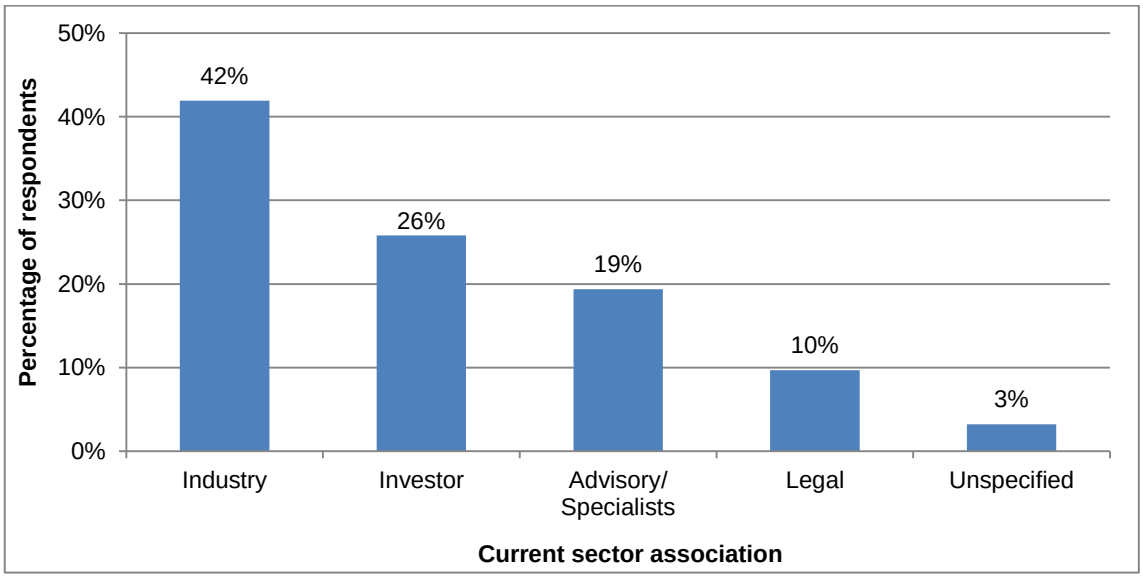


Figure 6 – Respondents sector association in the private investment landscape

The Industrial sector (42 percent) constituted the largest proportion of the respondents, followed by Investors (26 percent), Advisory/Specialists (19 percent) and Legal (10 percent) professionals. One respondent failed to specify his/her current sector involvement, and as a result of the data being nominal and qualitative of nature, an imputation method could not be applied.

The most relevant stakeholders resided within the Industry and Investor sectors and comprised 68 percent of the respondents. Power project developments are usually initiated by stakeholders from the Industry or Investor sectors, while Advisory/Specialists and Legal sectors are generally considered to be supportive in nature of these investments. Therefore it was encouraging to note that the primary role-players for private investments in the power sector constituted more than two-thirds of the respondents.

5.3.2 Respondent's experience in private investment in the power sector of SSA

Respondents' total work experience was evaluated alongside relevant investment experience, as illustrated by Figure 7. The largest proportion of the sample had work experience between 10 to 15 years (29 percent), while the next significant work experience proportion of 30 to 40 years constituted 26 percent of the sample, suggesting that more than half of the sample had a substantial amount of work experience. However, in the aforementioned groups of work experience, only 19 percent and 6 percent of the sample was represented by respondents with investment experience of 10 to 15 years and 30 to 40 years respectively. The proportion with the largest contribution of investment experience only had 0 to 10 years (61 percent) investment experience. This suggested that a significant proportion of the sample was not involved power project investments for the entire duration of their working careers.

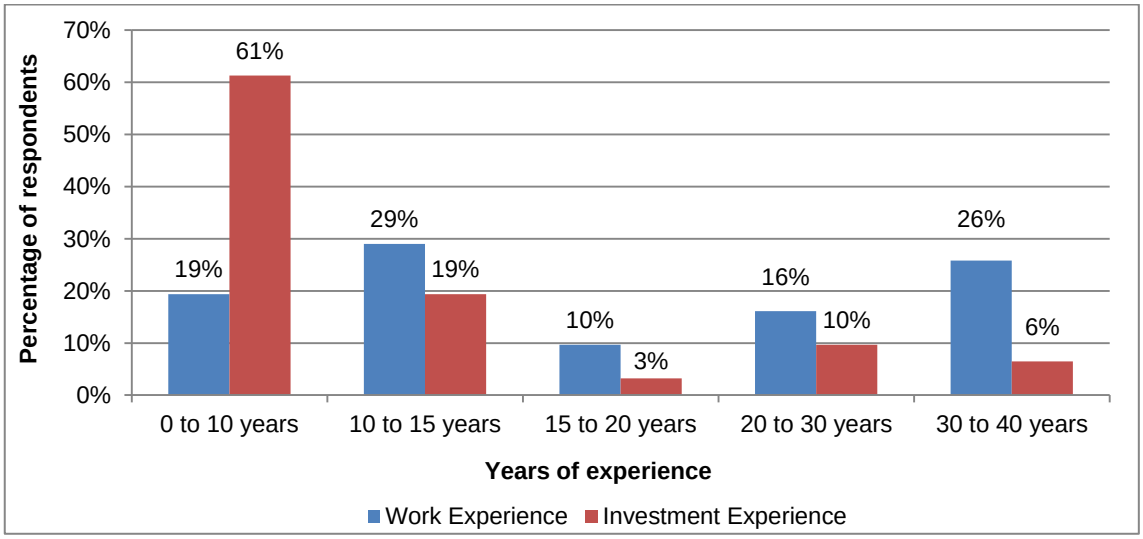


Figure 7 – Respondent work and investment experience in the power sector

From the abovementioned, it appears that a significant contribution of the sample were only momentarily involved in private power project investments, or as their careers advanced along with the evolving industry and power landscapes, got involved in private investments in the power sector.

5.3.3 Respondents' countries of residence

Figure 8 summarises the respondents' current country of residence. 84 percent of the respondents currently reside in South Africa, with the next largest proportion residing in Nigeria (6 percent), while only one respondent per country, including Uganda, United Kingdom and Ghana, participated in the research.

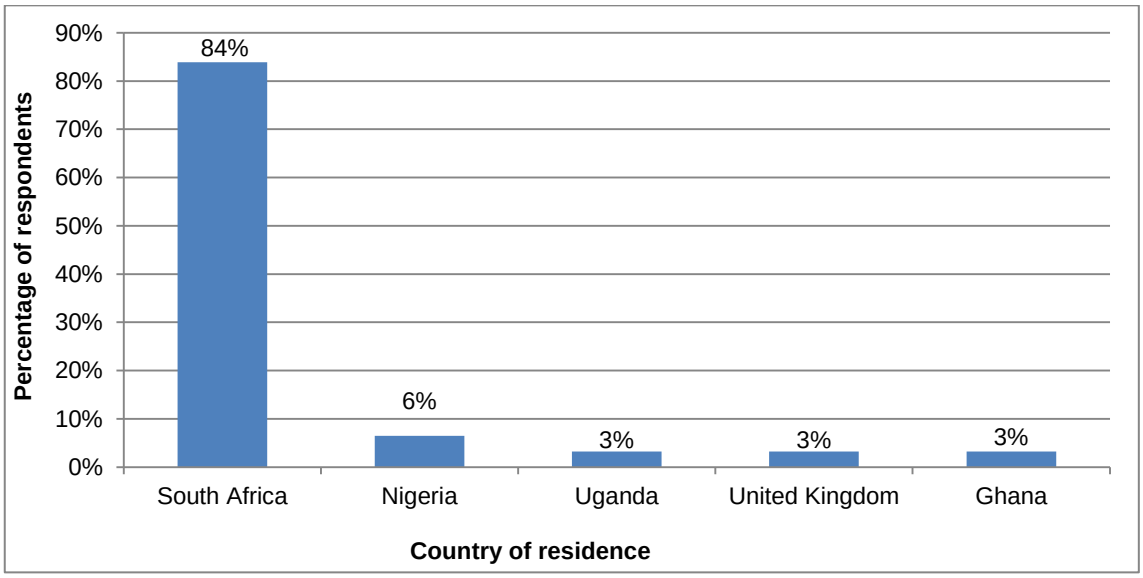


Figure 8 – Respondents' current country of residence

Figure 8 should however not be viewed in isolation, but should also be compared to Figure 9, illustrating the countries of successful private investments in the power sector. Despite 84 percent of the respondents currently residing in South Africa, only 52 percent (refer to Figure 5.4) of the number of private investments in the power sector were concluded in South Africa, suggesting that South African private investment stakeholders in the power sector were also active in other countries of SSA.

5.3.4 Respondents' geographical countries of private investment in the power sector of SSA

An open ended question was posed to the respondents concerning the countries where they have successfully concluded private investment in the power sector of SSA. Albeit

many of the stakeholders participating in private investments in the power sector of SSA, only 21 out of the 31 respondents have successfully concluded private investments in this region's power sector. However, many of the respondents who have concluded private investments in this region's power sector, have done so in more than one SSA country.

Figure 9 illustrates the regional contribution of successful private investments in the power sector of SSA. South Africa (52 percent) constituted the largest proportion of the private investments in this region's power sector. Nigeria (15 percent) was responsible for the second largest proportion of relevant investments, followed by Ghana (12 percent) and Uganda (6 percent). The remainder of the countries from the sample, including Ivory Coast (3 percent), Tanzania (3 percent), Mozambique (3 percent) and Kenya (3 percent), only accounted for a single successful investment in each region.

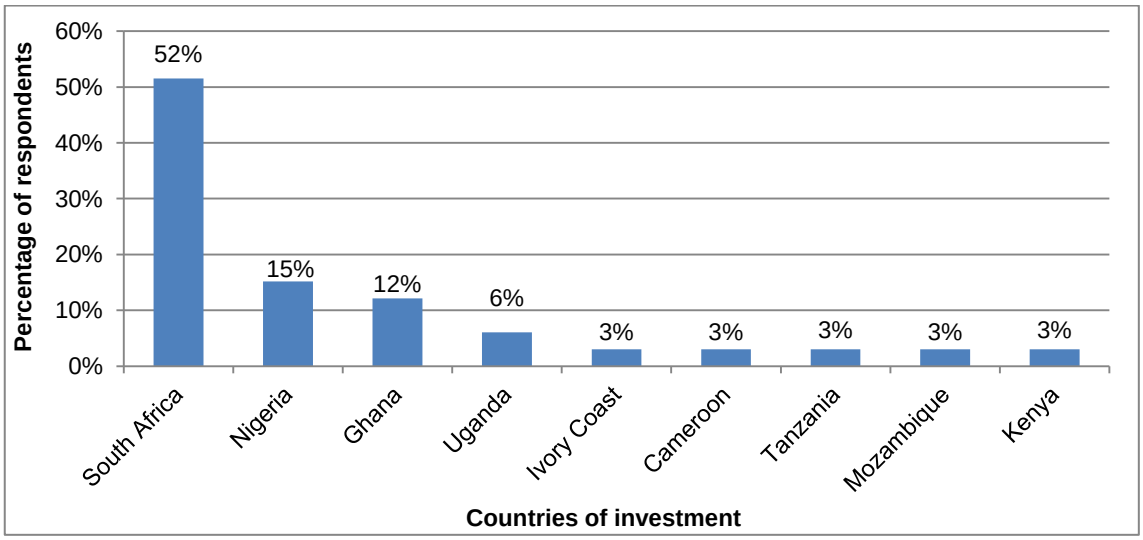


Figure 9 – Respondents' geographical experience of success private investments in the power sector of SSA

5.4 Internal consistency (reliability) test

The internal consistency of the research instrument was tested using Cronbach's alpha, which is a statistical indicator for pairwise correlations between items (Zaiontz, 2013). The reliability of the research instrument was considered acceptable if alpha was larger than 0.6, while reliability increases as it neared 1. An alpha of 0.747 was achieved for this research instrument, suggesting that the instrument was reliable. A total number of 44 items were used in the calculation of alpha.

Despite an alpha of 0.747, it must be noted that there are limitations in the use of Cronbach's alpha. According to Sijtsma (2009), statistics based on a single test do not express considerable evidence about the accuracy of the individual's test performance. He further noted that the test structure also impact alpha. In addition to the observations made by Sijtsma, alpha can only be calculated for the quantitative data, implying that the qualitative data derived from the research instrument had to be tested by means of triangulation, as suggested by Golafshani (2003). Triangulation of qualitative data was done by means of comparing the qualitative responses to that of the quantitative responses from the various responses to ensure general alignment between the quantitative and qualitative data. Subsequently, triangulation proved that the qualitative data was generally aligned with the quantitative data responses, and given that Cronbach's alpha for this research instrument was at an acceptable level, it could be inferred that the qualitative data derived from the research instrument was also reliable.

5.5 Analysis of critical success factors for private investment in the power sector of SSA

Given the objective of this research, namely identifying and defining the critical success factors for private investment in the power sector of SSA, different types of data had to be collected in order to holistically address the research objectives. The primary source of data was Likert-scale data, which was treated as quantitative data, as justified in Chapter 4. Furthermore, qualitative data was gathered from the respondents, either through closed-ended questions, or by transforming open-ended questions into nominal qualitative data entries, as indicated in the numerical code book (refer to Appendix C).

Quantitative data was subject to a one sample t-test of which the details are explained in Section 5.5.1 below, whereas all qualitative data was subject to frequency and mode analyses, as explained in Section 5.5.2.

Six key sets of constructs, aligned with the research questions, were analysed to development inferences related to the sample population.

5.5.1 One sample t-test

Respondents were presented with a number of constructs related to the critical success factors for private investment in the power sector of SSA, and requested to

respond to the constructs by means of selecting the appropriate response from a five-point Likert scale. Sections B, C, D, F, G, H and I were subject to one sample t-tests, wherever Likert scale data was gathered.

Dedasaniya (2013, pp. 53-54) highlight the following five points concerning the analysis of a one tailed, one sample t-test with respect to analysing five-point Likert scale data:

- The means of a number of constructs, derived from a five-point Likert scale, were compared to the mid-point of the Likert scale, namely three. Dedasaniya sited Park (2005), who suggested that this method was appropriate given that it could be assumed that the variables were normally distributed and subsequently the sample mean could be compared to the hypothesised mean.
- One way sample t-tests were conducted for each construct against the midpoint of the five-point Likert scale. A mean significantly greater than the midpoint of the Likert scale suggested that the respondents agreed with the construct, while a mean significantly smaller than the midpoint of the Likert scale, suggested that the respondents disagree with the construct. Hypothesis testing was used to determine if the constructs were significantly larger or smaller than the midpoint of the Likert scale, or in this case the hypothetical mean.
- The null hypothesis for each construct stated that the respondents' responses were neutral, thus a construct mean of exactly three, while the alternative hypothesis for each construct stated that the respondents neither agree or disagree with the constructs, thus, where the construct mean was significant larger or smaller than three. The null hypothesis was rejected if the t-test realised a p-value of less than 0.05. The null and alternative hypotheses could be summarised as follow:
    - Null hypotheses: $H0: \mu1 = \mu2$ (construct mean = 3)
    - Alternative hypotheses: $H1: \mu1 \neq \mu2$ (construct mean >< 3)
- The t-test is further underpinned by the fact that the null hypothesis was rejected on the basis that the calculated t-value was greater than the critical t-value, where t is a function of 30 degrees of freedom (31 observations) and a probability of 0.05.
- Given the abovementioned, the null hypothesis was rejected in favour of the alternative hypothesis if the one tailed p-value was smaller than 0.05 or if the calculated t-value was greater than the critical t-value of 1.697.
- Additionally to the five points highlighted by Dedasaniya, each construct was tested for homogeneity, by means of subjecting it to an f-test. The importance of this test related to the t-test instrument selected from the data analysis software, namely Microsoft Excel 2010.

5.5.2 Analysis of qualitative data responses

The analysis of the qualitative data was largely determined by the structure of the qualitative constructs. As all qualitative constructs were essentially reduced to nominal qualitative data points, each construct was subject to a frequency analysis, and the mode of each construct was also determined. Wherever the respondents were afforded to select the option “other” from the construct responses, they were requested to elaborate on those responses in order to provide further insight. Each case where “other” was selected was assessed on an individual basis.

5.5.3 Drivers for private investment in the power sector of SSA

Table 3 below summarises the results from the t-test conducted on the drivers for private investment in the power sector of SSA. According to Table 3, all but one of the constructs realised t-values greater than 1.697 and p-values smaller than 0.05, resulting in in the null hypothesis being rejected in favour of the alternative hypothesis for first eight constructs related to the drivers of private investment in this region’s power sector. According to the t-test, the mean difference between the response mean and the hypothetical mean was not statically significant for the socio-economic factors being a key investment consideration. Based on ranking the constructs according to response means, respondents agreed that the need to private investment was increasing, which was the most important factor for investment in this regions power sector.

Figure 10 summarises the regional GDP growth required for private investment in the power sector of that region. Four of the respondents did not provide a response to this construct. The mode for this question posed to the respondents corresponded to “other” and equalled ten. The largest proportion (37 percent) of the respondents argued that regional GDP growth was not a key requirement, but rather factors like:

- General economic health, opposed to a GDP growth rate threshold
- Investment decisions being primarily driven by demand
- GDP growth rate not being a direct factor impacting private investments
- Instead of GDP growth rate, other factors like state of economic health, capacity of government guarantees to support purchase power agreements (PPAs) and foreign currency availability were important considerations.

One-sample statistics					One-sample against hypothetical mean of the scale (3)	
Rank	Drivers for private investment in the power sector of SSA	N	Mean	Standard deviation	t-value	P-value (one sided)
1	The need for private investment is increasing	31	4.290	0.739	9.720	0.00
2	Regional demand for electricity is a significant driver for power sector investment	31	4.194	0.833	4.574	0.00
3	Despite strong regional demand for electricity, offtake agreements are the main attractor for investment in the power sector	31	4.194	0.910	7.303	0.00
4	Strong regional economic growth is a key driver for private investment in the power sector	31	3.903	1.012	4.970	0.00
5	Government's lack of funds promotes private investment in the power sector	31	3.742	1.094	3.774	0.00
6	Regional demand for electricity is sustainable for the foreseeable future	31	3.710	0.864	4.574	0.00
7	Alternative electricity offtake agreements must be available before private investments are considered	31	3.419	1.089	2.145	0.02
8	Energy sources are in abundance, easily accessible and a significant driver for private investment in the power sector	31	3.323	0.945	1.901	0.03
9	Socio-economic factors, e.g. urbanisation, are key considerations for private investment	31	3.258	0.999	1.438	0.08

Table 3 – One-sample t-test for the drivers of private investment in the power sector of SSA

The largest proportion of respondents who did specify a minimum GDP growth rate, suggest that 2 percent growth is a requirement, and constituted 26 percent of the 2 percent respondents. However, 19 percent of the respondents believed that GDP growth greater than 4 percent was required before private investment in a region's power sector is considered.

Figure 11 represents 22 responses. 27 percent of the respondents were of the view that private investment could be warranted as long as there was any unserved capacity, and did not refer to a regional capacity demand. However, the largest proportion of the sample (55 percent) was of the opinion that the size of the unserved power market was not a requirement for private investment in a region's power sector. The mode related to "other" and equalled 12.

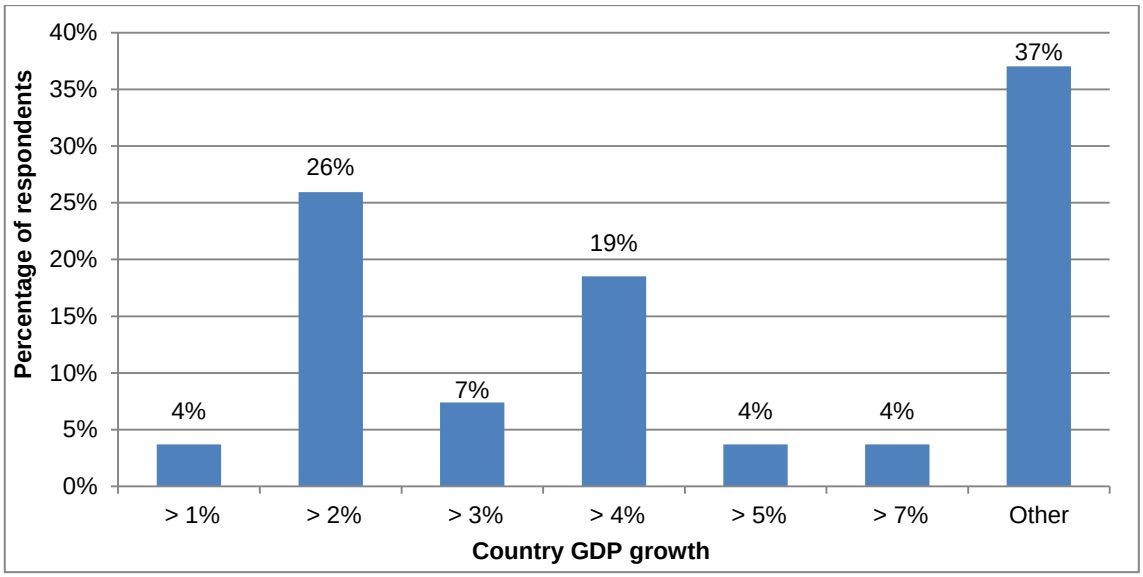


Figure 10 – Country GDP growth requirement for private investment

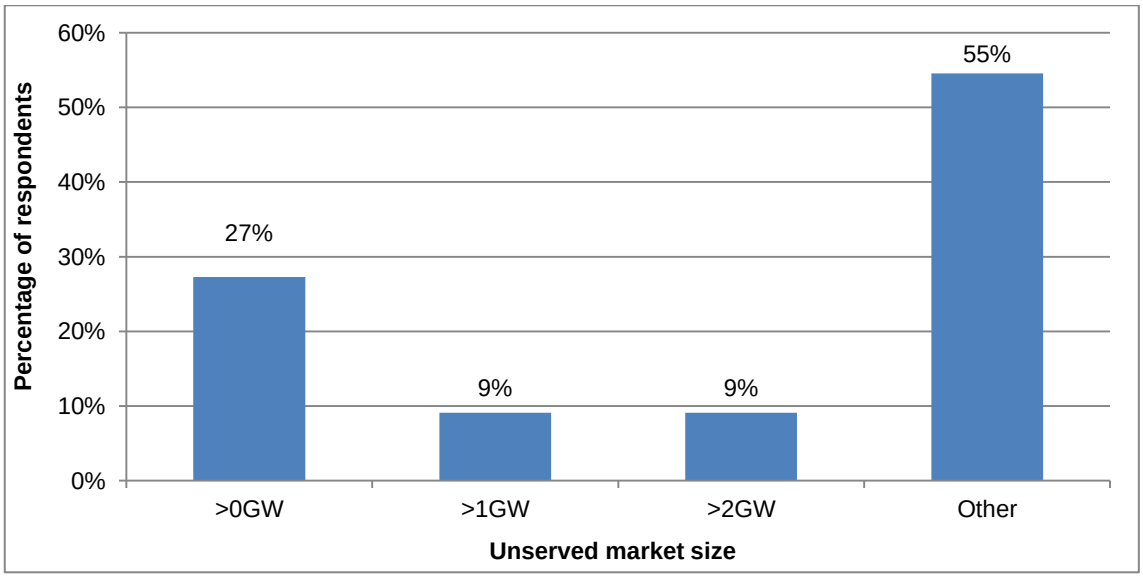


Figure 11 – Size of unserved market required for private investment in a region's power sector

5.5.4 Indicators influencing the decision for private investment in the power sector of SSA

Table 4 below summarises the results from the t-test conducted on the indicators influencing the decision for private investment in the power sector of SSA.

One-sample statistics					One-sample against hypothetical mean of the scale (3)	
Rank	Indicators influencing the decision for private investment in the power sector of SSA	N	Mean	Standard deviation	t-value	P-value (one sided)
1	ROE, ROCE and RONA are the most important indicators used for entering into a private investment venture in the power sector	31	4.194	0.833	7.973	0.000
2	Generation capacity/potential is a key consideration, i.e. the larger the required generation capacity, the more lucrative the setting for private	31	4.194	0.910	7.303	0.000
3	Carbon emission reduction is a key consideration for technology selection	31	3.903	1.012	4.970	0.000
4	Tax incentives are a significant consideration to improve investment returns and may even result in restructuring private investments to benefit from these tax incentives	31	3.742	1.094	3.774	0.000
5	Financial indicators take preference over other sustainability indicators like carbon emission reductions, job creation, etc. in the power sector of SSA	31	3.710	0.864	4.574	0.000
6	Supplying affordable electricity to support a sustainable power sector is as important as maximising investment returns	31	3.419	1.089	2.145	0.020
7	The opportunities for additional power projects are substantial	31	3.323	0.945	1.901	0.033
8	The demand for electricity and private investment is sustainable for the foreseeable future	31	3.258	0.999	1.438	0.080

Table 4 – One-sample t-test for the indicators influencing decision for private investment in the power sector of SSA

According to Table 4, constructs one to seven realised t-values greater than 1.697 and p-values smaller than 0.05, resulting in in the null hypothesis being rejected in favour of the alternative hypothesis for the seven constructs related to the drivers of private investment in this region's power sector. This implied that respondents were in agreement with the first seven constructs. Although construct eight, related to the sustainable future demand for electricity, realised a sample mean greater than the hypothetical mean, this construct was statistically insignificant and regarded as an inconclusive indicator to pursue private investment in the power sector of SSA.

Based on ranking the constructs according to response means, it was clear that respondents agreed that the financial indicators are the primary indicator used in deciding whether or not to pursue private investments in a region's power sector.

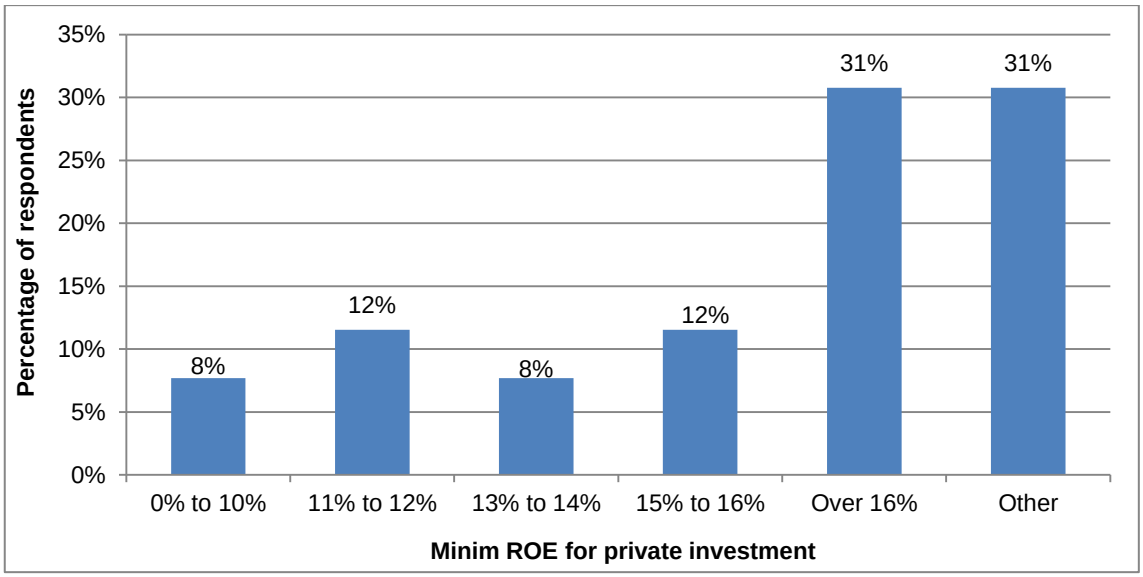


Figure 12 – Minimum ROE for private investment in the power sector of SSA

According to Figure 12, which represents the views of 26 responses, suggested that more than 31 percent of the respondents strive to realise ROE levels in excess of 16 percent. The mode for this constructed reside with two variables, namely “over 16 percent” and “other” each with a total of eight counts. However, 31 percent of the respondents did not view ROE as the primary indicator for decision making to invest in power projects in a particular region. A number of other factors were highlighted by respondents that take preference over a certain level of ROE, which included:

- ROE was dependent on the jurisdiction and currency in a region
- Internal rate of return (IRR) was an indicator preferred over ROE
- The required ROE was dependent on the level of risk in a particular region, as well as the technological risks associated with the investment.

5.5.5 The private investment landscape in the power sector defined from structural and regulatory perspectives

Table 5 below summarises the results from the t-test conducted on the private investment landscape in the power sector of SSA defined from structural and regulatory perspectives.

One-sample statistics					One-sample against hypothetical mean of the scale (3)	
Rank	Private investment landscape in the power sector defined from structural and regulatory perspectives	N	Mean	Standard deviation	t-value	P-value (one sided)
1	Power sector regulatory reform should be a joint effort between private investors and regulatory bodies	31	4.355	0.839	8.995	0.000
2	Current power sector regulation in SSA requires significant reform	31	4.032	1.016	5.657	0.000
3	Governments are the sole driver for regulatory reform in the power sector of SSA	31	3.355	1.170	1.688	0.051
4	An unregulated power market allows for a more lucrative private investment setting in the power sector of SSA	31	3.258	1.064	1.351	0.093
5	Regulation in the power sector of SSA has improved and is more conducive for private investment	31	3.000	1.095	0.000	0.500

Table 5 – One-sample t-test for the private investment landscape in the power sector of SSA defined from structural and regulatory perspectives

Table 5 suggests that only two of the constructs were statistically significant. This is illustrated by the first two constructs' t-values being greater than 1.697 and p-values smaller than 0.05, resulting in the null hypothesis being rejected in favour of the alternative hypothesis for those constructs. Although most of the construct means were greater than the hypothetical mean, only constructs one and two could truly represent the respondent's agreement with the constructs.

Figure 13 summarises 29 respondents' views on the preferred pricing structure to be applied for relevant private investments. 52 percent of the respondents agreed that long-term fixed contracts are the preferred pricing structured, followed by a cost plus margin structure (34 percent) and market-driven (10 percent) pricing structures. One notes that the most preferred structure is also the structure that affords the greatest amount of certainty to investors. Only one respondent argued that there are no preferred pricing structures and that all investments should be dealt with on a case-by-case basis.

According to Figure 14 above, it is clear that IPPs (94 percent) are the preferred ownership structures for relevant private investments. Only one respondent suggested that private investments in the public power sector were the preferred ownership

structure, while another respondent was inconclusive concerning the preferred ownership structure. All 31 respondents provided an opinion concerning the ownership structure for private investment in the power sector of SSA.

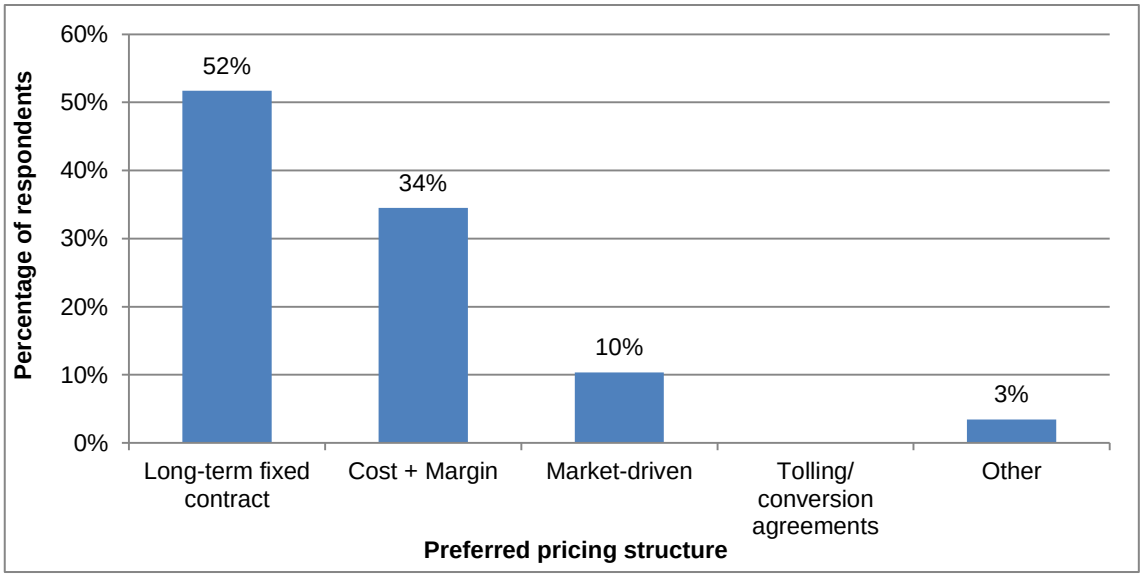


Figure 13 – Preferred pricing structures for private investment in the power sector of SSA

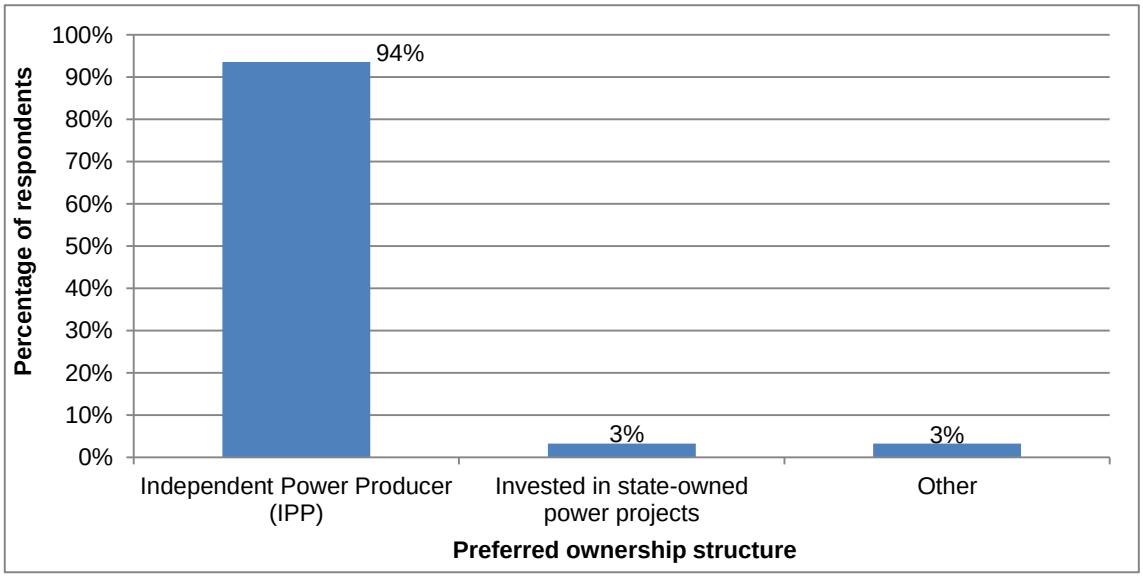


Figure 14 – Preferred ownership structures for private investment in the power sector of SSA

5.5.6 Addressing challenges in the private investment landscape in the power sector of SSA

A number of challenges were subject to investigation to determine the main mitigation actions followed. Challenges related to the private investment in the power sector of SSA included, diminishing margins, regulatory frameworks, static regulatory frameworks, and problems associated with the technology selection. Respondents were presented with a number of closed ended statements pertaining to each construct to determine what were the key mitigation actions followed by respondents. Respondents were allowed to select more than one mitigation action used, given that mitigation responses differ from situations.

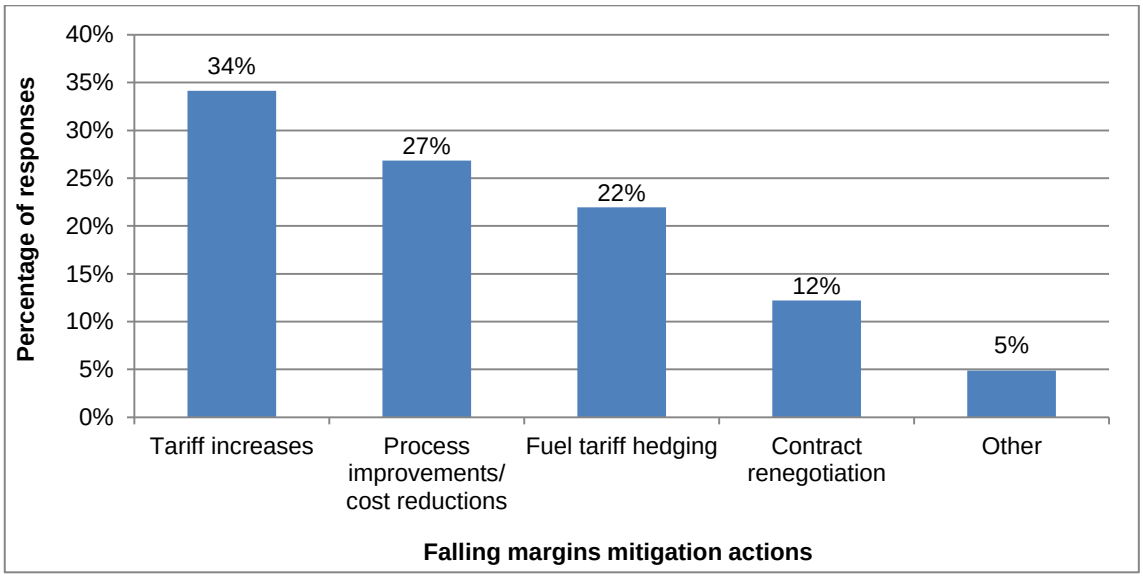


Figure 15 – Mitigation actions for diminishing margins for private investment in the power sector of SSA

According to Figure 15, tariff increases (34 percent) represented the largest proportion of the different mitigation actions used by private investors. Secondly, margins could also be improved by means of process improvements and cost reduction initiatives (27 percent), closely followed by fuel tariff hedging (22 percent). Contract negation only accounted for 12 percent of the respondent's responses. 5 percent of the responses were related to mitigation actions not presented to the respondents, of which tolling agreements appeared to be an alternative mechanism to protect margins.

Figure 16 suggests that there is not a significant discrepancy in the mitigation actions followed by respondents concerning the challenges related to private investment regulatory frameworks. However, a concerning observation is the fact that 35 percent

of the responses suggested that investors would avoid investing in a particular region due to any regulatory challenges, which cannot be considered to be a mitigation action, but rather an avoidance trait. From a mitigation point of view, 32 percent of the responses related to the joint development of regulatory frameworks, while 29 percent of the responses suggested that investors would apply for exemptions from certain regulatory clauses. One response (3 percent) suggested that investors apply for ministerial dispensations, which effectively coincide with the exemptions on regulatory clauses response.

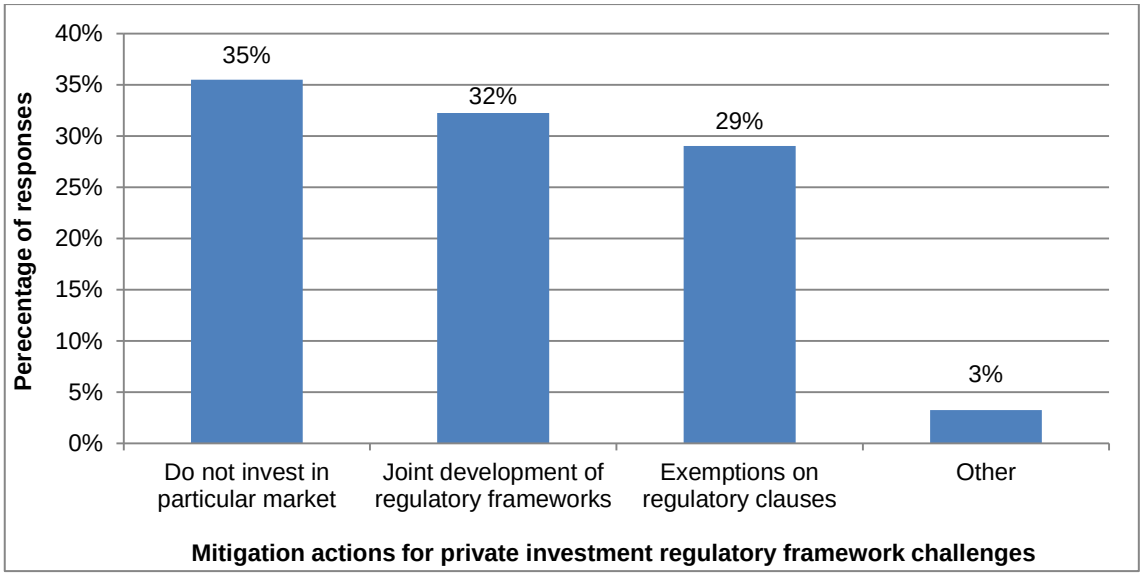


Figure 16 – Mitigation actions for challenges associated regulatory frameworks for private investment in the power sector of SSA

Stemming from the regulatory challenges that investors face, equally taxing to investors was the fact that regulatory frameworks are static in many regions. Subsequently, respondents were presented with a number of typical responses to static regulatory frameworks. 31 Responses were gathered for this construct and is summarised in Figure 17. It is encouraging to note that 68 percent of the responses related to stakeholders taking action to facilitate regulatory reform. However, 19 percent of the responses suggest that it they would rather opt to exit markets where the regulatory evolvement was insufficient, while 10 percent of the responses suggested a passive approach to the problem by doing nothing. One respondent (3 percent) suggested an action like lobbying with governments to promote regulatory reform, which corresponded with the development of forums and industry bodies to facilitate regulatory reform.

From Figure 18 there was clear agreement that the use of mature technologies (57 percent) was the preferred approach followed by respondents, although 20 percent of the responses were in favour of technologies with the most favourable incentives. The use of the lowest cost technologies and other technologies selection criteria accounted for 11 percent of the responses respectively.

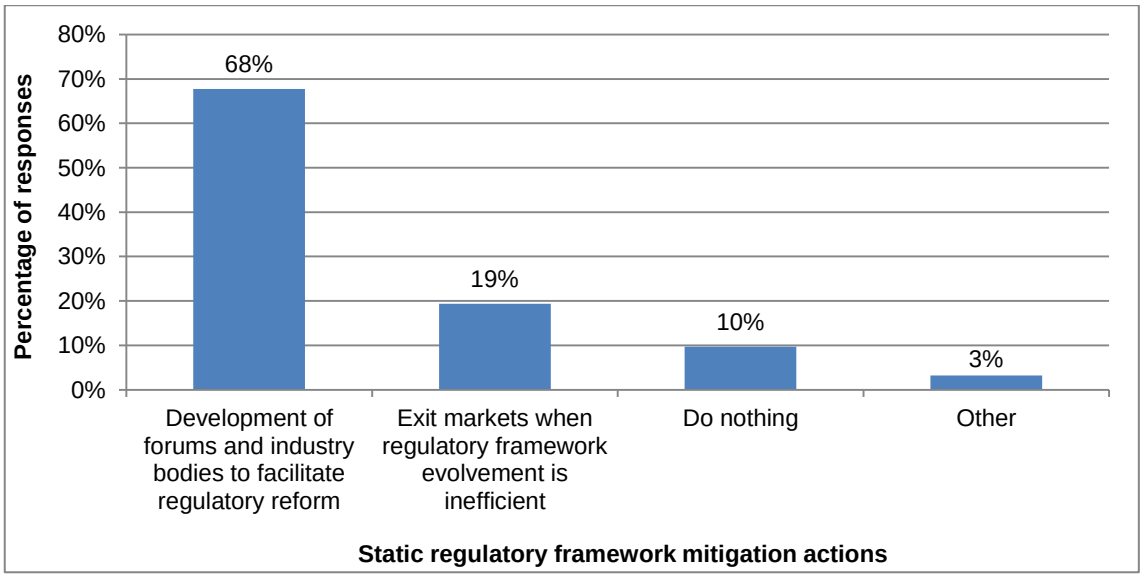


Figure 17 – Mitigation actions for challenges associated static regulatory frameworks for private investment in the power sector of SSA

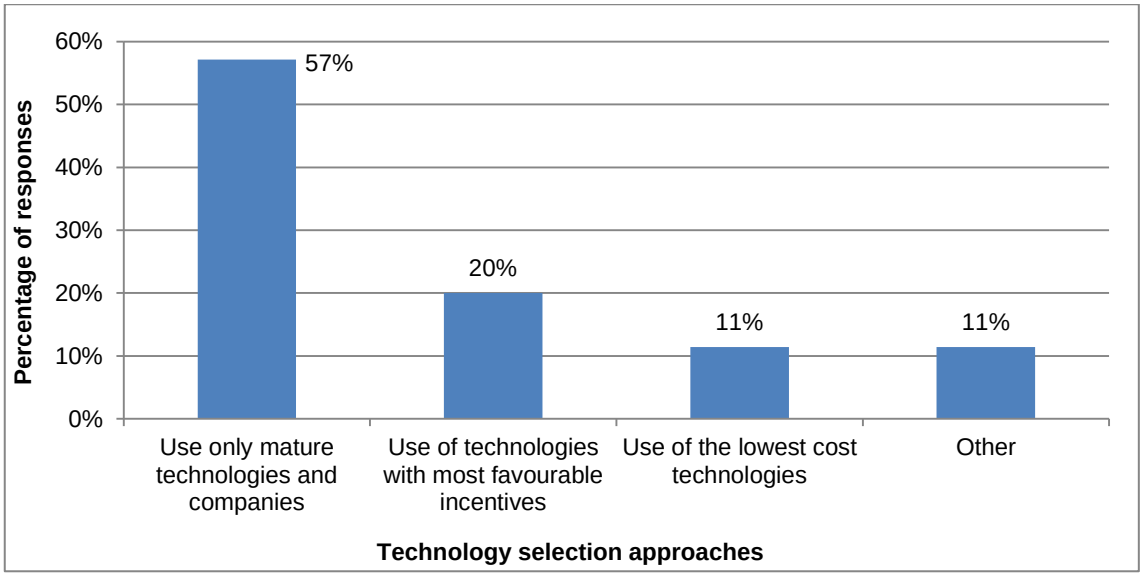


Figure 18 – Preferred technology selection approaches applied for private investment in the power sector of SSA

5.5.7 Addressing risk and uncertainty in the private investment in the power sector of SSA

Table 6 below summarises the results from the t-test conducted related addressing risk and uncertainty for private investment in the power sector of SSA.

One-sample statistics					One-sample against hypothetical mean of the scale (3)	
Rank	Addressing risk and uncertainty in the private investment landscape	N	Mean	Standard deviation	t-value	P-value (one sided)
1	Regional political risks are a significant consideration and may prevent private investment in a given country	31	4.452	0.624	12.954	0.000
2	Uncertainty in macroeconomic conditions may outweigh offtake agreements, and prevent private investment	31	3.968	0.795	6.776	0.000
3	Risks associated with the supply of energy sources are adequately addressed for the duration of the investment lifespan	31	3.581	0.848	3.814	0.000
4	Project execution risks are adequately addressed with limited probability that investment failure resides in the project execution	31	3.516	0.769	3.737	0.000
5	Risk mitigation mechanisms for power sector projects, like provided by the World Bank, are adequately utilised to reduce risk	31	3.387	0.803	2.683	0.006

Table 6 – One-sample t-test for addressing risk and uncertainty for private investment landscape in the power sector of SSA

According to Table 6, all of the constructs realised t-values greater than 1.697 and p-values smaller than 0.05, resulting in in the null hypothesis being rejected in favour of the alternative hypothesis, implying that all of the constructs were statistically significant. Furthermore, the realised sample means of the constructs were all greater than the hypothetical mean, suggesting that the respondents were in agreement with the constructs mentioned above.

Based on the ranking of constructs, respondents consider risks largely out of their control, like political and macroeconomic risk more important that the risks that are within their control.

5.5.8 Impact of renewable energies on the private investment landscape in the power sector of SSA

Table 7 below summarises the results from the t-test conducted related to the impact of renewables on the private investment landscape in the power sector of SSA. Only two of the presented constructs related to renewable energy sources rendered means that were significantly higher than the hypothetical mean.

One-sample statistics					One-sample against hypothetical mean of the scale (3)	
Rank	Impact of renewables on the private investment landscape	N	Mean	Standard deviation	t-value	P-value (one sided)
1	Renewable energy technologies warrants greater application in the power sector of SSA	31	3.548	0.995	3.070	0.002
2	Costs associated with renewable energy technologies are acceptable for private investment	31	3.516	0.851	3.375	0.001
3	Electricity tariffs from renewable energy technologies exceeds that of fossil fuel derived technologies	31	3.097	1.012	0.532	0.299
4	Renewable energy technologies are the preferred electricity generation technology in SSA	31	2.806	0.980	-1.10	0.140
5	Risks associated with renewable energy sources have been appropriately dealt with	31	2.645	0.950	-2.08	0.023

Table 7 – One-sample t-test for impact of renewables on the private investment landscape in the power sector of SSA

According to Table 7, these two constructs realised t-values greater than 1.697 and p-values smaller than 0.05, resulting in the null hypothesis being rejected in favour of the alternative hypothesis. The means for the statistically significant constructs were only marginally larger than the hypothetical mean, suggesting that the respondents have a near neutral point of view for these constructs.

5.6 Hypothesis testing

Two hypotheses were the subject of the investigation, to evaluate if the critical success factors for private investment in the power sector of SSA would improve these investments' performance and greater investment participation. Subsequently, the two main hypotheses consisted of six sub-hypotheses which were all subject to a t-test to

determine if there was a statistically significant difference between the sample means and the hypothetical mean, similar to t-test conducted earlier. Elston (1991) suggested that in order to test a main hypothesis from a number of sub-hypotheses, the p-values can be combined using Fisher's method. If the p-value, calculated by means of Fisher's method, is less than 0.05, the null hypothesis could be rejected in favour of the alternative hypothesis. The null and alternative hypotheses can be summarised as follow:

- Null hypotheses: H0: $\mu 1 = \mu 2$ (construct mean = 3)
- Alternative hypotheses: H1: $\mu 1 \neq \mu 2$ (construct mean >< 3)

A statistically significant construct mean greater than three would imply that the respondents were in agreement with the construct, while a construct mean less than three would imply that the respondents were in disagreement with the construct.

5.6.1 Hypothesis one

One-sample statistics					One-sample against hypothetical mean of the scale (3)	
Rank	Performance of private investments characterised by the critical success factors	N	Mean	Standard deviation	t-value	P-value (one sided)
1	A well-defined structural and regulatory landscape to structure private investments accordingly will improve investment returns	31	4.258	0.575	12.171	0.000
2	Ensuring alignment with the drivers for private investment in the power sector of SSA (as alluded to in Section B) will result in improved investment returns	31	4.065	0.727	8.149	0.000
3	Defined mechanisms to address current challenges for private investors will improve investment returns	31	3.968	0.605	8.911	0.000
4	Defined indicators in the decision making to pursue private investments will result in improved investment returns	31	3.968	0.657	8.195	0.000
5	An investment risk and uncertainty framework allow for improved investment returns	31	3.613	0.882	3.867	0.000
6	A framework to address renewable energy sources will allow for improved investment returns	31	3.581	0.807	4.005	0.000

Table 8 – One-sample t-test for the performance of private investment in the power sector of SSA characterised by the critical success factors

Table 8 below summarises the results from the t-test conducted on the critical success factors and the impact it had on private investment performance in the power sector of SSA. According to Table 8, all of the constructs realised t-values greater than 1.697 and p-values smaller than 0.05, resulting in in the null hypothesis being rejected in favour of the alternative hypothesis. Fisher's method for combining p-values realised a collective p-value of 1.6E-39, suggesting that the main null hypothesis was rejected in favour of the alternative hypothesis. Therefore it can be conclusively stated that the critical success factors improved investment performance of private investments in the power sector of SSA.

5.6.2 Hypothesis two

Table 9 below summarises the results from the t-test conducted on the critical success factors and the impact it had on private investment participation in the power sector of SSA.

One-sample statistics					One-sample against hypothetical mean of the scale (3)	
Rank	Private investment participation characterised by the critical success factors	N	Mean	Standard deviation	t-value	P-value (one sided)
1	A well-defined structural and regulatory landscape to structure private investments accordingly will improve investment participation in the region	31	4.387	0.558	13.830	0.000
2	Ensuring alignment with the drivers for private investment in the power sector of SSA (as alluded to in Section B) will result in improved investment participation in the region	31	4.323	0.599	12.287	0.000
3	Defined mechanisms to address current challenges for private investors will improve investment participation in the region	31	4.226	0.617	11.062	0.000
4	Defined indicators in the decision making to pursue private investments will result in improved investment participation in the region	31	4.032	0.605	9.505	0.000
5	An investment risk and uncertainty framework allow for improved investment participation in the region	31	3.710	0.739	5.346	0.000
6	A framework to address renewable energy sources will allow for improved investment participation in the region	31	3.452	0.768	3.275	0.001

Table 9 – One-sample t-test for private investment participation in the power sector of SSA characterised by the critical success factors

Similar to hypothesis one, Table 9 indicated that all of the constructs realised t-values greater than 1.697 and p-values smaller than 0.05, resulting in in the null hypothesis being rejected in favour of the alternative hypothesis. Furthermore, Fisher's method for combining p-values realised a collective p-value of 3.4E-49, suggesting that the main null hypothesis was rejected in favour of the alternative hypothesis. Thus, it can be categorically stated that the critical success factors improved participation of private investments in the power sector of SSA.

5.7 Addition analysis

5.7.1 Comparison of opinion through ANOVA Test

The preceding analysis highlighted that the critical success factors indeed improve investment performance and participation of private investments in the power sector of SSA. The sample comprised of respondents from various sectors, namely advisory/specialists, industry, investors and the legal fraternity. Since the data was adequately grouped according to these sectors it provided the opportunity to examine the difference in opinion between sectors for the various constructs used for the main hypotheses. A one-way analysis of variance (ANOVA) was used to evaluate if there was a statistically significant difference in opinions for the various constructs. Although the ANOVA evaluation can calculate whether there is a statically significant difference between the sector means for a particular construct, the ANOVA evaluation fails to highlight where the difference resides. Thus, if the ANOVA evaluation indicated that there was indeed a statically significant difference between the sector means, where the significance level was below 0.05, further analyses had to be conducted to identify between which sectors the difference in means were prevalent.

Wherever the ANOVA evaluation highlighted that there was a statistically significant difference in the sector means, a multiple comparison test was conducted, by means of investigating the least significant difference (LSD). Wherever the LSD was smaller than the absolute mean difference of the sectors in scope, the null hypothesis ($H0:\mu1 = \mu2$) can be rejected in favour of the alternative hypothesis ($H1: \mu1 \neq \mu2$), suggesting that the sector means are unequal.

The abovementioned evaluations were conducted for both the main hypotheses' constructs to determine if there were any statistically significant differences between the sectors' means.

5.7.2 Comparison of opinion one: Investment performance

The null and alternative hypotheses related to the investment performance and the various constructs can be summarised as follow:

- Null Hypothesis H0: All the different sectors' means are equal for private investment performance and the relevant constructs.
- Alternative Hypothesis H1: At least one mean rating between sectors is different.

The results are summarised in Table 10 below:

Descriptive statistics						
Dependent variable	Industry sector		n	Mean	Standard deviation	
Ensuring alignment with the drivers for private investment in the power sector of SSA (as alluded to in Section B) will result in improved investment returns	Advisory/Specialists		6	4.000	0.400	
	Industry		13	4.231	0.359	
	Investor		8	3.625	0.839	
	Legal		3	4.667	0.333	
	Total		**30**	**4.067**	**0.740**	
	ANOVA					
		Sum of squares	df	Mean square	F	Sig
	Between groups	3.017	3	1.006	2.035	0.134
	Within groups	12.849	26	0.494		
	Total	**15.867**	**29**			

Table 10 – Comparison of opinion one: Investment performance related to alignment with the drivers for private investment in the power sector of SSA

Descriptive statistics						
Dependent variable	Industry sector		n	Mean	Standard deviation	
Defined indicators in the decision making to pursue private investments will result in improved investment returns	Advisory/Specialists		6	4.000	0.400	
	Industry		13	4.154	0.308	
	Investor		8	3.500	0.571	
	Legal		3	4.333	0.333	
	Total		**30**	**3.967**	**0.669**	
	ANOVA					
		Sum of squares	df	Mean square	F	Sig
	Between groups	2.608	3	0.869	2.182	0.114
	Within groups	10.359	26	0.398		
	Total	**12.967**	**29**			

Table 11 – Comparison of opinion one: Investment performance related to defined indicators for decision making to invest in the power sector of SSA

According to the results in Table 10, the p-value (0.134) from the ANOVA was larger than 0.05, implying that the null hypothesis could not be rejected, concluding that that there was no statistically significant difference in sector means.

As per the results in Table 11, the p-value (0.114) from the ANOVA was larger than 0.05, implying that the null hypothesis could not be rejected, concluding that that there was no statistically significant difference in sector means.

The results in Table 12, the p-value (0.003) from the ANOVA was smaller than 0.05, implying that the null hypothesis could be rejected in favour of the alternative hypothesis, suggesting that was at least one statistically significant difference in sector means.

Descriptive statistics						
Dependent variable	Industry sector		n	Mean	Standard deviation	
A well-defined structural and regulatory landscape to structure private investments accordingly will improve investment returns	Advisory/Specialists		6	4.167	0.167	
	Industry		13	4.462	0.269	
	Investor		8	3.875	0.125	
	Legal		3	5.000	0.000	
	Total		**30**	**4.300**	**0.535**	
	ANOVA					
		Sum of squares	df	Mean square	F	Sig
	Between groups	3.361	3	1.120	5.897	0.003
	Within groups	4.939	26	0.190		
	Total	**8.300**	**29**			

Table 12 – Comparison of opinion one: Investment performance related to a well-defined structural and regulatory landscape for private investment in the power sector of SSA

A multiple comparison evaluation was conducted to determine where the sector mean differences resided and is summarised in Table 13 below. According to the multiple comparison test, statistically significant differences in means of the following sectors were identified:

- Advisory/Specialists and Legal (LSD of 0.633, which is smaller than the absolute mean difference of 0.833)
- Industry and Investor (LSD of 0.403, which is smaller than the absolute mean difference of 0.587)

- Investor and Legal (LSD of 0.607, which is smaller than the absolute mean difference of 1.125)

Multiple comparisons				
Least significant difference (LSD)				
Dependent variable	Sector (A)	Sector (B)	Absolute mean difference	LSD
A well-defined structural and regulatory landscape to structure private investments accordingly will improve investment returns	Advisory/Specialists	Industry	0.295	0.442
		Investor	0.292	0.484
		Legal	0.833	0.633
	Industry	Investor	0.587	0.403
		Legal	0.538	0.574
	Investor	Legal	1.125	0.607

Table 13 – Multiple comparison of difference in opinion: Investment performance related to a well-defined structural and regulatory landscape for private investment in the power sector of SSA

According to the results in Table 14, the p-value (0.224) from the ANOVA was larger than 0.05, implying that the null hypothesis could not be rejected, concluding that that there was no statistically significant difference in sector means.

Descriptive statistics						
Dependent variable	Industry sector		N	Mean	Standard deviation	
Defined mechanisms to address current challenges for private investors will improve investment returns	Advisory/Specialists		6	3.833	0.967	
	Industry		13	3.923	0.077	
	Investor		8	3.875	0.411	
	Legal		3	4.667	0.333	
	Total		**30**	**3.967**	**0.615**	
	ANOVA					
		Sum of squares	df	Mean square	F	Sig
	Between groups	1.669	3	0.556	1.555	0.224
	Within groups	9.298	26	0.358		
	Total	**10.967**	**29**			

Table 14 – Comparison of opinion one: Investment performance related to defined mechanisms to address current challenges for private investment in the power sector of SSA

According to the results in Table 15, the p-value (0.195) from the ANOVA was larger than 0.05, implying that the null hypothesis could not be rejected, concluding that that there was no statistically significant difference in sector means.

Descriptive statistics						
Dependent variable	Industry sector		N	Mean	Standard deviation	
An investment risk and uncertainty framework allow for improved investment returns	Advisory/Specialists		6	4.333	0.267	
	Industry		13	3.462	0.603	
	Investor		8	3.500	0.857	
	Legal		3	3.333	2.333	
	Total		**30**	**3.633**	**0.890**	
	ANOVA					
		Sum of squares	df	Mean square	F	Sig
	Between groups	3.736	3	1.245	1.684	0.195
	Within groups	19.231	26	0.740		
	Total	**22.967**	**29**			

Table 15 – Comparison of opinion one: Investment performance associated with risk and uncertainty private investment in the power sector of SSA

The results in Table 16, the p-value (0.047) from the ANOVA was smaller than 0.05, implying that the null hypothesis could be rejected in favour of the alternative hypothesis, suggesting that was at least one statistically significant difference in sector means.

Descriptive statistics						
Dependent variable	Industry sector		n	Mean	Standard deviation	
A framework to address renewable energy sources will allow for improved investment returns	Advisory/Specialists		6	3.667	0.667	
	Industry		13	4.000	0.500	
	Investor		8	3.125	0.411	
	Legal		3	3.000	1.000	
	Total		**30**	**3.600**	**0.814**	
	ANOVA					
		Sum of squares	df	Mean square	F	Sig
	Between groups	4.992	3	1.664	3.045	0.047
	Within groups	14.208	26	0.546		
	Total	**19.200**	**29**			

Table 16 – Comparison of opinion one: Investment performance related to renewable energy sources and private investment in the power sector of SSA

A multiple comparison evaluation was conducted to determine where the sector mean differences resided and is summarised in Table 17 below. According to the multiple

comparison test, statistically significant differences in means of the following sectors were identified:

- Industry and Investor (LSD of 0.683, which is smaller than the absolute mean difference of 0.875)
- Industry and Legal (LSD of 0.973, which is smaller than the absolute mean difference of 1.000)

Multiple comparisons				
Least significant difference (LSD)				
Dependent variable	Sector (A)	Sector (B)	Absolute mean difference	LSD
A framework to address renewable energy sources will allow for improved investment returns	Advisory/Specialists	Industry	0.333	0.750
		Investor	0.542	0.821
		Legal	0.667	1.074
	Industry	Investor	0.875	0.683
		Legal	1.000	0.973
	Investor	Legal	0.125	1.029

Table 17 – Multiple comparison of difference in opinion: Investment performance related to renewable energy sources and private investment in the power sector of SSA

5.7.3 Comparison of opinion two: Investment participation

According to the results in Table 18, the p-value (0.800) from the ANOVA was larger than 0.05, implying that the null hypothesis could not be rejected, concluding that that there was no statistically significant difference in sector means.

Descriptive statistics						
Dependent variable	Industry sector		n	Mean	Standard deviation	
Ensuring alignment with the drivers for private investment in the power sector of SSA (as alluded to in Section B) will result in improved investment participation in the region	Advisory/Specialists		6	4.333	0.267	
	Industry		13	4.308	0.397	
	Investor		8	4.250	0.500	
	Legal		3	4.667	0.333	
	Total		**30**	**4.333**	**0.606**	
	ANOVA					
		Sum of squares	df	Mean square	F	Sig
	Between groups	0.397	3	0.132	0.335	0.800
	Within groups	10.269	26	0.395		
	Total	**10.667**	**29**			

Table 18 – Comparison of opinion two: Investment participation related to alignment with the drivers for private investment in the power sector of SSA

Table 19 realised a p-value of 0.599 from the ANOVA which was larger than 0.05, implying that the null hypothesis could not be rejected, concluding that that there was no statistically significant difference in sector means.

Descriptive statistics						
Dependent variable	Industry sector		n	Mean	Standard deviation	
Defined indicators in the decision making to pursue private investments will result in improved investment participation in the region	Advisory/Specialists		6	3.833	0.167	
	Industry		13	4.154	0.474	
	Investor		8	4.000	0.286	
	Legal		3	4.333	0.333	
	Total		**30**	**4.067**	**0.583**	
	ANOVA					
		Sum of squares	df	Mean square	F	Sig
	Between groups	0.674	3	0.225	0.636	0.599
	Within groups	9.192	26	0.354		
	Total	**9.867**	**29**			

Table 19 – Comparison of opinion two: Investment participation related to defined indicators for decision making to invest in the power sector of SSA

According to the results in Table 20, the p-value (0.077) from the ANOVA was larger than 0.05, implying that the null hypothesis could not be rejected, concluding that that there was no statistically significant difference in sector means.

Descriptive statistics						
Dependent variable	Industry sector		n	Mean	Standard deviation	
A well-defined structural and regulatory landscape to structure private investments accordingly will improve investment participation in the region	Advisory/Specialists		6	4.000	0.400	
	Industry		13	4.462	0.269	
	Investor		8	4.375	0.268	
	Legal		3	5.000	0.000	
	Total		**30**	**4.400**	**0.563**	
	ANOVA					
		Sum of squares	df	Mean square	F	Sig
	Between groups	2.094	3	0.698	2.554	0.077
	Within groups	7.106	26	0.273		
	Total	**9.200**	**29**			

Table 20 – Comparison of opinion two: Investment participation related to a well-defined structural and regulatory landscape for private investment in the power sector of SSA

According to the results in Table 21, the p-value (0.987) from the ANOVA was larger than 0.05, implying that the null hypothesis could not be rejected, concluding that that there was no statistically significant difference in sector means.

Descriptive statistics						
Dependent variable	Industry sector		n	Mean	Standard deviation	
Defined mechanisms to address current challenges for private investors will improve investment participation in the region	Advisory/Specialists		6	4.167	0.567	
	Industry		13	4.231	0.359	
	Investor		8	4.250	0.500	
	Legal		3	4.333	0.333	
	Total		**30**	**4.233**	**0.626**	
	ANOVA					
		Sum of squares	df	Mean square	F	Sig
	Between groups	0.059	3.000	0.020	0.045	0.987
	Within groups	11.308	26.000	0.435		
	Total	**11.367**	**29.000**			

Table 21 – Comparison of opinion two: Investment participation related to defined mechanisms to address current challenges for private investment in the power sector of SSA

According to the results in Table 22, the p-value (0.815) from the ANOVA was larger than 0.05, implying that the null hypothesis could not be rejected, concluding that that there was no statistically significant difference in sector means.

Descriptive statistics						
Dependent variable	Industry sector		n	Mean	Standard deviation	
An investment risk and uncertainty framework allow for improved investment participation in the region	Advisory/Specialists		6	4.000	0.400	
	Industry		13	3.692	0.731	
	Investor		8	3.625	0.268	
	Legal		3	3.667	1.333	
	Total		**30**	**3.733**	**0.740**	
	ANOVA					
		Sum of squares	df	Mean square	F	Sig
	Between groups	0.556	3.000	0.185	0.315	0.815
	Within groups	15.311	26.000	0.589		
	Total	**15.867**	**29.000**			

Table 22 – Comparison of opinion two: Investment participation associated with risk and uncertainty private investment in the power sector of SSA

According to the results in Table 23, the p-value (0.261) from the ANOVA was larger than 0.05, implying that the null hypothesis could not be rejected, concluding that that there was no statistically significant differences in sector means.

Descriptive statistics						
Dependent variable	Industry sector		n	Mean	Standard deviation	
A framework to address renewable energy sources will allow for improved investment participation in the region	Advisory/Specialists		6	3.167	0.567	
	Industry		13	3.769	0.526	
	Investor		8	3.375	0.554	
	Legal		3	3.000	1.000	
	Total		**30**	**3.467**	**0.776**	
	ANOVA					
		Sum of squares	df	Mean square	F	Sig
	Between groups	2.451	3	0.817	1.414	0.261
	Within groups	15.016	26	0.578		
	Total	**17.467**	**29**			

Table 23 – Comparison of opinion two: Investment participation related to renewable energy sources and private investment in the power sector of SSA

5.8 Summary of hypotheses testing

In view of the research objective presented in Chapter 3, this research endeavoured to determine the critical success factors for private investment in the power sector of SSA, and if these success factors would essentially improve investment performance and participation in this region's power sector. Subsequently, the critical success factors were defined by means of the preceding t-tests. With the critical success factors defined, two hypotheses were postulated to determine how the critical success factors impacted private investment performance and participation, which is summarised below:

Hypothesis one result: Null hypothesis was rejected

Null hypothesis (1): H_0: p = 0, The critical success factors for private investment in the power sector of SSA are not effective in improving the performance of these investments.

Alternative hypothesis (1): H_1: p > 0, The critical success factors for private investment in the power sector of SSA are effective in improving the success of these investments.

The null hypothesis was rejected on the basis that the p-value calculated from Fisher's method for combined p-values was 0.00 (smaller than 0.05) resulting in the rejection of the null hypothesis in favour of the alternative hypothesis.

Hypothesis two result: Null hypothesis was rejected

Null hypothesis (2): H_0: p = 0, The critical success factors for private investment in the power sector of SSA are not effective in improving investment participation in the region.

Alternative hypothesis (2): H_1: p > 0, The critical success factors for private investment in the power sector of SSA are effective in improving investment participation in the region.

Similar to the hypothesis one, the null hypothesis for hypothesis two was rejected in favour of the alternative hypothesis on the basis that the p-value calculated was 0.00 (smaller than 0.05), using the same evaluation method as used for hypothesis one.

Thus, it could be concluded that the critical success factors for private investment in the power sector of SSA, positively impacted investment performance and participation.

CHAPTER 6:

DISCUSSION OF RESULTS

6.1 Introduction

The primary objective of this research was to conclusively define the critical success factors for private investment in the power sector of SSA, and to develop a framework for successful private investment and improved private investment participation in this region's power sector. Given the objectives of this research, this chapter discusses in detail the research findings delineated in Chapter 5. The basis of this analysis was grounded on the primary data collected from 31 respondents. Subsequently, this data was subject to statistical analyses to address the research questions and hypotheses presented in Chapter 3, of which the summarised analytical results were presented in Chapter 5.

This chapter aims to utilise the analytical results obtained from Chapter 5, which was derived from quantitative and qualitative data gathered from a survey questionnaire, to discuss the findings in more detail. The results discussion was supported by the theoretical underpinnings from the literature review in Chapter 2, and connected to the research questions and hypotheses from Chapter 3. The conclusion of this research not only highlighted the critical success factors for private investment in the power sector of SSA, but also suggested that these factors would lead to successful private investment performance and improve investment participation.

6.2 Discussion of results

Each of the research questions and hypotheses identified in Chapter 3 was discussed individually to derive a conclusive outcome, which would form the mainstay to a private investment framework for investors to use when considering investing in the power sector of SSA. Each of these discussions was supported by the analytical findings and insights gained from preceding chapters.

6.2.1 Research question one

What are the drivers for private investment in the power sector of SSA?

The objective of this research question was to evaluate the respondents' views on what were the main drivers for private investment in the power sector of SSA, as well as

what were the underpinning economic and infrastructure development conditions that would result in successful investments. Respondents were presented with a number of statements related to possible investment drivers and requested to rate their level of agreement with the statements. As part of this discussion, reference is also made to Table 3 and Figures 10 and 11 in Chapter 5, to support the interpretation of the results represented in Figure 19. Figure 19 illustrates the respondents' feedback from the survey questionnaire and ranked the response mean per construct from high to low in order to signify the level of importance of the constructs. A similar approach was applied to the successive research questions.

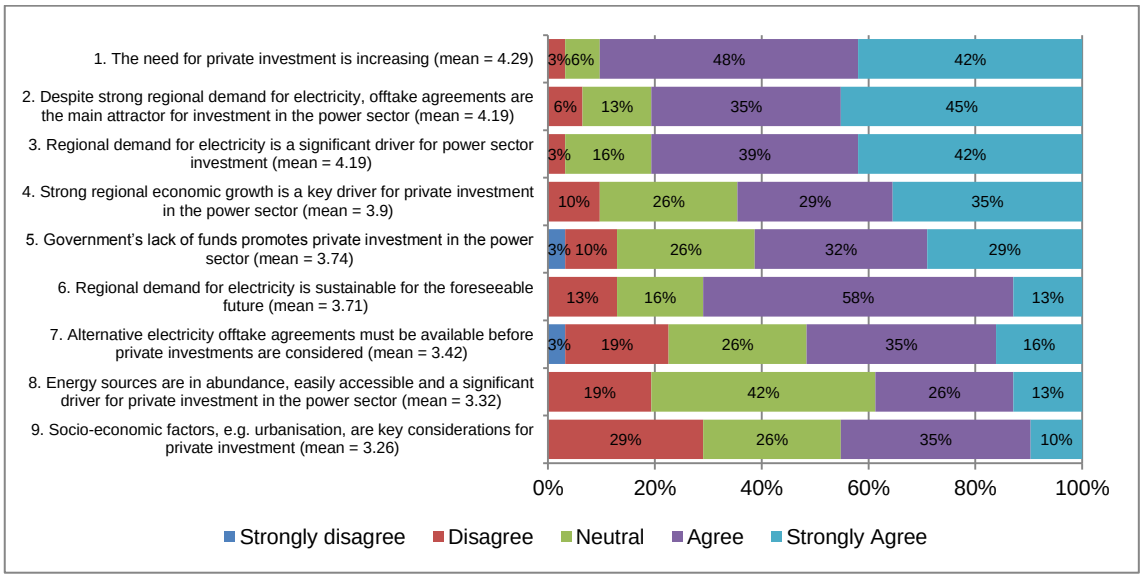


Figure 19 – Respondents' view on the drivers for private investment in the power sector of SSA

According to the survey results most of the respondents agreed (level of agreement ranging from agree to strongly agree) with the drivers for private investment in the power sector of SSA, given that the mean scores achieved for every construct, being larger than the hypothetical mean. However, the statistical significance of the mean scores were also considered, which has resulted in construct nine, related to the socio-economic factors as being a key consideration, affirmed as not being a statistical significant construct, with a p-value of 0.08. This suggested that despite a mean rating of 3.26, it could not be conclusively determined that socio-economic factors were a key driver for investment. Although the level of importance differed between the drivers stated in Figure 19, constructs one to eight all rendered statistical significant mean scores, suggesting that these constructs were indeed key private investment drivers.

Furthermore, 90 percent of the respondents agreed that the need for private investment in the power sector of SSA was increasing.

Figure 10, which illustrated the respondents' opinion on what was the required GDP growth rate before private investment was to be considered in a region, indicate that 66 percent of the respondents agreed that positive regional GDP growth was a key consideration, with 26 percent suggesting that a minimum level of GDP growth was around 2 percent. Notably, 37 percent of the respondents did not view regional GDP growth requirements as a key investment driver, but rather factors like general economic health, secured electricity demand (off-take) and government guarantees to support PPAs.

Figure 11 suggested respondents' views concerning the size of the unserved market as a key driver for private investment. Majority of the sample (55 percent) did not view this criterion as a key driver. This appeared to be in contradiction with construct three, which related to regional demand as being a key driver. However, Otto (2016) indicated that although regional demand was a good indicator of where opportunities may reside, direct demand, usually associated with a PPA, or a power supply agreement with an industrial off-taker was considered a superior driver opposed to national power supply deficits. Thus, it can be inferred that regional demand is still a consideration; although, if investors were faced with options, direct demand, typically in the form of a PPA, would enjoy preference.

The drivers for private investment in the power sector of SSA stemming from the literature review in Chapter 2 are consistent with most of the findings derived from the respondents of the survey, with the exception of construct nine, where socio-economic factors were not considered to be a key driver, as proposed by Boston (2013). Obeng-Odoom (2013) proposed that this may very well be as a result of Africa still using traditional indices for evaluation of economic ventures, and failing to use these developments to improve social conditions.

Kim (2015) and Wolde-Rufael (2009) supported the notion that opportunities existed on the basis of a supply deficit and the ever increasing demand for electricity as result of rapid urbanisation and continued economic growth in these regions. Furthermore, the opinion from majority of the respondents concerning a growing economic landscape (GDP growth) as a qualifier for private investment in a region's power sector was consistent with that of the World Bank (2016). Kouassi and Pineau (2011) mentioned that the need for private investment in infrastructure development in SSA

was increasing due to decreasing government reserves to fund these developments. Given the respondents' view on this matter, it was clear that they were aligned with this problem facing the SSA countries. Thus, it can be concluded that there is a unanimous agreement of the need for private investment in this region's power sector.

Given the justification for private investment in the power sector of SSA and the aforementioned discussion on the investment drivers, inputs to an investment framework could be defined as follow:

- Power off-takers need to be defined and secured, and is considered the main gatekeeper for private investment in the power sector of SSA.
- Healthy regional economic landscape, with positive GDP growth rates, typically in excess of 2 percent growth.
- Crowding in is not a prerequisite for investment success, as the absence of government spending in infrastructure development can be advantages to private investors.
- Alternative power off-takers are to be identified, or the intended power off-takers should have additional guarantees provided for to meet investment obligations.
- Although socio-economic factors were not a priority for investors, it does not imply that it could be omitted. Investors play a significant role in nurturing the economic landscape. Therefore, consideration for socio-economic development factors needed to be included in the development of private investments in the power sector of SSA, and requires significant regulatory involvement to ensure actual progress.

Therefore it could be concluded that the drivers for private investment in the power sector were conclusively defined, which answer research question one, as identified in Chapter 3.

6.2.2 Research question two

What are the indicators influencing the decision making for private investment in the power sector of SSA?

Research question two endeavoured to identify the most relevant and significant indicators used by private investors when considering investing in the power sector of SSA. Expectedly, investors were biased to financial indicator, although, this research

question also considered non-financial indicators centred on the topic of sustainability, both from an investment perspective as well as from an environmental point of view.

The results from the survey is summarised in Figure 20 below, and the discussion also makes reference to Table 4 and Figure 12. According to Figure 20, the mean scores derived from the survey responses were all greater than three, suggesting the respondents' agreement with the constructs. Although all of the constructs means were greater than the hypothetical mean, the p-value calculated for construct eight, which related to the demand for electricity and private investment, was greater than the 5 percent significance level, rendering this construct to be statistically insignificant. Given the results from research question one, where respondents agreed that the need for private investment in the power sector was increasing and the demand for electricity in the SSA region was sustainable, it appeared to be an immediate contradiction, which warranted further analysis and is discussed in more detail in this section.

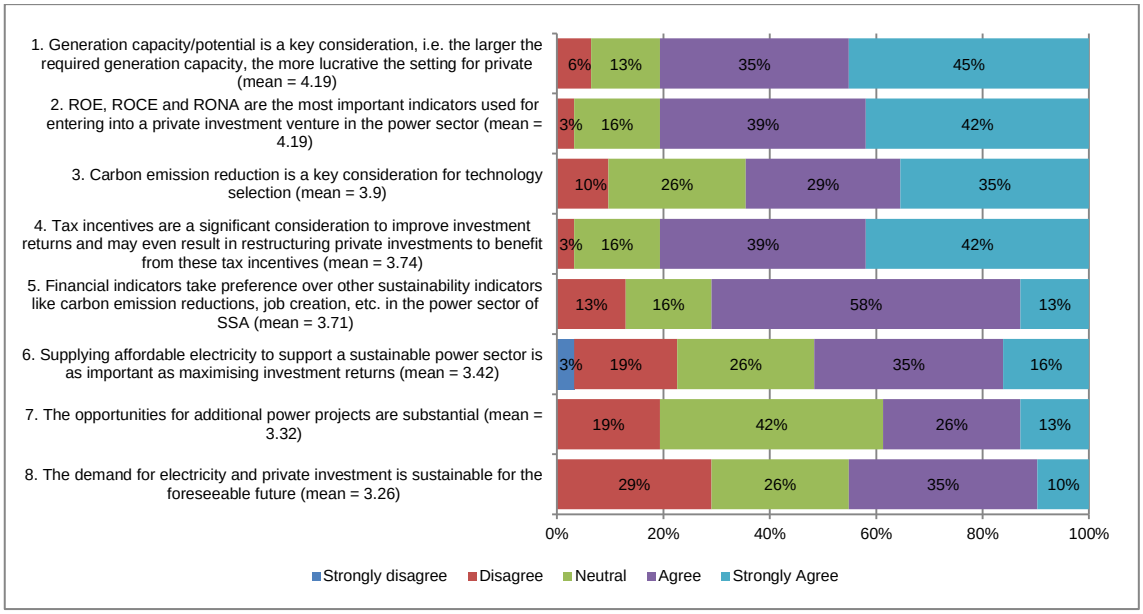


Figure 20 – Respondents' view on the indicators for decision making used for private investment in the power sector of SSA

According to the survey results, respondents viewed traditional financial indicators, like ROE, ROCE and RONA (80 percent of the respondents agreed), and the potential size of the investments, with reference to the generation capacity of the investments (81 percent of the respondents agreed) as the most important indicators when considering private investment in the power sector of SSA. In view of these financial indicators being the crux in the investment decision making process, respondents were also asked to indicate the level of return expected from these investments, which is

summarised in Figure 12. According to Figure 12, 69 percent of the respondents indicated that they were targeting some level of ROE, of which 31 percent of this group targeted a ROE of at least 16 percent. On the contrary, 31 percent of the sample suggested that there was not a fixed ROE target or that ROE was not their main indicator used in the decision making process. These respondents referred to alternative indicators like payback periods, IRRs or indexed their ROE expectations on the level of risk that they were willing to tolerate.

Despite the strong bias towards the indicators driving the financial outcome of the investment, the respondents viewed carbon emission reductions as the third most important indicator (75 percent of the respondents were in agreement). This tendency to pursue emission reductions may be motivated by two factors, namely, investors actually being responsible civil citizens and being aligned with a sustainability agenda, or merely because there is a possible financial incentive in attempting to reduce emissions (Athar & Khan, 2010). Given the respondents' feedback, it appears as if it may be the latter, as the construct four and five suggested that investors value financial indicators more important than sustainability indicators and that tax incentives may be leveraged to improve the financial performance of investments. Recent propositions for the imposition of a carbon tax on the carbon dioxide (CO_2) equivalent of greenhouse gas emissions in South Africa, as outlined by National Treasury (2015), is a good example of such a tax incentive, whereby the producers of greenhouse gases would be taxed according to the produced emissions. Thus, inducements like a carbon tax, may force investors to reconsider the generation technologies in order to avoid additional tax penalties. Given that a sustainable power sector consider environmental factors (Boston, 2013), governments and regulatory authorities may very well be motivated to impose initiatives like carbon taxes, or even promote other vehicles like the UNFCCC's (2016) clean development mechanism (CDM), whereby financial gains can be realised by means of offsetting greenhouse emissions. Thereby ensuring that a sustainable power sector is nurtured by means of motivating investors on the basis of investment performance; however, it must be cautioned that these motivating factors need not become an investor deterrent, but the technicalities of developing these incentives reside outside the scope of this research.

Albeit being considered less important (ranked amongst the lowest priorities for investors), the sample mean for the construct related to the price affordability of power supplied to off-takers was still statistically significant and greater than the hypothetical mean. It subsequently aligned with the view that the investment incentive decreases

with lower tariffs offered to off-takers (Atmo & Duffield, 2014). However, it does seem to contradict the notion that the elastic nature of the consumer (assuming public electricity retail), where low income consumers would sacrifice access to electricity over more essential needs (Fraser, 2003). Nevertheless, research question one highlighted that investors generally opt for off-take agreements opposed electricity retail to consumers (general public), which then by and large supersede the elastic nature of power consumption by the general population.

Given the constructs related to this research question presented to the respondents, the least important, but yet statistically significant construct concerned the investment opportunity for further power developments in SSA. The survey responses suggested that investors were not as confident about additional investment opportunities, despite most of the respondents agreeing in research question one that the need for private investment in the power sector of SSA was increasing. This seemingly contradiction also aligned with construct eight, although this construct could technically not be considered in view of the statistically insignificant sample mean achieved. This somewhat neutral view that additional investment opportunities exist in the power sector of SSA can be linked the overall reduction in foreign direct investment (FDI) in SSA, as noted by the United Nations (2016), as Africa saw a 31.4 percent reduction in FDI from 2014 to 2015, while the World average FDI increased by 36.5 percent. Also, recent comments in the South African media, where South African Minister of Energy, Tina Joemat-Petterson indicated that a decision was taken by the Eskom Board not to enter new contracts with IPPs (Mackay, 2016), may have contributed to the neutral response concerning the view on additional investment opportunities, seeing that the survey was distributed the same time as when these announcements appeared in the media.

In addressing research question two, it was determined that the most significant indicators for investors resided with financial indicators, and generally enjoys preference over non-financial indicators. Furthermore, in endeavouring to develop the investment landscape, regulatory bodies will need to ensure that the financial indicators derived from a particular region would align with the expectations of investors, as alluded to during this discussion.

6.2.3 Research question three

How is the private investment landscape in the power sector defined from structural and regulatory perspectives for the top five largest private investment disbursed countries in SSA?

The objective of research question three was to determine the ownership and pricing structures preferred by private investors as well as the actions and reforms required to support these structures. According to Figure 14, it is clear that the preferred structure for private investments in the power sector of SSA was that of IPPs, given that 94 percent of the respondents indicated in favour of this structure. In view of the level of liberalisation of the power sector in this region, it appears as if the sector has leapfrogged a number of phases of market liberalisation from where the market is completely dominated by state generators to the introduction of IPPs in the market. This observation is underpinned by the general phases of power sector reform advocated by Gratwick and Eberhard (2008), but where SSA found itself in the unique position of moving directly to the last phase of power sector reform, that is, the introduction of IPPs without going through the process of sector unbundling and the introduction of competition. This phenomenon could largely be explained by the halted power sector reform (Woodhouse, 2005). In view of the respondents' industry involvement and experience, it can be inferred that the IPP structures referred to "classic" IPPs and captive generation as illustrated in Figure 2. This observation is supported by the fact that respondents were either involved in investments whereby IPPs would sell to an off-taker, like Eskom, rendering it a "classic" IPP, or where industries had to develop off-grid power solutions in order to satisfy their electricity demands, resulting in the formation of captive generation capacity (Woodhouse, 2005).

Aligning with the market structure promoted by the respondents, essentially two main pricing structures were favoured by the respondents. According to Figure 13, 52 percent of the respondents were in favour of long-term fixed contracts, while 34 percent of the respondents were in favour of cost plus margin contracts. Although the two main pricing structures were simplified in this discussion, the technicalities supporting these to pricing structures can still be complicated, but the objective of this construct was to distinguish between "intended" pricing structures versus that of purely market driven or spot pricing structures. The notion whereby respondents preferred long-term fixed contracts or cost plus margin pricing structures can be attributed to the fact that efficient and market driven pricing would invariably result in lower costs for the consumer, which inevitably implies smaller margins for the power producers (Reynolds,

2009). Despite literature indicating that the most commonly adopted pricing structure by IPPs was that of a cost-plus margin pricing, most respondents indicated that they were in favour of long-term fixed contract pricing, which appears to be a contradiction to mainstream convention (Linden, Kalantzis, Maincent, & Pienkowski, 2014). However, as pointed out Section 2.4.3, pricing structures are still a function market structure, thus, given the current market structure in SSA, long-term fixed contracts were the preferred pricing structure (Mäntysaari , 2015). It must be noted thought that long-term fixed contract pricing requires significant regulated modalities to ensure that the power sector is structured and regulated in an equatable manner.

Latching on to the aforementioned dispositions on the prefered market and pricing structures, Figure 21 endeavoured to indicate the appropriate regularoty reform interventions in order to support these structures. According to Figure 21, respondents regarded power sector reform as a joint effort between private investors and regulatory bodies the most important, underpinned by the second construct in Figure 21, suggesting that the power sector in SSA required significant reform. Both of these constructs rendered statistically significant sample means. Although constructs three to five, in Figure 21, realised sample means greater than three, it also realised significance levels in excess of five percent, rendering these responses statistically insignificant, as a result of the large standard deviations in the responses. In addition, these sample means were relatively close to hypothetical means, suggesting that respondents were collectively neutral about the factors pertaining to governments being the sole driver for regulatory reform, unregulated power markets being more lucrative investment settings and improvement of regulation in the power sector of SSA.

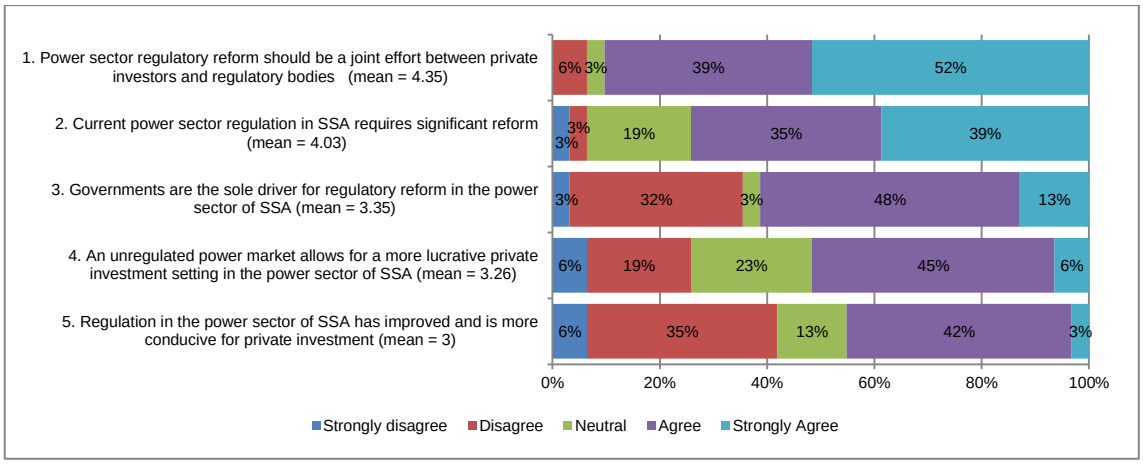


Figure 21 - Respondents' view on regulatory reform for private investment in the power sector of SSA

Borenstein and Bushnell (2015) highlighted from the experience gained in the United States electricity industry restructuring over the past 20 years was largely impacted by exogenous factors instead of the effects of restructuring which has led to higher costs of power from a societal point of view, but privately economic as a result of the rent transfers it enabled.

Thus, in order to ensure a sustainable power sector, it necessitate that private investors and regulatory bodies collaborate in developing policies related to the power sector reform, given the prevailing market and pricing structures.

6.2.4 Research question four

How are the challenges associated with private investment in power markets addressed?

Given the large amount of defies that any investor face in any market, this research question investigated the appropriate means deployed to mitigate these challenges and was focused primarily on investment margins, addressing regulatory challenges, as well as static regulatory landscapes, and the technology selection, which can all be underpinned by the challenges highlighted by the WEF. Alarming to note from the results was that despite majority of the respondents proposing some or other mitigation action, a large portion of the respondents would actually not invest in a region where certain challenges are encountered or even withdraw their investments on account of these challenges. Therefore, there is a compelling case to develop the landscape from a regulatory perspective in order to ensure that investor challenges are addressed.

Furthermore, additional value reside in the fact the mitigation actions should not be viewed in isolation, but also be related to the outcomes of research question three, like development of regulatory environment to best address the challenges encountered by investors, as well as to nurture a dynamic landscape that would allow from regulatory adaptations as the landscape morphs.

As already highlighted by research question two, financial returns from investments were considered one of the most important criteria for investors concerning the decision to invest in certain regions and technologies; hence, it is to be expected that investors need to protect the margins for the investments. According to Figure 15, respondents are most likely to opt for tariff increases in order to protect their investment margins. This mitigation action inherently aligns with a cost + plus margin pricing structure; however, in view of investors preferring long-term fixed contracts to govern tariffs, it necessitate that these long-term contracts also need to be adaptable, to prevent a possible contradiction of investor preferences. In order to also protect consumers from exorbitant tariff increases, regulatory or granter intervention is required (Terblanche, 2013), especially considering the absence of substantial competition in the various regions' power sectors.

Next to tariff increases, process improvements (cost reduction initiatives) (Eberhard & Shkaratan, 2011) and fuel tariff hedging (Fraser, 2003) respectively were the next most relevant considerations to protect investments against falling margins. In the minority, respondents indicated that contract renegotiation and less significant interventions could also be considered to protect margins. Despite the respondents being inclined to favour mitigation like tariff increases, one would typically note that a number of the actions mentioned Figure 15 would actually being applied followed simultaneously, which was made evident by respondents selecting multiple mitigation actions.

The challenges concerning the possibility of investing in a particular region and subsequently operating an asset are pertinent. The responses collected during the survey questionnaire were both alarming, form the perspective of governments' dependency on private investment, but simultaneously, there was also a positive and proactive assertiveness presented by the respondents in addressing these challenges. The largest portion of the responses (35 percent) suggested that investors would rather avoid investing in a particular region in lieu of an investment-conducive regulatory framework. This may be explained by the fact that the development of the regulatory landscape is usually slow, and can often omit the interest of private stakeholders. However, the second largest proportion of the responses (32 percent) indicated that

joint development is of regulatory frameworks is the appropriate approach to follow. This approach is what can be considered as one of the key success factors for the power sector reform witnessed in Nigeria (Ogunleye, 2016). Furthermore, in view of the power sector regulatory landscape being undefined to a large extend to accommodate private investors, private sector has the opportunity to bear fruit in the development of this sector that could potentially be closer aligned to their requirements. Thirdly, the respondents indicated (29 percent) that exemptions from certain regulatory clauses were a typical method applied, especially when regulatory requirements are not clear concerning accommodating private entities in a particular power sector. The researcher's experience in the industry could also confirm that this approach is typically followed in the event of ambiguous regulation or where compliance cannot immediately be practically achieved. However, exemption clauses are usually temporary, and stakeholders inevitably have to comply.

The respondents indicated a similar approach to mitigating static regulatory frameworks as in the aforementioned discussion concerning regulatory frameworks. Most of the respondents (68 percent) indicate that the established of forums and industry bodies to facilitate regulatory reform was the most appropriate means in addressing static regulatory frameworks. This approach is also consistent with the Nigerian example, where private sector was afforded a platform to interact and co-develop regulations and procedures. This is also evidence that stakeholders in the power sector are willing to intercede and cooperate with regulatory bodies to develop this sector's regulatory environment. The second largest proportion of the respondents (19 percent) suggested that exiting markets where the regulatory evolvement was inefficient was strong consideration. Albeit this approach is in complete reaction to the situation, and most likely fuelled with frustration about a particular region's regulatory progression, it is in all likelihood the last resort for investors, as exiting a market, especially where physical assets were developed, would come at significant losses and liabilities to investors. For this reason this approach cannot be accepted as an appropriate mitigation action.

Lastly, this research question also considered the challenges surrounding technology selection. This is an especially important consideration due to the instability experienced in supply chains, as suppliers tend to develop equipment based on what they consider important opposed to what is required by a region (World Economic Forum, 2014). However, majority of the respondents (57 percent) indicated their preference to use mature technologies. This can be attributed to a number of reasons,

including lower risk associated with the technologies, easier to finance proven technologies, support services, established supplier networks, and generally these technologies are also associated with lower costs. Therefore, the rationale for the use of mature technologies is well-grounded. The second most considered (20 percent) technology selection approach was that of incentivised technologies. The basis for choosing this approach over that of deploying mature technologies would only make sense if the incentives outweigh the risks associated with these technologies; bearing in mind that in some cases, incentivised technologies would also constitute mature technologies, in which case the approach to follow is obvious. Lowest cost technologies ranked among the least considered approaches to deploy. Considering only the cost of the technology is ineffective, as one need to consider the total value in use in order to optimally allocate a technology to a particular investment.

From the discussion related to addressing the challenges in the power sector of SSA, the main themes that came to the forefront was that of protecting the margins of investments as well as a cooperative approach between private investors and regulatory bodies to jointly develop the landscape to be conducive for private investment.

6.2.5 Research question five

How is risk and uncertainty limited for private investments in the power sector of SSA?

The objective of research questions five was to identify the risk considerations faced by private investors, and align the risks with possible mitigation actions, stemming from the previous research questions as well as the available literature concerning this subject. According to Figure 22, all of the respondents agreed with the proposed constructs and all the sample means proved to be statistically significant to a five percent significance level. Subsequently, the respondents considered regional political risks as the most important risk consideration that may prevent investment in this region. The rational for respondents to view this risk so significant is founded on the increase of expropriatory actions by governments against foreign investors over the past five to ten years, as advocated by the Multilateral Investment Guarantee Agency (MIGA) (2011). The main drivers generally leading to these expropriatory actions include (Multilateral Investment Guarantee Agency, 2011):

- Most disputes have been prompted by a significant shift in political realms or by some economic shocks,
- In a democratic administration, most of the actions and directives that are perceived to have a negative impact are taken by government role-players, other than the executive branch. However, once the executive branch is responsible for dealing with the repercussions, do disputes tend to come to an amendable settlement,
- However, in a non-democratic administration, where actions and directives from the executive branch have a negative impact, it is less likely to be resolved.

Given the main drivers for these risks, it is comprehendible that this risk rank so high for investors as it is a risk completely out of their control. Although investors cannot control the eventuality of these risks, they can still protect their investments by means of taking out political risk insurance (PRI) (Multilateral Investment Guarantee Agency, 2011). Given the increasing number of expropriatory actions by governments, the demand for PRI has been steadily increasing over the past years. Fortunately, the PRI supply is still considered abundant, despite the growing demand, resulting in a buyer's market for PRI.

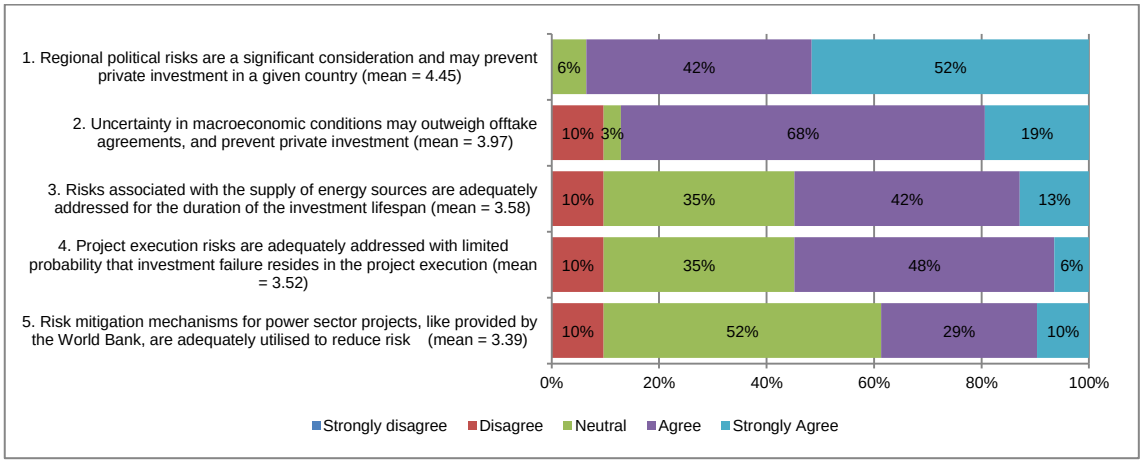


Figure 22 – Respondents' position on risks associated with private investment in the power sector of SSA

The second most important risk consideration for investors concerned the macroeconomic conditions in the subject region, to the extent that even offtake agreements may be superseded in favour of opting not to invest in the region. This observation appears to be consistent with the identified drivers for private investment in the power sector of SSA, as alluded to in research question one. According to the majority of the respondents' view, a healthy regional economic landscape, with positive

GDP growth rates are generally a prerequisite for investment in the region. Thus, this risk can generally not be eliminated, but rather avoided by focusing investments in regions with favourable economic conditions.

Constructs three and four, related to risks associated with energy supply sources and project execution are approximately equal, and despite a sample mean greater than three, there is not a substantial difference between these means, which may imply that the respondents do not consider these risks to be too much of a concern. This notion can be supported by the fact that these risks are inherently addressed by means of the IPP SPV structure as highlighted in Figure 3 (Terblanche, 2013). In both instances there are very clear agreements in place that localise the risk to a limited number of stakeholders. Generally, construction agreements will be entered with the EP&C stakeholder and penalties will be imposed for defaulting on the agreement. Similarly, feedstock agreements will govern the supply of energy sources to the IPP SPV. Where the risk related to these activities does however increases is when the number of stakeholders in the structure increase and the lines for direct accountability for activities become clouded. This is typically the case presented in Figure 4, where inefficient policy and regulatory requirements have significantly decreased the direct lines of accountability resulting in a more complex IPP SPV structure (Terblanche, 2013). This increases the need for more contractual agreements and resources, which would inevitably result in increased project development costs.

Albeit a significant sample mean, greater than three, concerning respondent's agreement on the utilisation of risk mitigation mechanisms to protect investment, majority of the respondents' views were neutral to this subject. Thus, from the survey feedback it appears as if the mechanism are currently not being utilised in the process of developing IPP projects. This may as a result of the well-structured IPP SPV structure that already addresses most of these risks by means of contractual agreements.

6.2.6 Research question six

How has renewables impacted the private investment landscape in the power sector of SSA?

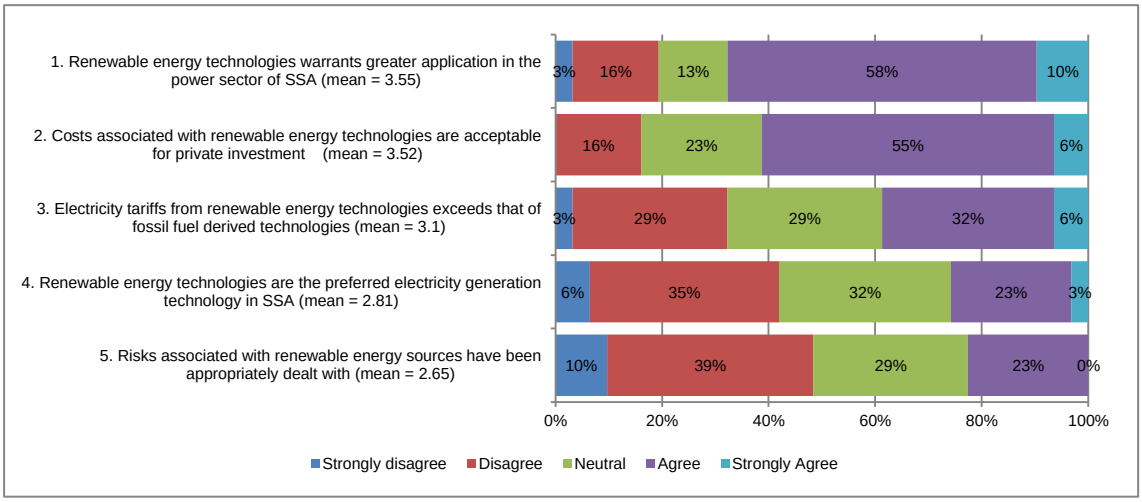
In light of the success achieved with the REIPPPP in South Africa during the past five years, research question six aimed to determine if the appetite and application for renewable energies were as prevalent throughout SSA. Figure 23 below represents

the respondents' positions on renewable energies as a possible consideration for private investment in the power sector of SSA. Despite the success of the REIPPPP in South Africa, the survey results suggested that investors are not overwhelmingly in support of renewable energies, for a various number of reasons as explained below.

Construct one, related to further application of renewable energies in the power sector of SSA was considered the most important given the constructs presented to the respondents. Although, the statistically significant sample mean suggested agreement with the construct, the sample mean is relatively close to the hypothetical mean, in comparison to other constructs tested. Nevertheless, respondents were still favouring the notion of greater application of renewable energies. This can be attributed to the benefits that renewable energies present to investors, off which the first benefit can be related to the localised power generation, reducing the need for expensive transmission and distribution networks (International Renewable Energy Agency, 2012). Furthermore, renewable energies realise a far smaller carbon emission footprint, benefitting the achievement of emission targets. Even though, renewable energies support localised generation, total dependency on renewables, without a grid connection or conventional fossil fuel backup generation capacity, warrants localised generation unobtainable due to the intermittent character of wind, solar and other renewable energy sources. Turkenburg (2012) further highlighted the disadvantages of renewable energy sources like its low spatial energy intensity (J/m^2) or energy density (J/m^3) compared with most conventional energy sources, generally capital intensive installation costs, often unexpected higher-than-desirable operational costs, and a variety of environmental and social concerns related to their development.

The aforementioned concerns also explain the relatively neutral stance from investors concerning the costs associated with renewable energies, as represented by construct two in Figure 23. Even though the costs for renewable energy technologies have been decreasing in recent years, the fact that investment is still required for fossil fuel technologies. In the event of separating the projects, the business case related to the fossil fuel backup technology becomes cumbersome to motivate as suggested by Wiecher (2013). Thus, it depends on the structure of the investment, and if the fossil fuel backup needed to be provided, whether or not the investment costs would be acceptable.

In the event of the consumer having access to grid supplied power or any other fossil fuel derived power, renewable energies may well benefit investors as a source of hedging the generation facility against fuel price volatility. However, this would be



subject to the fuel offtake agreements entered with the fuel supplier, nevertheless it is an opportunity that is worth investigating (International Renewable Energy Agency, 2012). To further offset costs associated with renewable energies, the opportunities still exists to leverage of emission tax incentives as well as other mechanisms like the CDM. Interesting to note though, is that even with these incentives to the investors' disposal, scepticism still prevailed concerning the costs associated with renewable energies. The researcher's experience in benefitting from these incentives support investors' position on this matter, as accessing these incentives proved to be costly and heavily cumbersome.

Although construct four concerning a preference of renewable energies over that of fossil fuel derived technologies realised a statistically insignificant sample mean, mainly as a result of the large standard deviation in the responses, the sample average did suggest that the respondents were not in agreement with the construct. This large standard deviation may have been attributed by the fact that a large proportion of the respondents were involved in the REIPPPP, which they consider as a tremendous success, while the remainder of the respondents, who did not venture into the

Figure 23 – Respondents' position on renewable energy for private investment in the power sector of SSA

REIPPPP did not share the same sentiment. Furthermore, the inclination of the respondents to disagree with this statement also rest on the fact that renewable energies are generally still the more expensive option, given that SSA has significant fossil fuel reserves. Using South Africa as an example, it is clear that coal will be the least expensive energy source for the foreseeable future.

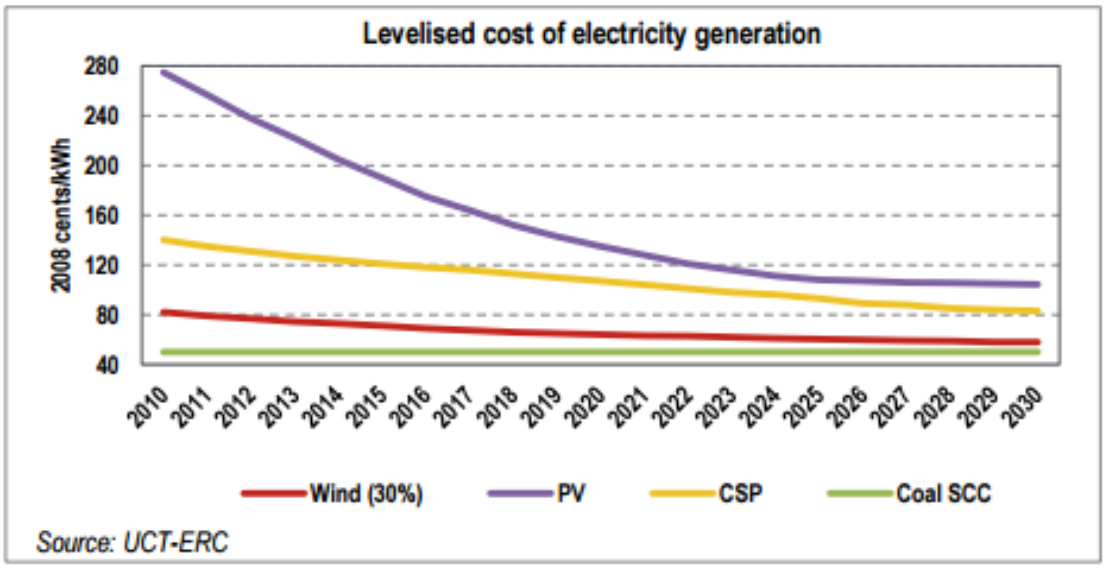


Figure 24 – Evolution of levelised cost of electricity generation in South Africa

Lastly, construct five indicated that respondents were of the view that the risks associated with renewable energies are not yet adequately addressed. A consensus regarding the risks associated with renewable energies have been stipulated as per Section 2.7 (Noothout, *et al.*, 2016). Although it can be comprehended that that respondents were of the opinion that the risks related have not been properly addressed, yet, they have also indicated that mechanisms available to address risk, have not been adequately used, suggesting that the respondents' actions and concerns may be in conflict. Also, a significant a number of the risks reside with policy development and regulatory frameworks, which coincide with respondents' position that development of regulatory frameworks are required.

Thus, research question six can by answered from the consensus that application prospects for renewable energies are increasing, and that the current costs of renewable energies are acceptable. However, there are still a number of complications that surround renewable energies, which pose challenges to securing financing and maintaining security of supply. Nevertheless, this remains a significant consideration for private investors and governments alike.

6.2.7 Hypothesis one

Hypothesis one endeavoured to determine if there is a correlation between the critical success factors for private investment in the power sector of SSA and the investment performance.

Null hypothesis (1): H_0: p = 0, The critical success factors for private investment in the power sector of SSA are not effective in improving the performance of these investments.

Alternative hypothesis (2): H_1: p > 0, The critical success factors for private investment in the power sector of SSA are effective in improving the success of these investments.

According to the results analysis presented in Section 5.6.1 it is clear that the application of the critical success factors would lead to improved investment performance. This statement rested on the aggregated results presented in Figure 25 above, which represents the respondents' position on the impact of the critical success factors on investment performance. Important to note is that the sample means realised for all constructs were statistically significant. Given that the respondents were in agreement that the application of these constructs would lead to improved investment performance, and complimented by the fact that these constructs align with the six research questions, it can be concluded that these constructs should form the basis of a framework for private investors in the power sector of SSA.

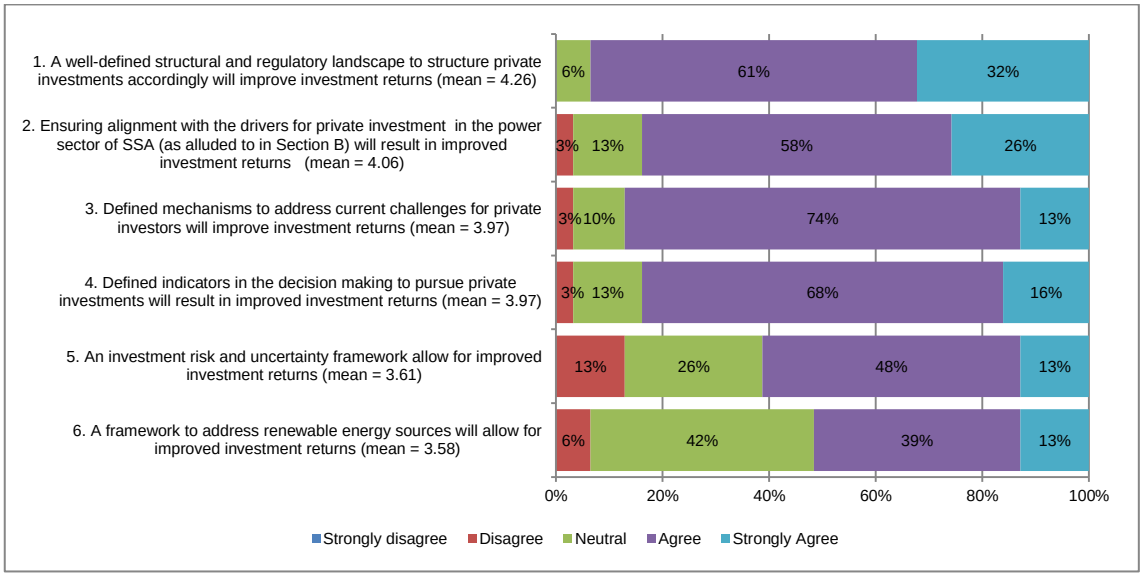


Figure 25 – Respondents' position on the investment performance impact as a result of the critical success factors for private investment in the power sector of SSA

In furthering the discussion on the results presented in Figure 25, respondents regarded a well-defined regulatory landscape as the biggest influencer of investment performance. This appears to be consistent with the common theme noted throughout the results discussion, as a significant number of the constructs relate back to

regulatory factors. In view of inefficient and static regulatory frameworks being identified as being a significant challenge for private investors (World Economic Forum, 2014), it is then aligned with the fact that respondents considered well-defined regulatory environments as the most important factor impacting the success of investments. In addition, respondents have indicated that there is a substantial need to co-develop these regulatory frameworks, which highlights the need for regulatory bodies to include private investors and other relevant stakeholders in the development of regulatory landscapes. ANOVA results concerning the regulatory frameworks suggested that certain stakeholder groups attached more and less importance to this construct. Stakeholders from a legal fraternity (referring to Table 13) valued this construct as the most important factor influencing the success of investments (legal stakeholder sample mean = 5 out of 5). While on the contrary, investors scored this construct substantially lower (investor stakeholder sample mean = 3.875 out of 5). The difference of which can be explained as the stakeholders' interest in the project.

The construct which was considered the least import to respondents related to a renewable energy framework the sample mean only amounted to 3.58 out a 5. ANOVA results also indicated that there was a statistically significant difference in the sample means between the different stakeholder groups. Interestingly, industry stakeholders (industry stakeholder sample mean = 4 out of 5) considered the impact of such a framework to improve the investment performance much higher, compared to the legal fraternity stakeholders (legal stakeholder sample mean = 3 out of 5) who were neutral about the impact this framework would have on the performance of investments. Given that few industry stakeholders in SSA have actually pursued renewable energy solutions, while legal stakeholders have been involved in the actual contracting of these projects, it is peculiar that industry stakeholders would rate the impact of such a framework this highly.

Based on the aforementioned discussion, it can be inferred from the results of hypothesis one that the critical success factors would positively impact the performance for private investments in the power sector of SSA.

6.2.8 Hypothesis two

The objective of hypothesis two was to determine the correlation between the critical success factors for private investment in the power sector of SSA and the investment participation in this region.

Null hypothesis (3): H_0: p = 0, The critical success factors for private investment in the power sector of SSA are not effective in improving investment participation in the region.

Alternative hypothesis (4): H_1: p > 0, The critical success factors for private investment in the power sector of SSA are effective in improving investment participation in the region.

According to the results analysis presented in Section 5.6.2 there was a unanimous agreement among respondents that the application of the critical success factors would realise improved investment participation in the region. This statement is further support by the aggregated results presented in Figure 26 below, which represents the respondents' position on the impact of the critical success factors on investment participation in the region. Similar to hypothesis one, all of the sample means derived from the survey responses were statistically significant and subsequently could all of the constructs be considered.

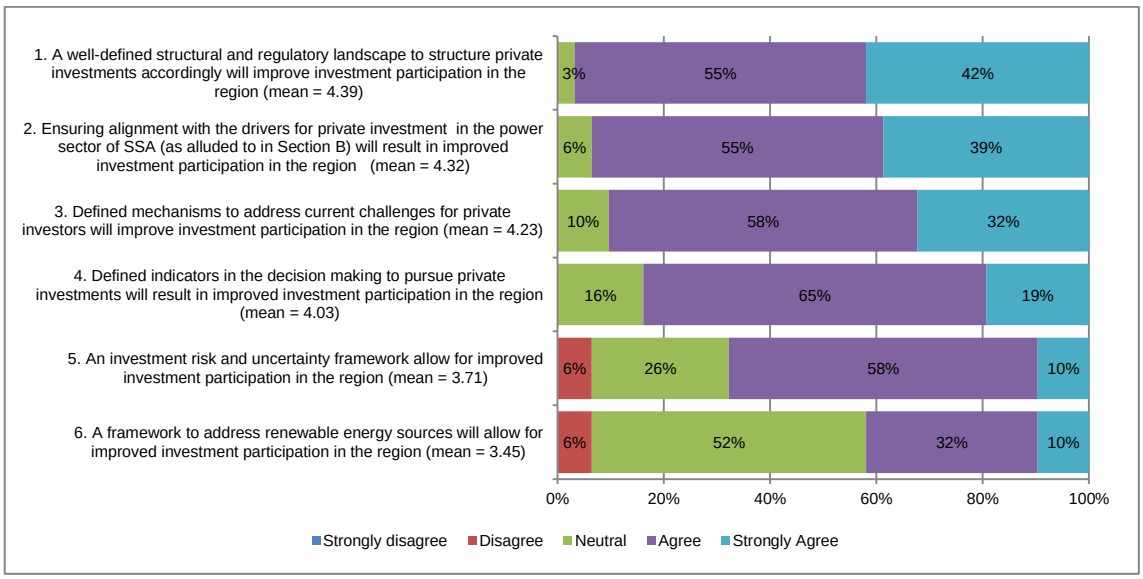


Figure 26 - Respondents' position on the investment performance impact as a result of the critical success factors for private investment in the power sector of SSA

I can be observed in Figures 25 and 26 that the ranking of the constructs between hypothesis one and two are identical, suggesting that there is a strong correlation between investment performance and participation in a region. This observation is consistent with the results from research question two which highlighted that the most important driver for investment is the financial indicators and factors benefitting financial indicators, like the size of the investments. Furthermore, the ANOVA results

related to hypothesis two showed that there was no statistically significant differences in the sample means for the various stakeholders involved, unlike hypothesis one where two constructs realised significant differences.

From the discussion it can be concluded that there is a strong correlation between the application of the critical success factors and investment participation in the region. Additionally, it can be inferred that in investment participation in a region would follow wherever investment performance can be guaranteed.

6.3 Conclusion

The findings presented in this discussion conclusively answered the research questions and hypotheses of this study, which would constitute the development of an investment framework concerning private investment in the power sector of SSA.

The sample used in this research allowed for the insights gained from stakeholders actively involved in the private investment landscape in the power sector of SSA as to expand on the existing theory base. Stakeholders from various professional fraternities and countries were considered in this research in order to ensure that the most accurate representation as practically possible could be achieved.

Given the consensus from the respondent, the critical success factors for private investment in the power sector of SSA as defined in this discussion would improve investment performance and subsequently also improve regional investment participation.

CHAPTER 7:

CONCLUSION

7.1 Introduction

The aim of this chapter is to highlight the significant findings of this research and to make the necessary recommendations to the stakeholders involved in the private investment landscape related the power sector of SSA. Stemming from the findings of this research, a framework for private investment in the power sector of SSA is presented on the critical success factors impacting the performance of these investments as well as the investment participation in this region's power sector. These findings should be especially important for regulatory bodies and organisations, like the African Forum for Utility Regulators, to facilitate the power sector reform needed in SSA to be aligned with investor requirements. Considering that the reform should not only be to benefit investors alone, but rather to create a sustainable power sector in SSA. This implies that although investors are the protagonists in developing this region's power sector, it should not come at the expense of a sustainable power sector, and should also benefit stakeholders like, governments, civil society and the environment.

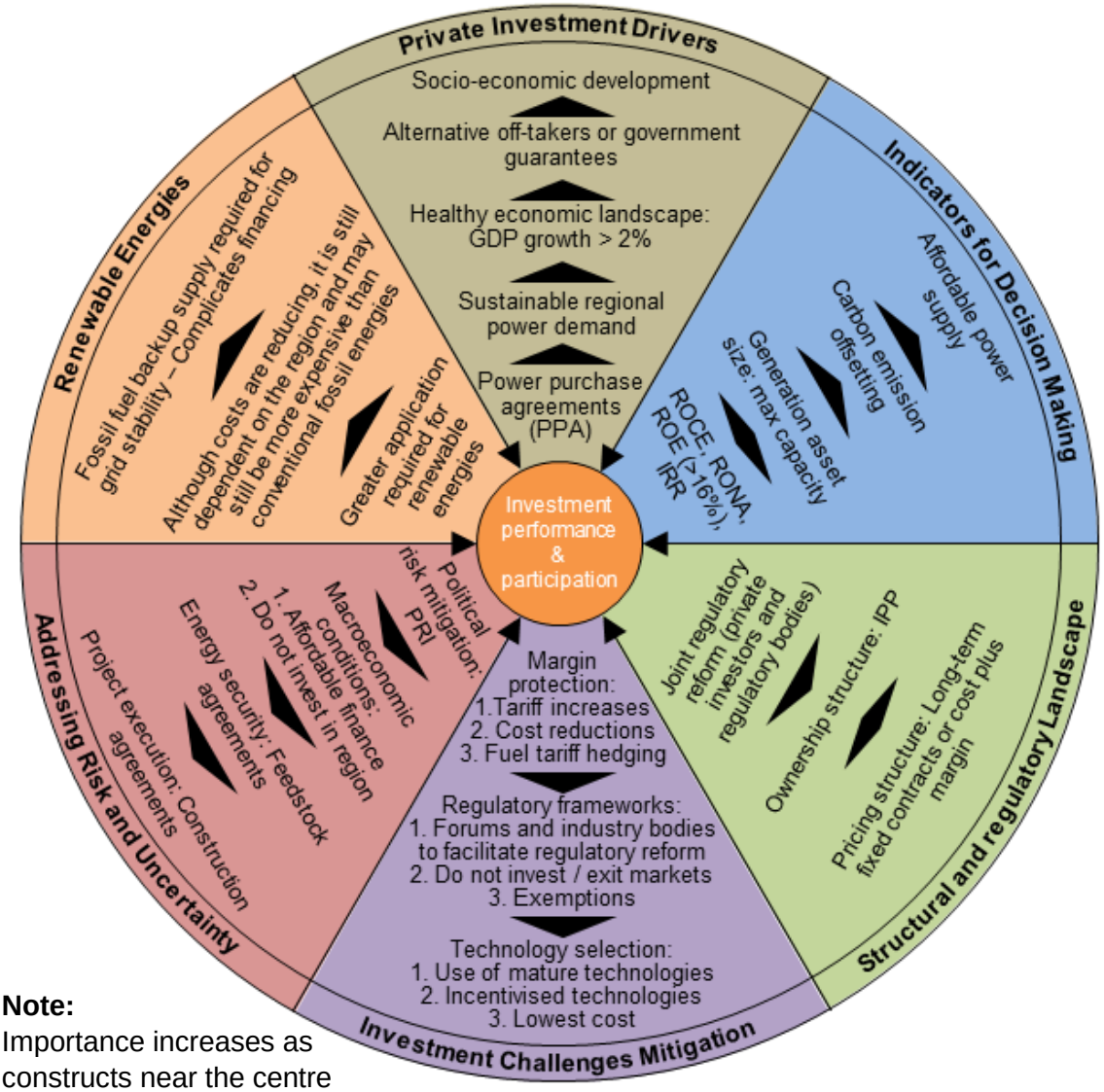
7.2 Significant findings

Private investors have a significant contribution to offer the power sector of SSA, which have far-reaching benefits, if managed correctly. Not only is power a key requirement for economic growth, but it can dramatically improve the quality of life for many Africans. Thus, there is a strong case to ensure that the power sector of SSA is appropriately developed. Given the fiscal constraints experienced by most SSA governments to develop essential infrastructure, a large onus is placed on the private sector to intervene. However, for the private sector to intervene, a lucrative business case needs to be tabled for private investors.

In view of the aforementioned, the research undertook the identification of the critical success factors required to create this business case. Underpinned by the fact that investors' main priority is to create shareholder value, or simply, to generate favourable returns on investments, one can infer that settings conducive for sound investor returns would also attract investors to those regions. Subsequently, these success factors have been defined in this research, and it was found that there was a strong correlation

between the manifestation of these success factors and private investment performance. The rationale that a setting conducive for favourable investor returns was confirmed by the strong correlation between the prevalence of these success factors and investor participation in a region, suggesting that the manifestation of these success factors would entice private investors to invest in a region, which would correspondingly increase investment performance.

Based on the empirical findings from this research, as well as inputs from the literature to supplement these empirical findings, the success factors can broadly summarised and represented by Figure 27.



Note:
Importance increases as constructs near the centre

Figure 27 - Private investment framework for the power sector of SSA

Figure 27 schematically represents the address of the six main investment considerations, which was also aligned with the research questions. Figure 27 is

interpreted as follows: The importance of the constructs to stakeholders in the power sector of SSA increases as the constructs near the centre of the circle. Subsequently, one would prioritise the constructs closest to the centre of the figure and progressively work towards the outside of the figure. The most significant finding for each one of the six investment considerations is briefly highlighted below (the constructs are presented in decreasing level of importance):

Private investment drivers

- Securing a well-structured PPA with the necessary guarantees was considered a requirement that may supersede most of the investment drivers,
- A sustainable regional demand for electricity alludes to the notion that if there is a willing buyer, then there will be a willing seller,
- Investors have indicated that the investment setting (macroeconomic conditions) should be healthy and a typical GDP growth of at least 2 percent is required,
- In order to secure financing, most commercial financiers require that alternative power off-takers are secured in the event of the main off-taker default; alternatively, the off-take needs to be guaranteed, typically through take-or-pay agreements,
- Although not a requirement for investors, but socio-economic development is required in order to nurture a sustainable power sector.

Indicators for decision making

- The main indicators used by investors in the decision making process to pursue private investments in a region related to the investment returns, namely, financial ratios like ROE, and the asset generation capacity, as it is underpinned by the concept of economies of scale and support larger revenue possibilities,
- Investor consider carbon emission offsetting as a key indicators primarily as it supports potential additional revenue streams; however, regulatory bodies need to use this as a tool to promote environmental sustainability agendas,
- Price affordability is in the interest of the power off-takers; bearing in mind that investors agenda inherently contradicts lower tariff; hence, the need for regulatory intervention.

Structural and regulatory landscape

- Due to the abnormal progression of power sector of SSA and the developing hybrid power market, joint development of the regulatory landscape is key for the mutual benefits of investors and governments alike,
- Ownership structures are inclined to IPPs, mainly due to the immediate power supply deficit and a halted power sector reform,

- Due to the security, especially considering stringent financing requirements, investors are biased towards long-term fixed contracts and cost plus margin tariff structures.

Investment challenges mitigation

- Diminishing margins have resulted in investors considering this as the main challenge encountered in power sector, resulting in investors to typically increase tariffs, implement cost cutting measures and fuel tariff hedging initiatives (measures can be done conjunction with more than one measure at a time) to protect margins,
- Regulatory frameworks, whether it is ineffective or static, requires joint development between investors and regulatory bodies to ensure that an investor conducive landscape is nurtured; alternatively, investors can decide not to invest in certain regions, exit markets or apply for exemption from certain regulatory requirements,
- Technology selection is primarily centred on mature technologies as it presents the least risk, followed by incentivised and lowest cost technologies.

Addressing risk and uncertainty

- Political risk was considered by investors to be their main risk; despite being largely out of the control of investor, PRI can be obtained to protect investors,
- Macroeconomic condition is a risk that is also out of the control of investors, and they are faced with options either not to invest in a region, or invest, provided that financing is still affordable and sensible for the investment,
- Energy security and project execution risks were considered less important as these risks are generally addressed appropriately in the IPP SPV.

Renewable energies

- A general consensus resided among stakeholders in this region's power sector that renewable energies require greater application; yet, it should be able to compete against abundant and cheap fossil fuel options,
- Renewable energies usually require a fossil fuel alternative, if the reliability in security of supply is considered critical; this complicates the investment case significantly.

7.3 Benefits of the framework

Although the elements constituting the framework are not unique in the sense that they have not been considered by investors or regulatory bodies in the past, it does present a structured approach to combining the relevant elements required for successful

private investment in the power sector of SSA, as well as indicate the priorities and define constructs that were previously only presented as considerations.

Benefits of the framework presented in Figure 27 include, but are not limited to the following:

- Departure point for regulatory bodies and governments concerning regulatory reform, as it highlights the constituents of investor requirements and sustainability requirements,
- It prioritises the efforts and focus areas for investors and regulatory bodies alike, with regards to:
    - Selecting regions, or identifying investment opportunities,
    - Main indicators and measures to apply for assessing investment opportunities,
    - Structuring power generation investments,
    - Appropriately addressing commonly occurring challenges, risks and uncertainties in SSA region,
    - Dealing with renewable energies as a possible means of power generation.
- Applying the presented framework in the investment development and execution phases will lead to improve investment performance,
- Governments and regulatory bodies, developing the investment landscape in accordance with the framework recommendations will improve investment participation in the region,
- Improve planning and development of potential power generation investments,
- Calculating resource allocation improvements as efforts will be more focussed,
- Benefitting civil society in the longer run as infrastructure development in SSA is heavily dependent on private investment.

7.4 Applicability of this framework

The framework presented in Figure 27 will allow investors, regulatory bodies and stakeholders relevant to the power sector of SSA to execute pre-emptive planning and preparation for the development of private investments in this region's power sector as well as the reform of the regulatory landscape, which has been considered to be slow or completely absent. The framework was derived from academic and industry perspectives by means of a comprehensive literature review, and it was expanded and conclusively defined by means of including the experience of stakeholders actively

involved in the power sector of SSA, to move the framework from a purely theoretical to a practical milieu.

Although many of the factors related to the development of investments in the power sector are unique to certain regions, the underpinning structured approach behind this framework allows for the application across most of SSA. Furthermore, this structured approach is applicable to the nurturing of the power sector as a whole throughout SSA, as the success factors are set to benefit investors and power sector alike. With many of the constituents being unique to the power sector, the motivation behind this framework is common for other infrastructure development investments in this region, which implies that the framework can be attuned to a broader scope other than merely the power sector. Thus, applicability of this framework is far-reaching in that it can be used as an investment tool, as well as a departure point for regulatory reform, not only within the power sector, but also within various other infrastructure development divisions.

7.5 Considerations and limitations

Although this extensive efforts were made to ensure that this framework is as exhaustive as possible, one still need to appreciate that this framework is supported by a sample of 31 experienced stakeholders from the investment fraternity in the power sector. As also highlighted in Chapter 4, the sample cannot be generalised for the entire population, and is the discretion of the user of the framework still of utmost importance to ensure the success of investment. Therefore it is important that stakeholders planning got use this framework, take a contextual position about the application thereof and assimilating factors that may have not been present during the formulation of the framework. Given the aforementioned, users need to realise that the success and the benefits of this framework are principally dependent on:

- The macroeconomic environment in which the investors operate,
- Structure, maturity and ability to adapt of the regulatory landscape,
- Availability of energy sources, as well as other essential power infrastructure,
- Complexity surrounding the involvement of a large number of stakeholders,
- Level of risk attendant with projects,
- Skills and experience of the stakeholders involved,
- External environment or investment milieu.

A key point highlighted in this research concerns the joint development of the regulatory landscape, which should include stakeholders from the investor fraternity,

industry role players, regulatory bodies and advisories. It is realistic to assume that many of these stakeholders may have practical experience concerning this subject that can supplement this framework and build on this body of knowledge to further improve the evolution of this region's power sector.

7.6 Recommendation for the regulatory bodies

This research has shown that SSA cannot continue to meet its power demands without the intervention of private investment in this region's power sector. Given the importance of sustainable security of supply for economic growth and augmenting the quality of life, governments are compelled to develop the power landscape to be conducive for private investment, and to ensure that sustainable power sector is nurtured in the process.

There was a clear consensus amongst all stakeholders involved in this research that joint development of the regulatory landscape is required. With the prevalent cooperation indicated by investors, it is vital that regulatory bodies take the initiative to create the necessary platforms and channels as to commence with the process of regulatory reform. Nigeria is a good example of a country who demonstrated government's cardinal role it has to play in order to initiate the required regulatory reform. The Nigerian case also pinpoints the need for involvement of private investors in order to foster a regulatory environment with limited bureaucracy that is effective in execution and that collective work on the reform of the power sector.

7.7 Recommendations for private investors

Private investors are considered the protagonists for the development of the power sector in SSA, which should include addressing security of supply, building a sustainable power sector, co-develop the regulatory landscape and align with the socio-economic needs of this region. Over and above the need to maximise shareholder value, it is clear that the responsibility of private investors are reaching far wider than simply generating investor returns; this is especially true in the absence of an established regulatory landscape, that may currently omit many of the aforementioned factors. Thus in ensuring that the playing field is equal for all investors it is required that the factors beyond investor returns be included in regulatory reform process, to prevent discrepancies in the level of engagement of investors related to these factors. This is aligned with the notion that until factors other than creating shareholder returns are mandatory, investors are not necessarily maximising

shareholder returns. Therefore it is also in the interest of investors to establish these factors to be included in the regulatory reform process as soon as possible to ensure that the playing field is even for all those partaking.

With regards to the application of the framework presented in Figure 27, investors are urged to consider the contextualising of the subject investment, in the wake of the unclear and uniquely evolving setting that investors may find themselves. The framework is to be considered a base for improved investment performance, especially when considering a long-term position. This is justified on the basis that investors should strive for a sustainable power sector, especially in view of the long maturity periods associated with power investments.

7.8 Recommendations for future research

Although the value of this research resided in conclusively identifying and quantifying the critical success factors for private investment in the power sector of SSA, which would improve investment performance and participation in this region, also highlighted a number of areas that would benefit from future research:

- Determining and developing a roadmap for regulatory reform, possibly using the Nigerian case as the base case,
- Defining the integrated resource plan for SSA as a whole, which should form the boundaries within which each country in this region should develop it energy landscape; the South African IRP is an example of this resource planning at a country level, but an integrated resource plan for SSA is not available,
- Delineating the appropriate means to develop the business case for renewable energies in SSA, considering the importance of security of supply and the dependency on fossil fuel based generation capacity as backup supply,
- Testing the reliability of the framework presented in Figure 27 on investment performance and participation in this region's power sector,
- Determining which constituents of the framework can be considered the levers realising the greatest impact on investment performance and participation.

7.9 Conclusion

This research has shown that the development of the power sector of SSA is deeply dependent on the involvement of private investors, while in parallel significant opportunities exist for investors in view of this dependence. However, navigating this

landscape can be complex, of which the outcome is evident in the current low success rate of power investments in this region (Swedish International Development Cooperation Agency, 2015). The materiality of the aforementioned have been demonstrated by the challenges, risks and structuring complexities of power sector, which has subsequently played a critical role in the identification in the critical success factors for private investment in the power sector of SSA.

Conclusively, this research has suggested an investment framework for private investment in the power sector of SSA and demonstrated that adopting this structured process would increase investment performance and participation in this region's power sector. Furthermore the insights gained from this research have raised the attentiveness concerning the strong correlation between a structured investment approach (critical success factors) and the impact on investment performance.

In general, this research presented a clear case for the establishment of a framework for private investment in the power sector of SSE to improve the investment landscape and to attract investment to this region. The findings are set to have a positive impact on the success of investments in this region's power sector. This outcome is anticipated to also benefit AFUR and other organisations involved in the regulation and policy setting, as this framework allows for a departure point in realising the necessary alignment between investors and regulatory bodies.

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APPENDIX A – SURVEY QUESTIONNAIRE LETTER OF CONSENT

Gordon Institute of Business Science
University of Pretoria

Letter of consent for survey questionnaire

Dear Respondent,

The purpose of this study is to determine the critical success factors for private investment in the power sector of Sub-Saharan Africa. Subsequently a survey questionnaire was developed with the aim of obtaining industry specific insights to develop a conclusive framework to improve private investment participation in this region's power sector. To that end, you are requested to complete this survey questionnaire for this research before 15 August 2016, which will take no more than 15 minutes of your time. Your participation is completely voluntary and you can withdraw at any time without penalty. Respondents can be rest assured that all data/survey questionnaires collected will be used without identifiers. By completing the survey questionnaire, you indicate that you voluntarily participate in this research. If you have any concerns, please feel free to contact me or my supervisor. Our details are provided below.

Researcher
Name: Brendan Marais
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Research Supervisor
Name: Mahendra Dedasaniya
Email: madedasaniya@deloitte.co.za
Phone: +27 (0) 82 877 5275

Please follow the instructions carefully and return the completed questionnaire via email.

Thank you for your participation.

Sincerely,
Brendan Marais

APPENDIX B – SURVEY QUESTIONNAIRE

SECTION A: PERSONAL INFORMATION

Please mark the appropriate box with a tick (X) in the space provided

A1: What is your current position or job title?

Chief Executive Officer

Chief Financial Officer

Other C-Suite Officer

Project Developer

Private Investor

Project Manager

Power Regulator Representative

Government Official

Other (Please specify in the next column)

A2: In which country are you currently residing and working?

A3: How many years' work experience to you have (total work experience, and experience in investment in the power sector).

	Work experience	Private investment experience in the power sector
0 to 10 years		
10 to 15 years		
15 to 20 years		
20 to 30 years		
30 to 40 years		

A4: Please indicate in which SSA countries you successfully secured/closed private investments in the power sector.

SECTION B: DRIVERS FOR PRIVATE INVESTMENT IN THE POWER SECTOR OF SSA

Question no	Question/ Statement	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
B1	Regional demand for electricity is a significant driver for power sector investment					
B2	Regional demand for electricity is sustainable for the foreseeable future					
B3	Despite strong regional demand for electricity, offtake agreements are the main attractor for investment in the power sector					
B4	Alternative electricity offtake agreements must be available before private investments are considered (e.g. backup offtake stakeholder in the event of the main offtake stakeholder defaults on the agreement)					
B5	Strong regional economic growth is a key driver for private investment in the power sector					
B6	Socio-economic factors, e.g. urbanisation, are key considerations for private investment					
B7	Energy sources are in abundance, easily accessible and a significant driver for private investment in the power sector					
B8	Government's lack of funds promotes private investment in the power sector					
B9	The need for private investment is increasing					

B10: What is the acceptable level of growth in GDP before private investments are pursued?

B11: What is the typical size of the unserved power market (GW) which you have invested in?

SECTION C: INDICATORS INFLUENCING THE DECISION FOR PRIVATE INVESTMENT IN THE POWER SECTOR OF SSA

Question no	Question/ Statement	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
C1	ROE, ROCE and RONA are the most important indicators used for entering into a private investment venture in the power sector					
C2	Financial indicators take preference over other sustainability indicators like carbon emission reductions, job creation, etc. in the power sector of SSA					
C3	Generation capacity/potential is a key consideration, i.e. the larger the required generation capacity, the more lucrative the setting for private investment					
C4	Supplying affordable electricity to support a sustainable power sector is as important as maximising investment returns					
C5	Carbon emission reduction is a key consideration for technology selection					
C6	The demand for electricity and private investment is sustainable for the foreseeable future					
C7	The opportunities for additional power projects are substantial					
C8	Tax incentives are a significant consideration to improve the investment returns and may even result in restructuring private investments to benefit from these tax incentives					

C9: What is the minimum ROE for the latest project you have been involved with in order to justify private investment?

SECTION D: THE PRIVATE INVESTMENT LANDSCAPE IN THE POWER SECTOR DEFINED FROM STRUCTURAL AND REGULATORY PERSPECTIVES

D1: What is the preferred pricing model for electricity tariffs (if "Other" is chosen is, please specify in the space available)?

Market-driven	Cost + Margin	Long-term fixed contract	Tolling/conversion agreements	Other

D2: What is the preferred ownership/investment structure for private investment (if "Other" is chosen is, please specify in the space available)?

Independent Power Producer (IPP)	Invested in state-owned power projects	Other

Question no	Question/ Statement	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
D3	Regulation in the power sector of SSA has improved and is more conducive for private investment					
D4	An unregulated power market allows for a more lucrative private investment setting					
D5	Current power sector regulation in SSA requires significant reform					
D6	Governments are the sole driver for regulatory reform in the power sector of SSA					
D7	Power sector regulatory reform should be a joint effort between private investors and regulatory bodies					

SECTION E: ADDRESSING CHALLENGES IN THE PRIVATE INVESTMENT LANDSCAPE IN THE POWER SECTOR IN SSA

E1: How is the challenge around falling margins addressed due to competitor activity or rising fuel costs (if "Other" is chosen is, please specify in the space available)?

Contract renegotiation	Process improvements/ cost reductions	Tariff increases	Fuel tariff hedging	Other

E2: How are challenges related to regulatory frameworks addressed to accommodate private investments (if "Other" is chosen is, please specify in the space available)?

Do not invest in particular market	Exemptions on regulatory clauses	Joint development of regulatory frameworks	Other

E3: How is the challenge around static regulatory frameworks addressed (if "Other" is chosen is, please specify in the space available)?

Development of forums and industry bodies to facilitate regulatory reform	Exit markets when regulatory framework evolvement is inefficient	Do nothing	Other

E4: How is the challenge around technology providers selection addressed (if "Other" is chosen is, please specify in the space available)?

Use only mature technologies and companies	Use of technologies with most favourable incentives	Use of the lowest cost technologies	Other

SECTION F: ADDRESSING RISK AND UNCERTAINTY IN THE PRIVATE INVESTMENT LANDSCAPE IN THE POWER SECTOR IN SSA

Question no	Question/ Statement	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
F1	Regional political risks are a significant consideration and may prevent private investment in a given country					
F2	Uncertainty in macroeconomic conditions may outweigh offtake agreements, and prevent private investment					
F3	Project execution risks are adequately addressed with limited probability that investment failure resides in the project execution					
F4	Risks associated with the supply of energy sources are adequately addressed for the duration of the investment lifespan					
F5	Risk mitigation mechanisms for power sector projects, like provided by the World Bank, are adequately utilised to reduce risk					

SECTION G: IMPACT OF RENEWABLES ON THE PRIVATE INVESTMENT LANDSCAPE IN THE POWER SECTOR IN SSA

Question no	Question/ Statement	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
G1	Renewable energy technologies are the preferred electricity generation technology in SSA					
G2	Risks associated with renewable energy sources have been appropriately dealt with					
G3	Electricity tariffs from renewable energy technologies exceeds that of fossil fuel derived technologies					
G4	Renewable energy technologies warrants greater application in the power sector of SSA					
G5	Costs associated with renewable energy technologies are acceptable for private investment					

SECTION H: PERFORMANCE OF PRIVATE INVESTMENTS CHARACTERISED BY THE CRITICAL SUCCESS FACTORS

Based on the aforementioned factors impacting private investment in the power sector of SSA mentioned in this survey questionnaire, please indicate the result it may have on ***investment performance***.

Question no	Question/ Statement	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
H1	Ensuring alignment with the drivers for private investment in the power sector of SSA (as alluded to in Section B) will result in improved investment returns					
H2	Defined indicators in the decision making to pursue private investments will result in improved investment returns					
H3	A well-defined structural and regulatory landscape to structure private investments accordingly will improve investment returns					
H4	Defined mechanisms to address current challenges for private investors will improve investment returns					
H5	An investment risk and uncertainty					

	framework allow for improved investment returns					
H6	A framework to address renewable energy sources will allow for improved investment returns					

SECTION I: PRIVATE INVESTMENTS PARTICIPATION CHARACTERISED BY THE CRITICAL SUCCESS FACTORS

Based on the aforementioned factors impacting private investment in the power sector of SSA mentioned in this survey questionnaire, please indicate the result it may have on ***investment participation***, implying attractiveness to pursue private investments.

Question no	Question/ Statement	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
I1	Ensuring alignment with the drivers for private investment in the power sector of SSA (as alluded to in Section B) will result in improved investment participation in the region					
I2	Defined indicators in the decision making to pursue private investments will result in improved investment participation in the region					
I3	A well-defined structural and regulatory landscape to structure private investments accordingly will improve investment participation in the region					
I4	Defined mechanisms to address current challenges for private investors will improve investment participation in the region					
I5	An investment risk and uncertainty framework allow for improved investment participation in the region					
I6	A framework to address renewable energy sources will allow for improved investment participation in the region					

APPENDIX C – NUMERICAL CODE FOR CLOSE ENDED SURVEY QUESTIONS

A1. Position	Code
Chief Executive Officer	1
Chief Financial Officer	2
Other C-Suite Officer	3
Project Developer	4
Private Investor	5
Project Manager	6
Power Regulator Representative	7
Government Official	8
Other	9

Response	Code
Strongly Disagree	1
Disagree	2
Neutral	3
Agree	4
Strongly Agree	5

A3. Years of experience	Code	
	Work experience	Private investment experience in the power sector
0 to 10 years	1	2
10 to 15 years	1	2
15 to 20 years	1	2
20 to 30 years	1	2
30 to 40 years	1	2

B10. GDP Growth rate before investments are pursued	Code						
	>0%	>1%	>2%	>3%	>4%	>5%	Other
	1	2	3	4	5	6	7

B11. Typical size of the unserved power market (GW)	Code					
	>0GW	>1GW	>2GW	>3GW	>4GW	Other
	1	2	3	4	5	6

C9. Minimum ROE to justify investment	Code					
	0% to 10%	11% to 12%	13% to 14%	15% to 16%	Over 16%	Other
	1	2	3	4	5	6

D1. Preferred pricing model	Code				
	Market-driven	Cost + Margin	Long-term fixed contract	Tolling/conversion agreements	Other
	1	2	3	4	5

D2. Preferred ownership/ investment structure for private investment	Code		
	Independent Power Producer (IPP)	Invested in state-owned power projects	Other
	1	2	3

E1. Addressing challenges around margins	Code				
	Contract renegotiation	Process improvements/ cost reductions	Tariff increases	Fuel tariff hedging	Other
	1	2	3	4	5

E2. Addressing challenges around regulatory frameworks	Code			
	Do not invest in particular market	Exemptions on regulatory clauses	Joint development of regulatory frameworks	Other
	1	2	3	4

E3. Addressing challenges around static regulatory frameworks	Code			
	Development of forums and industry bodies to facilitate regulatory reform	Exit markets when regulatory framework evolvement is inefficient	Do nothing	Other
	1	2	3	4

E4. Addressing challenges around technology providers selection	Code			
	Use only mature technologies and companies	Use of technologies with most favourable incentives	Use of the lowest cost technologies	Other
	1	2	3	5

APPENDIX D – GIBS ETHICAL CLEARANCE

Dear Mr Brendan Marais

Protocol Number: **Temp2016-01366**

Title: **Critical success factors for private investment in the power sector of Sub-Saharan Africa**

Please be advised that your application for Ethical Clearance has been APPROVED.

You are therefore allowed to continue collecting your data.

We wish you everything of the best for the rest of the project.

Kind Regards,

Adele Bekker