University of KwaZulu-Natal

A BUSINESS MODEL TO IMPROVE THE MANAGEMENT AND VALUE CREATION OF RENEWABLE INDEPENDENT POWER PRODUCER PLANTS IN SOUTH AFRICA

by

Bongani Khonjelwayo

(207519961)

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DECLARATION

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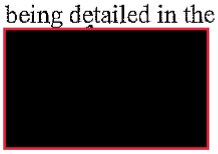
Signature: 

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This thesis is dedicated to my late uncle, Professor Themba Lancelot Ngwenya, who passed away on the 10th of July 2016. He was an inspiration to all of us, both academically and as a family man. He was beacon of light and hope and a moral compass for the family. As somebody referred to him he was "a philosopher of sorts, a writer, an intellectual, a critic, and a thinker of deep thoughts. I knew him to be a speaker, a lighter of rooms and a challenger of nonsense". He loved and feared God. May his soul rest in peace.

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ABSTRACT

The study proposes a renewable Independent Power Producer (IPP) business model. The model is a framework that identifies a number of business activities that need to be performed by managers in order to ensure that a IPPs business yields value for the shareholders and stakeholders. The main objective of the study was to propose an IPP business model by examining the various inputs, business processes and activities in an IPP plant that are designed to yield value to shareholders through effective and efficient management of resources.

The study is important because IPPs are exposed to numerous business risks and challenges. These include construction risks, such as the risks of cost overruns and contractor underperformance. There are also operational, market and political risks to which IPPs are exposed. Additionally, existing business models don't sufficiently capture the business risks that renewable IPPs are exposed to. These include market, technology, reputation and risks of change in legislation.

This study was conducted in two stages. The first stage was conducted through interviews with managerial employees of the first 40 IPP companies that were successful bidders of the Renewable IPP Programme of the Department of Energy (REIPPP). The second stage of data collection was through a survey questionnaire to test themes and items that will be included in the proposed business model. The survey questionnaire findings were used to analyse the importance of each variable in order to make a decision whether to include it in the proposed business model.

The main findings of the study are that the renewable IPP business model consists of a number of unique components which represent the chose inputs, business activities, outputs and outcomes that can be used by an IPP businesses to deliver value to its shareholders and stakeholders. These components consists of a number of themes relating to managerial activities should be executed to improve the management of IPPs, reduce business risks and create value the renewable IPPs in South Africa. Some of the inputs include pre-investment activities, post-investment activities, Engineering, Procurement and Construction (EPC) management, grid management, planning and executing operations and maintenance (O&M) activities.

The study succeeded in collecting and contextualising the experiences of new IPPs and linking those to relevant business sector trends. The findings of this study make a contribution towards the existing body of knowledge in the fields of management as well as energy studies. One of the research gaps emanating from this study is that there is insufficient empirical research to understand the components of business models as a managerial concept. This study makes a contribution towards closing these gaps. The study also makes a contribution in the academic knowledge in the subject of business models by expanding on the knowledge about the components of business models and their importance as a management tool. The proposed business model is presented as an original contribution to the management of IPPs, based on empirical data collected from IPPs operating in South Africa. From a management point of view, the components of the business model can be used as a guideline for business management and improvement.

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LIST OF ACRONYMS

BBBEE:	Broad Based Black Economic Empowerment
DFI:	Development Finance Institutions
DOE:	Department of Energy
EPC:	Engineering Procurement and Construction
GEAR:	The Growth, Employment and Redistribution policy
IPPs:	Independent Power Producers
IRP:	Integrated Resources Plan
NPM:	New Public Management
PPAs:	Power Purchase Agreements
O&M:	Operations and Maintenance
RDP:	Reconstruction and Development Programme
REIPPP:	Renewable Energy Independent Power Producer Programme

CHAPTER 1

NATURE AND SCOPE OF THE STUDY

1.1 INTRODUCTION

Since the beginning of the 1990s private power producers have been allowed to build and operate power plants in numerous developing countries, as a first step towards reforming the power sector (Sen, Nepal & Jamasb, 2016). This was a departure from the traditional model where vertically-integrated state-owned utilities were responsible for the generation, distribution and transmission of power. These private power producers sell electricity to utilities under long-term power purchase agreements (PPAs), and are known as independent power producers (IPPs) (Phakde, 2009). Globally, the purpose of IPPs is to bridge the power deficit gap by generating and selling electricity to the state utility or government. It can sell excess capacity to private distributors (in unbundled markets) or large companies (Chowdhury, 2012).

Electricity sector reforms in developing countries did not follow the same successful path as in developed countries (Eberhard et al., 2015). The authors state that the reason for this is that in developing countries, reforms are impeded by the fact that there are institutional weaknesses in the governance structures, making the establishment and implementation of adequate regulatory systems more complex (Rademeyer, 2016). A Deloitte Touche Tohmatsu report (2016) is of the view of that in the emerging markets, the volatile economic environment has been a major challenge to the commercial and economic viability of IPPs. Such challenges could be triggered by a major change in the host country's economic environment, for example, the devaluation of the local currency, the slowdown or economic collapse of the economy, or a significant contraction in demand for electricity (Sen, Nepal & Jamasb, 2016).

IPPs have been exposed in situations where criticism was laid against them for overcharging the public electricity providers and shifting all the market and business risk to power providers or host governments. This view is supported by Kashi (2015), who states that IPPs tend to overstate their investment costs in developing countries in order to reduce the risk of tariffs that not are not cost-reflective in greenfield electricity projects. During the Asian financial crisis of 1998, IPPs faced several financial difficulties, to the extent that certain projects in countries such as China, Thailand, Malaysia, and India had to either be suspended

or cancelled. In certain cases, governments refused to honour power purchase agreements or forced IPPs to renegotiate contracts (Sen, Nepal & Jamasb, 2016). In Pakistan, IPPs have been accused of not contributing to cleaner energy or the provision of cheap electricity, as is expected from privatisation efforts (Qudrat-Ullah, 2015). In Africa, certain IPP projects in Tanzania and Nigeria (Latham and Watkins, 2016) have seen project cost escalations, whilst some projects experienced escalating investment costs and a reduction in capacity charges, as well as technical delays that led to project delays (Kapika & Eberhard, 2013).

In addition, IPP contracts have been criticised for being less demanding, shielding IPPs from market rules which force competitors to be efficient and competitive. This is due to the fact that PPAs guarantee revenue over the long term, thereby depriving them of an incentive to produce more efficiently (Arizu, Maurer & Tenenbaum, 2004). Ferrey and Moreno (2013) state that if the business environment can improve and demand and supply dynamic change, governments will remain tied into PPAs, for periods of up to 35 years. These PPAs force governments to adhere to off-taker agreements that make them buy the same amount of electricity, irrespective of the change in demand and supply and the introduction of new technologies (Srivastava & Kathuria, 2014). Lastly IPP projects have a potential to expose investors to various risks such as market, credit, construction and market risks. (Chowdhury, Chen & Tiong, 2015).

This international perspective necessitates a focus, through empirical research, on IPPs in developing countries, including South Africa, to investigate whether the shortcomings, business risks and weaknesses can be reduced. This can be achieved through studies that seek to identify strategies to improve the performance of IPPs. This study has a similar purpose in contributing towards the performance of renewable IPPs in South Africa to ensure that they yield value for the shareholders and stakeholders.

Businesses around the world are seeking efforts for strategic renewal and business model innovation is becoming one of the main forces to achieve this renewal. Top management in a broad range of industries is actively seeking guidance on how to innovate in their business models to improve their ability to both create and capture value. However Wells (2013) and Casadesus-Masanell and Ricart (2011), argue that the academic community has offered little insight on business models and little is understood about what constitutes a superior business model, or what a business model really is.

Mason and Mouzas (2012) explain that a business model is an architecture that consists of variables, and should explain the relationship between these variables that impacts on business decision-making processes. A business model must depict the strategic choices that a business needs to make in areas such as customers, value proposition, capabilities, competencies and output. A business model details the value network that considers elements such as information flows, product and service flows, suppliers, and customer information. (Shafer, Smith & Linder, 2004).

Industrial activity can be understood as an economic structure through which materials are transformed into products. These products are then distributed and sold to consumers. Distinct industries tend to establish distinct institutional arrangements both within the boundaries of the firm and beyond whereby value is added or created, and then captured. These institutional arrangements are value adding activities, practices, processes (which may also be seen as business models), and with institutional structures and shared technological foundations, Wells (2013).

Mutaz, Debei and Avison (2010) cite one critique of business models is that there is insufficient knowledge on business model components in particular regarding interdependencies within and between them. Additionally, there is a limited insight on criteria and metrics for an appropriate evaluation of business models, which is mainly caused by the small quantity of (large-scale) empirical studies. The fact that a business model on its own cannot create a sustainable competitive advantage, is another criticism that has been raised against business models.

1.2 BACKGROUND AND RATIONALE FOR THE STUDY

According to Rabobank Special Report (2008), the power interruptions that were experienced in South Africa in 2008 were largely due to the fact that more than 20% of Eskom's generating capacity was not available. This led to gold and platinum mines suspending operations for a number of days. These interruptions also had a negative impact on the economy in sectors such as manufacturing and tourism. The country's GDP fell to the lowest rate in six years, influenced by the global recession, which had just begun (Rabobank Special Report, 2008). These power interruptions were due to the fact that Eskom had not invested in capacity expansion through new generating capacity for the past twenty years (Trollip et al., 2014).

In 2011, South Africa's Department of Energy (DOE) introduced IPPs through competitive bidding. By May 2014, 64 projects were awarded to different companies to build and operate renewable energy power plants to sell power to Eskom. This introduction of IPPs was premised by the DOE Integrated Resources Plan (IRP) 2010 document and the Renewable Energy Policy which prescribed the amount of power to be procured from renewables by 2030 (Eberhard & Kolker, 2014). The first projects had started producing electricity and operating commercially by November 2013 (South African Department of Energy, 2014).

The introduction of IPPs was not an isolated event. It was preceded by the global deregulation of the power markets from the 1990s onwards. Between the 1990s and the 2000s the IPP power market grew in size as new generating capacity was being added at a sporadic pace (Ireland, 2005). Up until the 1980s State-owned utilities were responsible for power generation (Phakde, 2009). In North America, Europe and Australia, government reform policies were a major contributor towards the successful introduction of IPPs in these regions (White, 1996). The main driver for these reforms was the fact that state-owned generators were technically and operationally inefficient in generating electricity, and thus could not cope with the growing demand from consumers. There was a requirement to ensure the price of electricity reflected the cost of its generation, taking into account the demand and supply market fundamentals (Joskow, 2006).

The electricity sector reforms in South Africa occurred against the backdrop of the racial, social and economic transformation of public sector institutions that commenced after the 1994 elections. A number of legislative acts and policies, such as the Reconstruction and Development Programme (RDP) of 1994, The Growth, Employment and Redistribution (GEAR) policy of 1996, and South Africa's commitment to the Millennium Development Goals (MDG) of 1999 were put into place to drive these transformation imperatives. The power sector could not avoid this as Eskom and Telkom were required to drive the socio-economic development goals by rolling out their services to the poor (Ayogu & Hodge, 2009).

The introduction of IPPs ushered in a new era in the power sector of South Africa, in that before that Eskom had been the sole producer of electricity. The IPPs were formed through partnerships of local companies with international companies with experience in the electricity sector. Since this is a new industry with its own set of unique challenges and

experiences, there is a requirement to investigate the types of business risks, challenges and experiences to support the sector, with empirical research that uncovers the pertinent business dynamics in this sector. In addition, as stated above in the introduction, the introduction of IPPs has not been without its challenges and failures, especially in developing countries (Sen, Nepal & Jamasb, 2016).

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An analysis of the business performance of IPPs globally has produced mixed results. Chapter 2 of this study is dedicated to the analysis of IPP performance against indicators such as profit margin analysis, investor returns, liquidity ratios and debt ratios. The results were mixed, with IPPs in developed countries performing, on average, markedly better than their counterparts in developing countries. Economic and political conditions have had an impact on the performance of IPPs in developing countries. Additionally, internal operating conditions such as high expenses and high interest payments impacted on the performance of IPPs. IPPs are highly geared, therefore affecting their ability to service debt and their balance sheet status (Edison Electricity Institute Data; 2014, Frost & Sullivan; 2011).

A number of studies have been undertaken in South Africa around the REIPPP. The reports focus on different aspects of the programme such as the key successes of the programme from the point of view of financiers, government entities, contractors and advisers. For example, The World Wide Fund report of 2014 and Pegels (2009) consider the potential barriers and options for success, while Eberhard (2014) expounds on success factors of IPPs from the institutional point of view of the political environment and market factors, in terms of how they create an enabling environment for IPPs. Another report published by the DOE (2015) focused on the macroeconomic perspective of IPPs, in terms of how they contributed towards foreign direct investment and local economic development. This study focusses on the macro or external environment within which IPPs operate. There is a need for a study that examines the internal micro environment within IPPs in terms of the managerial capabilities and their ability to deliver the expected results for shareholders or owners.

According to Buckhart, Krumeich, and Werth and Loos (2011) a business model is a management concept that can be used to understand, analyse and visualise the current business logic of a company. It is also a useful tool for planning strategic decisions and actions by designing and simulating new business concepts. Gaedicke (2012) argues that business models are increasingly being used to answer essential questions such as potential customers, value proposition, assets and governance structures.

However, a business model concept still suffers from deficiencies that are prone to the development of new theories with varying usefulness and multi-disciplinary applicability. One critique of business models is that there is insufficient knowledge on business model components in particular regarding interdependencies within and between them. Additionally, there is a limited insight on criteria and metrics for an appropriate evaluation of business models, which is mainly caused by the small quantity of (large-scale) empirical studies. Another criticism levelled against business models is that the model on its own cannot create a sustainable competitive advantage. Gaedicke (2012) argues that the fact that a business model is insufficient in theoretical grounding, does not take away the fact that it remains an essential business tool.

Several studies have been conducted around the business model theory and a number of key themes have emerged encompassing various disciplines such as strategy, information technology, marketing and business operations (Teece, 2010). Business model literature has largely been concentrated on definitional and conceptual examinations of the concept have attracted the most consideration in literature. Other research efforts have been directed towards the analysis of the comprehension of business model concepts and to understand establish as common understanding towards this. Perkmann and Spicer (2015) also assert that several findings conclude that a business model is not only an internal business tool, but firm's interaction with its environment (such as regarding value flows, the generation of a value proposition, as well as its place within a network of companies).

Numerous research gaps within the business model literature have been identified by a number of literature review efforts. For example, authors such as Debei and Avison (2010), Baden-Fuller & Mangematin (2015) have identified that there is also a research gap and a need to promote a common language and understanding of the concept, as well as to consolidate the work of different research streams.

This study contributes academic field of business models as a business management tool by investigating and examining the different components of an IPP business model in respect of inputs, business processes and activities that are designed to deliver outputs to the market and value to the business owners. The model developed from this study is an attempt to close some of the gaps that have been identified in the background and introduction of this study by developing a renewable IPP business model. One of the gaps is the insufficient empirical

research to understand the components of business models and the understanding of this concept. This study makes a contribution towards closing these gaps. This model will provide a framework or guideline that will assist in ensuring that IPPs are delivering value to their shareholders through effective and efficient management of resources. This has been achieved through empirical research of the IPPs that are already operating in South Africa as part of the DOE's Renewable Energy Independent Power Producer Programme (REIPPP).

1.3 DEFINITION OF CONCEPTS

This section explains a number of key concepts that are part of this study.

1.3.1 Business model

A business model is a representation of a firm's network that is responsible for marketing and generating value, relationship and capital. A business model is a structure of how a business creates profitable and sustainable revenue streams for one or several segments of customers. A business model is a representation of how a business generates revenue and value for its shareholders. It is also defined as a choice of the appropriate inputs, outputs, business activities and outcomes that a business uses to deliver value (Wells, 2013). There is a need to understand what kinds of business risks, challenges, and drivers are pertinent in the IPP sector.

Numerous generic business models exist, each representing a certain industry or a component of an industry. Chatterjee (2013) breaks down business models into four categories: efficiency-based business models, perceived value-based, network value-based and network efficiency-based, each representing a way of capturing value and delivering outputs to different customers. A utility business model has been the traditional way of delivering power to consumers through a vertically-integrated entity that generates, transmits and distributes electricity to different consumers. This business model is being challenged because consumer demands are changing, government policy is changing and there is an emergence of new technologies (Valocchi, Juliano & Shurr, 2010). The literature review conducted from this study could not identify a business model that represents how an IPP generates revenue and value for its shareholders and integrates all the components of business models as described above. The High Performance Utility Business Model that was developed by Accenture (a consulting firm) is the only model that details how a utility manages its operations and business activities to deliver value to its customers and stakeholders. It describes the necessary competencies that are required to perform certain business activities (Accenture,

2011). This model does not sufficiently capture all the capabilities, resources, and activities necessary to manage a renewable energy IPP. There is a need for a business model in the IPP sector that can capture the elements discussed above within its framework.

1.3.2 Value Proposition

A value proposition is a promise of value to be delivered and acknowledged, and a belief from the customer that value will be delivered and experienced. A value proposition can apply to an entire organization, or parts thereof, or customer accounts, or products or services (Shafer, Smith and Linder, 2004).

1.3.3 Eskom

Eskom is the South African state-owned power utility responsible for the generation, transmission and distribution of power. It also sells electricity to the Southern African Development Community (SADC) region (Eskom Briefing Note, 2016).

1.3.4 Engineering Procurement and Construction (EPC)

An EPC general contractor delivers the complete facility to a developer, who only needs a key to start operating the facility. It is known as a turnkey contract. The engineering and construction contractor is responsible for engineering design of the project as well as the procurement of all the equipment and materials required for the project. The EPC contractor is also required to construct and to deliver a functioning facility or asset to their clients (EPC engineer, 2016).

1.3.5 Independent Power Producer (IPP)

This is a private power producer that sells electricity to utilities under long-term power purchase agreements. IPPs may be private or public companies; municipal and regional governments; cooperatives structures; private individuals or other entities (West Coast Environmental Law, 2009).

1.3.6 Power Purchase Agreement (PPA)

A PPA is a long-term power purchase agreement signed by the power producer to sell power to a specific entity, often a state-owned power utility, which determines the price of electricity and the quantity to be sold. It is between the purchaser, the "off-taker" (often a state-owned electricity utility), and a privately-owned power producer (World Bank Public-Private-Partnership in Infrastructure Resource Center, 2015).

1.3.7 Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)

This is the Department of Energy's programme to introduce IPPs in South Africa through a competitive bidding process, where IPPs are invited to bid to supply power through different technologies at a specific bid price, normally in cents per kilowatt (Department of Energy IPP Renewable Programme, 2016).

1.3.8 Special purpose vehicle

A special purpose vehicle is a legally and financial standalone project company that is used to finance most IPP projects. This is known as off-balance sheet financing, where the project owners and partners are only exposed to the credit risk of the project and not of the assets on the balance sheet (PWC, 2011).

1.3.9 Unbundling

This is a process of separating generation, transmission and distribution activities and having different service providers providing each service separately (Pollit, 2007).

1.3.10 Vertical integration

This is when an electricity utility provides electricity across the value chain of power generation. In other words, it provides generation transmission and distribution activities as a sole entity (Michaels, 2007).

1.4 RESEARCH PROBLEM

International experience has demonstrated that the IPP sector has encountered a number of business challenges and failures over the past several decades. Sen, Nepal and Jamasb (2016) additionally state that a number of IPPs were not successful for a number of reasons which include the fact that they could not fully cover their operational costs, or because the tariffs were not cost reflective, or they were faced with unfavourable debt arrangements. They lacked equity partners, had insufficient revenue streams or lacked business experience or strategic focus.

In addition, the IPP sector is exposed to several business risks, which are also inherent to any business (Chowdhury, Chen & Tiong, 2015). These include construction risks, which may

include the risk of cost over-runs and under-performance by contractors. There are operational risks which may include the risks of operational underperformance and operational cost overruns. There are market and political risks which may include the risk of currency fluctuations, regulatory risks, government provision and legal constraints (DBRS Rating Agency, 2016).

The research problem lies in the fact that **IPPs are not always adequately positioned and prepared to deal with the challenges and business risks emanating from this sector.** As a result, they cannot adequately deliver value and the required rate of return for the shareholders. This has been experienced in South Africa recently where the state owned entity, Eskom, has been refusing to sign PPAs to buy power from 37 IPPs. This has exposed successful bidders to a risk that potential investors might pull out. An analysis of financial performance of IPPs globally in areas such as return of assets, return on investment has demonstrated that a majority of them are performing below the expected benchmarks for similar industries. Other IPPs, such as in the USA, are exposed to commodity price fluctuations and reduced energy demand, thus affecting their profitability. (Edison Electric Institute Data, 2014, Vaglisindi, 2013, Woodhouse, 2005 and Abimbola, 2010).

1.5 STATEMENT OF PURPOSE

To overcome this problem, this study aimed to develop a renewable energy IPP business model for South Africa. The findings of this study provide clarity on the business activities that need to be performed by managers in order to ensure that the IPPs deliver value to the shareholders and stakeholders. As explained in the previous paragraph, a business model is a representation of how a business generates revenue and value for its shareholders. It is a chosen system of inputs, business activities, outputs, and outcomes that a business uses to deliver value (The Technical Task Force of the International Integrated Reporting Council (IIRC) background paper for International Reporting, 2012).

1.6 RESEARCH QUESTIONS

Challenges faced by IPPs in the international context have a potential to manifest themselves in South African businesses in general, and IPPs in particular. The market and business risks that are prone to international IPPs might also reveal themselves in South Africa. Since the sector in new in South Africa, a research gap in terms of empirical studies of IPPs experience is also in existence. Literature review revealed that that a business model is a choice of the

appropriate inputs, outputs, business activities and outcomes that a business uses to deliver value. The literate review also revealed that a research gap exists in terms of the academic definition of business models, as well as the components of a business model. The main research questions of the study are the following:

1 What are the key business and managerial challenges and risks faced by IPPs?
2 To what extent can the experiences of new IPPs operating in South Africa be linked to business and sector trends, and be used develop a business model?
3 What are the customers, channels key activities, key resources, and key partners that impact on IPPs in South Africa?
4 How can the drivers for success that form part of the business environment of IPPs be identified, and what are these drivers?
5 What will a business model for renewable IPPs to improve managerial activities and value creation represent, and how can this be used to improve the success rate of IPPs in South Africa?

1.7 RESEARCH OBJECTIVES

The study thus far indicates that there is a need to create sustainable IPPs in South Africa as renewable energy producers. The main objective of this study therefore was to develop an IPP business model by examining the various inputs, business processes and activities in an IPP plant that are designed to deliver value to their shareholders through effective and efficient management of resources.

The following secondary objectives were formulated to achieve the main aim of this study. These objectives were:

1. To explore the key business and managerial challenges and risks faced by IPPs;
2. To collect and contextualise the experiences of new IPPs operating in South Africa and link these to business and sector trends;
3. To identify key activities, resources, partners, customers and channels that impact on IPPs in South Africa;
4. To ascertain the drivers for success that form part of the business environment of IPPs; and
5. To propose a business model for renewable IPPs to improve managerial activities and value creation to improve their success rate.

That model will contribute towards improvement of managerial activities and value creation to improve their success rate of renewable IPPs in South Africa.

1.8 HYPOTHESIS

Prasad, Rao and Rehani (2001) define a hypothesis as a conjectural statement that assumes the existence of a relationship between two variables. It is a tentative guess used to devise a theory or to plan experiments in experimental studies. It is a suggested statement or explanation that needs to be proved or disapproved. It serves as a guideline of what is to be investigated and should be specified before research is conducted. LeMire (2010) affirms that a hypothesis that opposes a null hypothesis is referred to as an alternative hypothesis. A null hypothesis is a statement that has been put forward and an alternative hypothesis is the opposite of a null hypothesis.

A total of 14 hypotheses were developed to be tested in this study, and these are identified below:

$H1_0$ - The pre-investment phase of planning for an IPP is essential for IPP business success.
H1a - The pre-investment phase of planning for an IPP is not essential for IPP business success.

$H2_0$ - Post-financing activities for an IPP are essential for the success of an IPP.
H2a - Post-financing activities for an IPP are not essential for the success of an IPP.

$H3_0$ - Proper management of an EPC contract is essential for the success of an IPP during project management and the operational phase.
H3a - Proper management of an EPC contract is not essential for the success of an IPP during project management and the operational phase.

$H4_0$ - Grid access management is an essential for successful plant operations.
H4a - Grid access management is not essential for successful plant operations.

$H5_0$ - The management of O&M operations is essential for successful IPP plant performance.
H5a - The management of O&M operations is not essential for successful IPP plant performance.

$H6_0$ - The management of plant operational costs is essential for successful plant business success.
H6a -The management of plant operational costs is not essential for successful plant business success.

$H7_0$ - The management of supply chain operations is essential for successful IPP plant operations.
H7a - The management of supply chain operations is not essential for successful IPP plant operations.

The hypothesis $H8_0$ - The management of human resources is essential for successful IPP plant operations.
H8a - The management of human resources is essential for successful IPP plant operations is not essential for successful IPP plant operations.

$H9_0$ - Management of regulatory/legal affairs is essential for IPP plant successful performance.
H9a - Management of regulatory/legal affairs is not essential for IPP plant successful performance.

$H10_0$ - Management of community affairs is essential for IPP plant success.
H10a - Management of community affairs is not essential for IPP plant success.

$H11_0$ - Unbundling of the power sector is an essential requirement to enable effective and efficient performance of the IPP sector.
H11a - Unbundling of the power sector is not an essential requirement to enable effective and efficient performance of the IPP sector.

$H12_0$ - Opening up the IPP sector for smaller players will make the IPP sector more attractive to SMMEs.
H12a - Opening up the IPP sector for smaller players will not make the IPP sector more attractive to SMMEs.

$H13_0$ - More access to funding for smaller players will encourage diversity in the IPP sector.

H13a - More access to funding for smaller players will not encourage diversity in the IPP sector.

$H14_0$ - Return on investment is an essential value proposition for the IPP business model.
H14a - Return on investment is not an essential value proposition for the IPP business model.

1.9 RESEARCH METHODOLOGY

This study was conducted using a two stage approach. Stimson (2014) states that a two-stage design is used when the size and parameters and the size of the population is not known. A smaller, know sample is used to aggregate the population into specific characteristics such as position/ rank. Once this data is known it is used to conduct a probability sample which can be used for interviews or survey. Giraldo and Zuanna (2005) states the advantage of a two stage sample design us that allows for collecting population-based data where initially the desired sample size is not known. It helps to increase the representation of elements in the population as well as the generalisability of the study. The purpose of utilising a two stage design is to improve the research triangulation, whereby one method compensates for the weaknesses of the other (Pinto, 2010).

The first stage of the study was utilised by the researcher to collect in-depth data on the IPP experience through semi-structured interviews. Interviews were conducted with IPP companies' senior managers, such as managing directors, general managers and CEOs. The research population consisted of 40 companies that were operating at the time the study was conducted, and the sample was randomly selected taking into account the technology type and the size of the plant in megawatts. The sampling frame randomly selected 26 respondents who occupy managerial positions from the 40 companies. These interviews assisted the researcher in understanding the business risks and the challenges of managing an IPP, from project development until the IPP plant becomes operational. The interviews assisted the researcher to understand the key success factors, drivers for success, and the business activities that have to be performed to effectively and efficiently manage an IPP business to meet the goals and objectives of shareholders and stakeholders of the business. The findings from these interviews were utilised to identify key themes that formed part of the business model development in this study.

The second stage of data collection occurred through the development of a questionnaire utilised the key themes that emerged from the qualitative data collected. The questionnaire was designed as a close-ended Likert scale to rank each theme according to its degree of significance. This enabled the researcher to acquire a deeper understanding of how essential each theme was, in order to determine whether or not it should be part of the model. The quantitative analysis of data revealed the relationships between each variable, as well as how the data was influenced by certain variables such as the seniority of the position of the respondent, their level of experience, and their occupation.

1.10 CONTRIBUTIONS OF THE STUDY

This study makes a contribution towards the existing body of knowledge in the field of management, energy studies and academic theory in the subject of business models. The business model that was developed from this study provides an elucidation of the components of a renewable energy IPP business model in South Africa. The study contributes towards closing a research gap in understanding the role of business models as a management tool as well as the components of business models. Literature review revealed that there is insufficient research conducted to understand the key components of business models. This study confirms existing components of business models and provides additional components such as enablers and key partners. Previous models were not detailed enough in that they focussed on value proposition but did not provide details on how to derive the value proposition. Others detailed certain competencies, but were not detailed enough on how these activities could be performed or why they were essential. This study bridged this gap by identifying specific business activities that deliver value to IPP businesses. This model also brings together dimensions from a technical (engineering) perspective and a managerial perspective into a coherent business model, which has not been the focus of existing literature.

1.11 SYNOPSIS OF CHAPTERS

Chapter 1 provides an introduction to this study. It details the purpose of and background to the study, the research problem as well as the research objectives and questions. It provides a brief overview of the research methodology that was used to conduct the study and the hypotheses that will be tested through the use of empirical data.

Chapter 2 focusses on the role of public sector reform dynamics as precursors to the electricity sector reforms. It examines the electricity reform dynamics globally and how these influenced the establishment of IPPs. The chapter provides an overview of the electricity sector reform models and phases. It also expounds on the evolution of the IPP market globally, as well as the dynamics, challenges and issues around this evolution. It describes the IPP business model as well as the business performance parameters and indicators of IPP businesses. Lastly, chapter provides an overview of the South African electricity sector and the introduction of the IPPs in South Africa.

Chapter 3 expounds on business models as a representation of how businesses generate revenue through the utilisation of certain inputs. It looks at electricity generation business models as well as describes the existing types of business models, both generic and utility business models.

Chapter 4 explains how the empirical research was conducted, and the tools that were used to collect data, taking into account that a two stage approach was utilised for this study. It addresses the ethical issues that are pertinent to this study.

Chapter 5 details the results of the primary data collection. These are the results from both the interviews as well as the questionnaire survey.

Chapter 6 presents an explanation of the findings of the study in relation to the objectives and the research questions of the study. It presents the relationship between the findings and the theories and concepts that were presented in the literature review of the study.

Chapter 7 provides the limitations, recommendations and conclusions of this study. The proposed business model is presented as one of the study's recommendations. In addition, the set of recommendations is proposed as a point of departure for further study of the research area.

1.12 SUMMARY

It is evident from this chapter that IPPs were introduced in developing countries as a means to reform the power sector and to introduce efficiencies, and as well as bridging power deficit differentials. Reforms in developing countries were not as successful as in developed

countries for several reasons, including the fact that institutional and governance weaknesses made the implementation of reforms difficult. Additionally, IPPs faced a number of challenges which impeded their economic and financial viability. This lead to IPP projects being cancelled or suspended when certain governments were unable to honour the PPA agreements. In other countries, certain project costs escalated, certain projects' technical performance was sub-par, and there were operational cost escalations experienced as well. IPPs are exposed to political, construction, market, operational and other risks which might hamper their ability to deliver the required returns and value for shareholders.

The purpose of this study was to contribute towards overcoming the challenges IPPs face in developing countries, by identifying business activities and capabilities that need to be performed by managers to reduce exposure to these risks, and in order to ensure that IPPs deliver value to shareholders. This was achieved through the establishment of a business model that depicts the architecture of how IPPs generate revenue and value for shareholders, by demonstrating the system of inputs, business activities and outputs that are necessary to do this.

This first chapter has provided an overview of the background, purpose, and objectives of the study. This chapter provided a brief overview of the research methodology and the tools and instruments that were used to conduct the empirical study. The following chapter is the literature review, focussing on the reforms of the electricity sector.

CHAPTER 2

REFORM INITIATIVES OF THE ELECTRICITY SECTOR AND THE EVOLUTION OF IPPs

2.1 INTRODUCTION

This chapter explains the electricity sector reforms that took place in various regions of the world over the past four decades. It highlights certain drivers, challenges and constraints of electricity sector reforms. It provides an overview of the evolution of IPPs globally. Lastly, it looks the global as well as the South African context of public sector reforms in general and electricity reforms, taking into account the emergence of IPPs. The objective of the study is to provide the context, ideological motive and academic conception of electricity sector reforms, which are the precursor to the introduction of IPPs.

The first electricity sector reforms in recent history were initiated and implemented during the 1980s in countries such as Chile, the UK, and Argentina (Holburn & Spiller, 2002). These reforms spread to several countries in the European Union and Eastern Europe (Byrne & Mun, 2003). Pollit (2004) explains that the reforms that started in Chile subsequently spread throughout the world. The drive for these reforms came from the fact that state-owned electricity generators were becoming inefficient in generating electricity, and they could not cope with the electricity demand imposed on them (Dubash, 2002). There were challenges with respect to the technical and operational efficiencies of these institutions, culminating in questions being asked as to whether these institutions were poised to address the demands of the 21st century. There was a need to create institutions that would provide long-term benefits to society and to ensure that the cost of providing those benefits was appropriately reflected in the price that consumers pay for electricity, and as such, the price should attract private investors (Joskow, 2006).

Evidence has revealed that not all sector reforms were successful in realising the benefits for which they were implemented. For example, according to Dagdeviren (2009), the expected investment from private electricity players in certain countries did not materialise. In addition, the liberalisation efforts did not lead to the expected competitive dynamics, as both generation and supply markets in Europe are still linked to a few market players. This view is supported by Joskow (2006), who reveals that except in the UK, Nordic countries, Chile, Texas and Australia, electricity sector reforms in most countries are either incomplete, moving slowly or

moving backwards. Alleyne (2013) holds that certain countries have seen reforms leading to the introduction of private electricity generators in the form of Independent Electricity Producers IPPs, without the benefits of a fully liberalised electricity market, as envisaged in the reform process.

In addition to the factors mentioned above, Ireland (2005) and Ma and Zhao (2013) hold that IPPs came into existence out of the realisation that to sufficiently address the electricity sector challenges, independent electricity that can compete with long established state utilities to drive efficiency into the sector needs to be part of the broader electricity sector reforms. Taking all of these elements into consideration, it becomes essential to elucidate on the dynamics that informed the establishment of IPPs from a global perspective and from a conjectural perspective.

2.2 PUBLIC SECTOR REFORMS AND THE DRIVE FOR PRIVATISATION OF ASSETS

Kuye (2006:291) defines reform as "change in the direction of greater social, economic or political equality, broadening of participation in society and policy." The author further defines public sector reforms as the "devolution of responsibilities away from the centralised bureaucracy." Public sector reforms should be measured on the effects they have on the social, economic and political landscapes.

The UN Energy report (2010), "Sustainable Energy Regulation and Policy Making for Africa," suggests that reform has a wider meaning. Most literature on public sector reforms equates reform with deregulation and the reduction of government participation in the electricity subsector. This definition, which is supported by Berger and Danninger (2005), is most prevalent from the multilateral development finance institutions (DFIs)' view on structural reforms necessary for creating a sustainable development environment.

Several reasons are put forward as to why public sector institutions should be restructured, and Ayogu and Hodge (2001) and Ayee (2005) affirm that all over the world there are different reasons for restructuring the public sector, amongst which is the desire to acquire technology and managerial expertise, and the desire to improve service delivery. Cook and Uchida (2003) as well as Filipovic (2005) assert that the fundamental motive for privatisation is the efficiency improvement associated with the private sector. Filipovic (2005) asserts that there is a positive correlation between the improved economic performance of a country after

privatisation and the liberalisation of the economy. Cook and Uchida (2003) affirm this view, citing several studies that have been conducted since the mid-80s which show a positive relationship between privatisation and economic growth. Rahbar et al. (2012) have a different opinion, in that privatisation has not had a similar impact in a number of developing countries. For instance, the authors' findings show that in Latin America, the Caribbean region and sub-Saharan Africa, privatisation has had little positive impact on economic growth, as opposed to the Asia and Pacific areas, Western Europe and South Asia, where privatisation has shown a positive impact on economic growth.

According to Omofeya (2008) and Ayee (2005), public sector reforms have been a prominent feature on the agenda of numerous African countries. The United Nations Economic Commission for Africa (ECA) (2011) affirms that countries such as Ghana, Kenya, Nigeria and South Africa have been instrumental in proving best practice in the field of public sector reforms in Africa. These reforms, according to Engida and Bardill (2012), meant privatisation and commercialisation of public enterprises, fighting corruption, and downsizing of the public service personnel. This view of reforms is supported by the ECA report (2010) which affirms that the mandate for the World Bank's New Public Management (NPM) was informed by these prerogatives. The premise is that to achieve efficiency, effectiveness and responsiveness of government, it is essential to embark on a public sector reform programme. Guma (2013) and Curristine et al. (2007) agree that the traditional profile of numerous governments worldwide has been characterised by substantial bureaucratic machinery which operates inefficiently, is unresponsive and is associated with high costs. One of the major drivers for public-sector reform has been the need to introduce effective and efficient systems of government (Lufunyo, 2013).

The prominent international donor agencies such as the World Bank, United Nations Development Programme (UNDP), and Organisation for Economic Corporation and Development (OECD), and the developed nations, were instrumental in driving this need for public sector reforms (Scott, 2011). This was further demonstrated by the World Bank, which established a 12-member Public Sector Board in 1997. The purpose of the Board was to assist donor and loan recipients' governments to improve the efficiency and effectiveness of their public sector institutions. This board is still active today, and has been instrumental in developing lessons learnt from public sector reforms into lending and risk management strategies to be utilised in the World Bank's client countries (World Bank's Public Sector and Governance Board, 2012)

In addition, Edigheji (2008) affirms that developmentalism is one of the major justifications of public sector reforms in Africa. Developmentalism is an economic development principle based on certain interventions by state actors. In Africa, the main driver of public sector reforms has been the assumption that these reforms will make the states more effective, efficient, responsive, accountable and productive, which are the necessary features for the development of the African continent. Maphunye (2009) and Olufemi and Adejuwon (2010) are of a different view, in that they state that the drive for public sector reforms was compelled by changes that began to be experienced in Western countries in the 1970s after the oil crisis started to affect Africa as well as developing countries in Latin America and Asia. Structural adjustment programmes were implemented as a means to improve state efficiency by reducing state intervention in the economy (Heidhues & Obare, 2011).

The 1970s and 1990s reforms in Africa were driven by a developmental paradigm which viewed economic development narrowly in terms of economic growth, and public sector reforms implemented during this period were focused on efficiency and effectiveness that was judged on their contribution towards this growth, as espoused by Edigheji (2008). This paradigm focussed on short-term macro-economic stabilisation, disregarding long-term growth and stabilisation. This paradigm was referred to as the re-colonisation of Africa. This era was replaced by a new period which was referred to as the New Public Management (NPM). According to Olufemi and Adejuwon (2010) and Overman (2013), the era between late 1970 and the 1990s is defined by the practice where the public sector is shaped and driven by private sector ethos, and is run along corporate lines. Components of NPM include management decentralisation within the public service, downsizing and rightsizing, outsourcing of government service, commodification, public private partnerships and the establishment of autonomous services (Groening, 2001).

Omofeya (2008), supported by Martins (1997), states that the main objectives of public sector reforms are the following:

- To improve the provision of public services.
- To create a climate that encourages the investment by the public sector.
- To create a market friendly and lean state or government institutional system that is also decentralised, and customer-friendly, with the consequence that the objectives of good governance will be better realised.

There are numerous reasons why the reforms of public sector institutions were not successful (Omofeya, 2008). These can be categorised under the partisan theory, which suggests that political leaders establish institutions to entrench their political survival, by protecting the interest of particular groups that support their constituency and provide them with a governing mandate. Chitto, Ramphul and Nowbutsing (2009) additionally state that struggles for equal distribution of resources and economic reforms are driven by the need to satisfy these interests groups and constituencies.

According to Birdsall and Nellis (2003) the benefits of privatisation are not always immediately visible. For example, potential investors request time-bound exclusivity clauses when taking over privatised institutions. These clauses are designed to protect the investor in the local market whilst it is still trying to establish itself. These clauses have the consequence that they delay the benefits of competition, according to Ayogu and Hodge (2001). Nellis (2006) confirms this viewpoint that privatisation raises the price of goods and services, but argues that the reason for these increases is largely because private firms need to modernise and expand to meet demand, and have to operate with little or no subsidies. Privatisation in countries such as Argentina, Bolivia, Mexico and Nicaragua has contributed marginally to the general rise of unemployment, where increased access to services was concentrated in certain income groups, and privatisation had a small effect on income inequality as well (Nellis, 2005). There are other concerns about privatisation, such as the failure to address social equity, the effect on the poor, and eminent political electricity struggles (Nellis, 2005). The Report by the California Debt and Investment Advisory Commission (2007) cites a number of risks related to privatisation, one of which is the fact that after the sale of assets, the public loses control over the assets of enterprise. As a result, the public agency is no longer in control over the fee or rate structure or process of the entity. There is also a possibility of job losses from restructuring after privatisation.

Omofeya (2008) and Olufemi and David (2010) question the intention of donor agencies in requiring public sector reforms from African countries. The authors state that the main reason these reforms were required by these agencies was that through privatisation and commercialisation of state agencies and state enterprises, the governments will be in a better position to repay the debt owed to these institutions. In addition, privatisation will assist core investors from Western countries to benefit most from these privatisation efforts, according to Hedger and Renzio (2010).

The previous section provided an overview of public sector reform as well as the drive to restructure and privatise assets as part of the reforms. Since the electricity sector reforms were informed by general public sector reforms, the following section will examine specifically the electricity market reforms and their objectives.

2.3 ELECTRICITY MARKET REFORMS OBJECTIVES

The International Energy Agency, Energy Market Reforms (2001) refers to reforms as all the activities and interventions that are designed to liberalise certain electricity activities, such as generation, the regulation of non-liberalised activities such as transmission, as well as making decisions about which agents are allowed to participate in the different markets. Reforms consist of opening up the market to competition and the separation of generation, distribution and transmission activities. It also entails the provision of access to the network through regulations and the opening up of electricity market for retail competition. Chao, Oren and Wilson (2006) are in agreement with this electricity sector reform conceptualisation, but further add that reforms entail the restructuring of the electricity markets through the separation of generation, transmission and distribution into separate, privately-owned entities. It entails the creation and liberalisation of wholesale and retail markets as well as the restructuring of regulatory policies to recognise the effects of investment, purchasing and contracting decisions by utilities in the context of liberalised markets, and to strengthen incentives for efficient operations.

Saylor, Agilomu and Pichard (2011) state that numerous governments around the world that have embarked on reforms have identified several objectives that were part of electricity market reform programmes. These objectives are explained below, because they form the core of electricity sector reforms and what they are meant to achieve.

2.3.1 Access to electricity

An International Energy Agency (IEA) Report on World Energy Outlook (2012) defines energy access as a housing unit ability to reach an electricity supply connection and access to reliable and affordable clean cooking facilities. It also includes a minimum level of consumption of 250 kilowatt hours (kWh) per year for rural households and 500 kWh for urban communities. The United Nations Decade of Sustainable Energy for All Secretary General (2013) report acknowledges that there is no universal definition of access to electricity, but affirms that access to electricity is defined as a household ability to access an

electricity connection at home. It also means that the household can use electricity for lighting. Other sources equate access with the availability of energy for cooking utilising non-solid fuels as a primary source.

Brew-Hammond (2010) found that energy access is one of the essential inputs of socio-economic development, and there is a strong link between energy access and the millennium development goals. Access to energy, and specifically electricity, is one of the key requirements for poverty eradication, especially in Sub-Saharan Africa where energy access is very low (Karekezi & Kimani, 2002).

The Energy Sector Management Assistance Program (ESMAP) report (2005) affirms that access to electricity is one of the measurements of the success of electricity sector reforms. The assumption is that by improving financial soundness and efficiency of electricity utilities, reforms can attract new investors to make available government resources to be used in expanding access to electricity. History has shown that introducing market-driven private sector participation, rather than just relying on government resources, has a potential to encourage utilities to focus on providing electricity to lucrative markets and that have low connection costs, as opposed to extending services to poor communities (Powell & Starks, 2000). These communities are more likely to be further from the grid, making connecting them to the grid costly. Davidson (2012) cites several reasons that restrict electricity access to poor people, especially in developing countries. Exploiting fossil and renewable energy resources, which are abundant in developing countries, is still a daunting task because of the major technological, institutional and financial obstacles. In addition, inadequate financial investments, an underdeveloped downstream energy sector and poor management are contributing to the challenges towards providing electricity to the poor.

2.3.2 Low cost electricity and better prices

The ESMAP report (2005) affirms that electricity sector reforms are expected to result in improved utility performance and lower costs. Current reforms in the UK, according to Keay (2013), and Mexico (Bower & Fuentes, 2014) are designed specifically for the purpose of achieving competition in the electricity sector and achieving lower tariffs. Experience in a number of countries that have embarked on reforms (for example, the US and Spain) shows that reforms have led to price increases of electricity to make a utility financially sound, to attract private sector investments by making tariffs cost-reflective and commercially profitable. In addition, the intention of tariff adjustment is to ensure that tariffs account for

inflation and market risks, as well reducing across-the-boundary subsidies which distort the market pricing mechanism. For example, Lave, Blumsack and Apt (2005) state that early reforms in the US in the 1980s initially led to an increase in the price of electricity, which was a contradictory outcome compared to what was expected from the reforms. In China, electricity retail prices were allowed to increase in accordance with the need to reflect capital and input cost of fuel. The pricing applied did not reflect cost reflectivity, despite the fact that large scale reforms have been implemented (Zhang & Qin, 2015).

The ESMAP report (2005) further affirms that price increases lead to social hardship for the poor and numerous countries have experienced political opposition to reforms which were meant to make utilities financially sound. As a result, numerous countries such as Ghana, Mali, Tanzania and Uganda have adopted strategies to provide relief to their public. These measures include government subsidies to IPPs or the utility (Karekezi & Kimani, 2002). These subsidies have not always benefitted the poor, because for the poor to benefit from subsidies, they need to have access to electricity first, which is not always the case.

2.3.3 Governance and regulation

Mishra and Das (2010) state that effective public governance institutions are assumed to be a natural consequence of effective policy actions that support continued investment and increased production. The attainment of high quality public governance institutions is a prerequisite for sustaining this increased production and the improved living standards of advanced countries. Fakir (2007) affirms that this institutional governance framework is applicable to sustaining growth in the output, efficiency and capacity of the public sector utilities sector in sectors such as water, electricity and telecommunications. A significant component of these reforms has been the introduction of a regulatory institution to bring about efficiency and sustained growth in capacity of utilities to serve the public.

Mishra and Das (2010) show that in the electricity sector, regulation is essential for both investor confidence and consumer protection. The primary purpose of regulation is to protect consumers from abuse by a monopoly and to provide investors with unilateral political decisions and provide incentives for efficient operation and investment (Harker & Price, 2006). An effectively-designed regulatory institution and frameworks are an essential element of successful electricity privatisation. According to the UN Energy report (2010), “Sustainable Energy Regulation and Policy Making for Africa,” the primary purpose of the regulation of infrastructural sectors such as the energy sector is to ensure proper competition

and to prevent the growth of the dominant group or single utility dominating the sector. The ultimate purpose of these efforts is to keep the prices down.

Thopil and Pouris (2013) support the view that governments establish independent groups of experts, called regulators, in order to address the concerns about electricity supply and to regulate the prices charged by utilities. The regulator has a twofold function: firstly, it has to level the playing fields by counteracting the monopoly of the electricity utility by addressing market failures. Secondly, the role of the regulator is to attract investment into the electricity sector by creating an investor friendly environment that can attract reasonable and competitive capital. A healthy and functioning utility can ensure that the investors are confident about the functioning of the system (Zinaman, Miler & Bazilian, 2014).

According to Thopil and Pouris (2013), regulators face their own challenges. They are faced with having to make decisions in an environment which does not have sufficient, transparent and objective information to make decisions. It is also confronted with differing interests of stakeholders and ambiguity. In addition, there is usually a lack of relevant skills, expertise and research capacity, especially in developing countries (Hafeez, 2003). This has led to regulators using different approaches to arrive at an appropriate price of electricity, yielding an unbalanced outcome between the interests of different parties (Kirkpatrick, 2001). Kennedy (2003) affirms that this is a result of the fact that regulator independence is limited by the fact that there is direct political input into the regulatory decision-making in certain countries. In addition, in certain instances regulators may be nominally independent but subject to government and political influence because they may, for example, be dependent on central government funding. These dynamics have led to a situation where regulatory rules such as tariff mechanisms are loosely specified, thus providing scope for political influence in tariff-setting (Scott & Seth, 2013).

2.3.4 Quality and reliability of supply

The ESMAP report (2005) affirms that improving the quality and reliability of the electricity supply was one of the major drivers of electricity sector reforms in Africa and the rest of the world, because governments envisaged that reliable service could improve efficiency, stimulate growth and reduce costs for small businesses that rely on electricity. The introduction of independent regulators and private-sector participation has a potential to greatly improve quality and efficiency by establishing enforceable quality standards and to monitor and enforce those standards. This view is supported by Adoghe, Odingwe and

Igbinovia (2009) who reveal that amongst the numerous drivers for reforms in the electricity sector were the high technical losses, poor maintenance and low equipment reliability which were experienced, which were all affecting the quality and reliability of supply.

2.3.5 Security of supply

The ESMAP report (2005) affirms that internationally the security of supply has become an essential factor, following the electricity interruptions that occurred in North America and Europe in the 2000s. Regular electricity interruptions are experienced in South East Asian countries such as South Korea as well as Kenya, India, Tanzania, Venezuela and South Africa (Byrd & Matthewman, 2014). This has led to numerous countries that previously had a traditional approach of leaving electricity generation to a state utility, to start introducing a transparent and inclusive approach that encourages independent investors to take part in the electricity market traditionally dominated by state-owned entities (Wilson & Adams, 2006). Trollip et al. (2014) define energy security as control over energy systems as well as any institutional arrangements preventing disruptive actions. According to Wilson and Adams (2006), factors such as the installed capacity, unit size demand forecasting error, plant reliability, and the shape of the load curve determine the adequacy of generation. The reserve margin is a criterion that provides a measurement of system availability.

2.3.6 Promoting regional and sub-regional cooperation

Mkwanazi (2003) affirms that regional economic trade can be extended to electricity trade that ensures that all participating countries and utilities benefit. The Southern African Electricity Pool (SAEP) is a good example of how economic benefits can be reaped from regional electricity cooperation and collaboration. Maupin (2009) affirms that the benefits of regional electricity trade are that they help to reduce variable demand and supply issues and stimulate capacity investments. Electricity sector reforms should include increasing bilateral and multilateral cross-border trading of energy resources such as electricity, gas and coal. The USAID Electricity Africa Report (2014) affirms that to reform the energy sector in Africa a new business model which entails the strengthening of regional electricity pools needs to be developed. This might mean that regional parties should make commitments to build new infrastructure for cross-border transmission of electricity and the development of regional energy markets to synchronise the use of energy across regions.

2.3.7 Improve financial health of the industry and encourage investment capital

Another reason for introducing electricity sector reforms is to reduce the reliance on public funds by introducing private participation. The reforms have led to governments reviewing the tariffs of electricity utilities and subsidies to become more transparent and more targeted towards poor customers (ESMAP, 2005). Nepal and Jamasb (2013) hold that international experience provides a number of demonstrations of the fact that for reforms to be successful there may be a need to raise the tariffs, reduce subsidies and establish an effective regulatory body.

The need for reforms to assist in addressing the socio-economic challenges of local communities. Therefore the proposed business model is required to consist of elements directed towards addressing this responsibility. A hypothesis was proposed to test the model in terms of this requirement;

$H15_0$ - IPPs have a socio-economic responsibility towards local communities.
H15a - IPPs do not have a socio-economic responsibility towards local communities.

The previous section examined the objectives for electricity sector reforms; the following section will expound on the drivers and impediments to electricity sector market reforms.

2.4 DRIVERS AND IMPEDIMENTS TO ELECTRICITY MARKET REFORMS

Williams and Ghanadan (2006) have found that by the 1980s, the performance of utilities had changed substantially, with certain utilities performing financially well and others struggling to cover operational costs, forcing them to rely on state budgets to fund their operational expenses and expansion efforts. Due to undercapitalisation, the utilities suffered from supply shortages, deteriorating equipment, and high systems losses (electricity losses), with the worst-performing ones unable to expand electricity access, and offering poor service to consumers (Glaeser & Goldin, 2006).

Gabriele (2004) explains that in developing countries, reforms have been driven by poor technical performance in electricity generation as well. Plant availability in developing countries is low, with an average of 50%, as compared to 80-85% in the United States, for example. Transmission losses are high, with an average of 30%, as compared to 7-8 % in the United States, and blackouts are more common in developing countries in the past ten years (Pollit, 2007).

Table 2.1 below provides a summary the key factors for electricity market reforms in developing countries. They are analysed from the pull and push factors. The push factors largely include economic conditions that are not favourable to the market, and the pull factors capture factors that are making the market attractive for investors.

Table 2.1. : Drivers for electricity sector reforms

Pull Factors	Push Factors
Macroeconomic events: The 1970s oil crisis, Post-Soviet economy-wide market based transition (1989), Asian Financial crisis (1997-1998), economy-wide liberalisation and reform programs as initiated by the fiscal **crisis.**	**Capital raising options:** Privatisation of state assets, greenfield private investment.
Limited national fiscal ability: High public debt, utility borrowings as a major proportion of national debt.	**Lending for institutional reforms:** Macroeconomic stabilisation lending conditional upon electricity sector restructuring, asset privatisation (IMF), liberalisation and reforms for the new electricity sector loans (World Bank in 1993).
OECD deregulation: New energy multinationals created as a result of OECD energy sector deregulation provided investment opportunities for Europe and USA.	**Spill-over effects from international experiences:** Learning and pioneering reforms of electricity sectors in Chile, England, Wales and Norway in the 1980s and early 1990s.
Investment constraints of the electricity sector: No ability to self-finance, system upgrading and modernisation required high projected energy demand.	**EU accession:** Opportunities to benefit from regional integration by reforming the electricity sector in accordance with EU directives.

Source: Nepal and Jamasb (2013:11)

Nepal and Jamasb (2013) posit that electricity sector reforms were driven by energy deficit, the state's incapability to raise acceptable capital, and inadequate access to electricity by the public. It was about the need to transform state subsidies to improve resource allocation through the sale of state assets. This will assist in raising revenue for the state. Grubišić (2009) additionally proposed that governments were under pressure to improve the quality of public services and contain costs whilst enhancing public accountability. Disposing of certain assets was part of the effort to improve the effectiveness and efficiency of public sector institutions.

In the developed countries, reforms were characterised by productivity inefficiencies and excess capacity which was a result of the use of expensive generation technologies, according to Nepal and Jamasb (2013). Cross-subsidies from industrial customers to residential customers contributed to this need as well. Raschen (2015) agrees that reforms are intended to

increase efficiency through better investment decisions, better utilisation of existing plant, better management, and better choices for customers.

Erdogdu (2011) affirms that the World Bank changed its lending policy in 1992 for electricity development from a traditional lending to policy-driven policy. This meant that countries borrowing from it had to reform their electricity sector by moving away from single national utilities, which had a monopoly, and adopt ownership, structural and regulatory reforms. Other financial institutions such as the Asian Development Bank, The European Bank of Reconstruction and Development, and the Inter-American Bank imposed similar restrictions (Nakhooda & Ballesteros, 2009), with the consequence that today the liberalisation of electricity, including its infrastructure, have become preconditions for their financial support programmes. This view is supported by Gratwick and Eberhard (2008), who state that from the 1990s the World Bank adopted lending practices in the electricity sector that required that certain reforms had to be implemented in the electricity sector. These reforms required, inter alia, the implementation of transparent regulatory processes, the commercialisation and corporatisation of state institutions, as well as an importation of services to address scarce skills to manage reforms. These practices were later adopted by other DFIs such as the Asian Development Bank and the Inter-American Development Bank (Nakhooda & Ballesteros, 2009).

The reforms taking place in developing countries are different from those in developed countries as a result of a number of reasons, as perceived by Nagayama (2009). This view is expounded by Muzenda (2007) who affirms that there is a need for an increased investment in generation infrastructure in developing countries as opposed to developed countries. This is due to a rapid increase in the demand for electricity in developing countries, driven by economic development and growth. Another reason is that the incentives might be used to make rural electrification attractive for distribution companies, without which they will be reluctant to invest in rural electrification (Barnes & Halpern, 2000). Lastly, there is a need to eliminate subsidies that artificially keep electricity prices low in order to make electricity affordable for poor communities (Barnes, 2007). The author affirms that these subsidies are at the heart of the problem of poor financial performance for state utilities, because they hamper the ability of these institutions to meet increasing demand, as well as attract private sector investment in this sector.

Parker, Zhang and Kirkpatrick (2006) pronounce that the electricity sector reforms in developing countries did not follow the same successful path as in developed countries. The authors state that the reason for this is that in developing countries, reforms are made difficult by the fact that there are institutional weaknesses in the governance structures, making the establishment and implementation of adequate regulator systems more difficult (Singh, 2007).

Besant-Jones (2006) supports this view by stating that the forces that drove market reforms in developing countries are different from those in developed countries. These forces were largely driven by economic crises in a country or region that forced them to review their economic models. The author lists the drivers of economic reform in developing countries as the following:

- The poor state of performance of state-run electricity utilities resulted in high costs, the inability to increase the rate of electrification, and the provision of unreliable service.
- The inability to fund capital expenditure and new investment and maintenance of infrastructure. This was coupled with endemic corruption, theft of electricity and political interference.
- There was a need to reduce fiscal pressure from the state so as to be able to redirect financial resources to other sectors of the economy, as experienced in Argentina and Brazil.
- There was a drive to increase the state's revenue by selling off electricity sector assets.
- Eastern European countries were under pressure to comply with the European Directives of 1996 as part of the preparations to be accepted into the EU.

In the European Union (EU), motives for reform were driven by the European Commission initiative through two directives in 1996 and 2003, according to Nepal and Jamasb (2013) (IEA, 2014). These directives laid down the foundations through the establishing of common rules towards the creation of an internal market for electricity. The 2003 directive set several directives, which included the creation of an independent regulator, legal unbundling of the network segments (distribution and transmission) from generation, and establishing non-discriminatory access of all parties to the network.

According to Borenstein and Bushnell (2011) and Barnes (2005), several factors make electricity reforms difficult and different in developing markets from the developed markets. This is because renewables are driving reforms in developing markets, as opposed to

developed markets. Secondly, electricity storage is difficult to achieve, with battery storage and pump storage proving too inefficient. Thirdly, this is complicated by the fact that supply and demand need to be matched "second by second," which implies that if consumers do not get the expected electricity, the grid's stability might be endangered. Demand is virtually inelastic in the short run because consumers cannot immediately respond to price fluctuations caused by supply constraints. Demand-side pressures are in the short run supply elastic which makes the electricity market weak.

This short term elasticity of price and the nature of electricity demand is well articulated by Doucet (2004), who affirms that systems reliability and efficiency is hard to achieve. This is because price rises cannot be matched at each demand point, because electricity is not stored but consumed immediately, therefore creating short-term price insensitivity for consumers. Such dynamics impact on how far competitive demand and supply practices (and price/tariff dynamics) can be implemented in the electricity sector (Adoghe, Igbinovia & Odingwe, 2009). Chao, Oren and Wilson (2006) have the view that the demand-side mechanisms, such as smart meters, go a long way towards alleviating this problem.

The previous section was dedicated to the drivers and impediments to electricity market reforms. The following section will focus on the benefits and shortcoming of the reforms.

2.5 BENEFITS OF REFORMS

According to Mfundisi (2011) and Sarker and Alam (2010), over the years, the development of a viable and efficient electricity sector has been seen as instrumental in promoting strong economic growth in a country. The Marketline Report (2015), titled "Utilities in South Africa," affirms that the electricity sector contributed $26 billion in revenue to the utilities sector, a significant contribution.

According to Rassenti, Smith and Wilson (2007) and Forster, Mouly and Sankaran (2006), electricity deregulation and privatisation are synonymous with liberalisation, which is in effect a massive shift of control and ownership of electricity from public to private hands, to achieve economic efficiency within the confines of private profit. Such liberalisation almost always came with immediate repercussions, such as a reduction in staff, as well as a drastic increase in the price of electricity to reflect the cost of electricity generation (Beder, 2005).

The electricity sector privatisation experience has brought about a number of benefits in the sector, as evidenced by Bacon and Bessant-Jones (2001). These benefits are reflected in the increased transparency of costs, the transfer prices and corporate structures, better control of different elements of the electricity value chain, as well as the ease of introducing competitive pressures on the supply chain (Domah & Pollit, 2000). These reforms have made it easier for suppliers and new entrants to exploit market opportunities, as well as easy entrance for non-traditional service providers.

Vagliasindi and Bessant Jones (2013) support the assertion that public sector reforms and privatisation have brought substantial benefits to the electricity sector. These include improved access to electricity for the population, an improved quality of electricity services, improved operational efficiency of electricity producers and improved financial efficiency.

The IPP procurement process had a profound impact on the cost of electricity (Sample, 2013). IPPs that were selected using competitive bidding demonstrated that the capital and operational costs are lower where a competitive bidding process is followed, as opposed to negotiated contracts (Sarraf et al., 2010). In countries such as Thailand and Bangladesh, projects that were selected through competitive bidding came out with a capital cost per unit of electricity produced that is closer to similar electricity projects in the developed world (Phakde, 2009)

Weisser (2003) asserts that electricity sector reform is supposed to improve economic performance on electricity production through a number of measures which include a more efficient resource allocation and utilisation through reflective electricity prices that reflect a marginal cost of production to ensure the full recovery of initial investment and future capacity expansion. Competition and private participation to encourage the “profit motive” that provides companies with a strong incentive to lower the cost of inputs necessary to produce a given output is also another measure. This enables the cost savings to be passed on to the consumer. State enterprises on the other hand are not driven by this profit motive, and as a result cost containment is not a major driver. Reforms are also supposed to assist in improving transparency and predictability of decision-making to attract long-term financing. Lastly, reforms can assist in relieving fiscal pressures, enabling funding to be available for social programmes.

According to Borenstein and Bushnell (2011), electricity reforms in the US have demonstrated that potential gains can be realised in the industry's operations, investment and consumption decisions. IPPs have been able to keep costs low and generate electricity more efficiently within a portfolio of assets at their disposal (Gratwick et al., 2006). For example, labour costs contribute only 12% of the total budget for generating and supplying electricity. Reforms have improved investment and the consumption decisions of utilities, becoming more prudent, impacting positively on capital expenditure and risk management (Woolf & Halpern, 2001). Lastly, consumers benefit from reforms due to flexible pricing that reflects the interaction between supply and demand. Traditionally customers have paid a flat rate for electricity consumed, without being exposed to the fluctuation cost of generation, and cannot respond when there is scarcity of electricity by reducing their consumption patterns. The introduction of reforms has enabled utilities to provide real-time reflection of demand, supply and price, an essential feature of a competitive market (Amra, 2013).

Nepal and Jamasb (2013) show that even though massive amounts of financial resources and effort has been put into electricity sector reforms, there has not been a clear agreement on the economic benefits of reforms, except for improvements in technical and operational efficiency in different sectors. Reforms have largely improved operational and productive efficiencies in numerous reforming countries, even though efficiencies deteriorated in the early phase of the reform process. Additionally, Bryne (2003) states that experiences with electricity reforms around the world have shown that reforms can lead to price hikes, unreliable service, employment loss and reduced access.

The Energy Sector Management Assistance Programme (ESMAP) report (2005) affirms that in the last two decades electricity market reforms in both developed and developing countries have required substantial capital investments. Justifications around these reforms have been that they will lead to the realisation of improvements in electricity sector efficiency (Bryne). The degree of success of these improvements has always been questioned by a number of non-reformists (Millan, 2006). One of the principal aims of public sector reforms is efficiency improvements that are supposed to be gained from these reforms. Shepherd (2003) affirms that the World Bank acknowledges that civil service reform achievements have been limited. For example, the targets in reducing the public sector wage bill and the reduction in unemployment in donor countries have had limited success. This is exacerbated by the fact that performance-related reforms are more difficult to measure and monitor; thus the degree

of accuracy of measurement of these improvements and the impact of other variables (such as economic and social indicators) other than reforms, has not been fully analysed.

This section provided an overview of the benefits and shortcomings of electricity sector reforms. The following section will expound on the requirements and lessons learnt from reforms.

2.6 REQUIREMENTS AND LESSONS LEARNT FROM REFORMS AND PRIVATISATION OF THE ELECTRICITY INDUSTRY

This section expounds on the requirements for reforms and privatisation as well as the lessons learnt from these reforms.

2.6.1 Requirements for electricity market reforms

According to Weisser (2004), before commencing with a reform programme certain conditions have to be met. The first one is that reforms have to be perceived as desirable, and the second one is that they should be politically feasible. Political feasibility depends on two factors: the government conviction that legal and institutional reform changes are going to be successful, and the buy-in from different stakeholders such as employees, bureaucrats, and politicians, who might wield political authority and influence (The World Bank PREM Notes, 2004).

Fundanga and Mwaba (1997) state that reforms include a number of phases, one of which is privatisation. This view is supported by Weisser (2003), that privatisation is one of the phases of public sector reforms. Doucet (2004) prescribes key institutional requirements that are necessary to ensure successful privatisation programmes. These include the following:

- The establishment of political and economic stability to provide predictability in making business decisions and reduce the level of risk.
- A functioning legal framework must be in place. It must include a process to provide security of property and persons, the provision enforceability of contracts, as well as reliable dispute resolution structures.
- There should be a sound economic and financial framework in place. This should include freedom to expatriate financial disbursements and other investment earnings.
- The establishment and implementation of tax and subsidy policies, reasonable pricing structure, and a regulatory regime that is independent of political process.

- Essential business ethics should be implemented to eliminate corrupt business practices.
- Capacity to supply technical skills, goods and services should be established as well.

The discussion above identified a need for technical skills to be able to deal with the requirements for electricity sector reforms. A hypothesis H7a - The management of human resources is essential for successful plant business success, and the null hypothesis H7a -The management human resources is not essential for successful plant business success, were proposed to be tested through empirical research.

Eberhard and Gratwick (2008) make an allusion to the fact that the success of IPPs depends on the existence of a number of business and economic enablers in the country within which they operate. These include the existence of a favourable investment climate, reforming the electricity sector to allow for fair competition, favourable equity arrangements and debt arrangements, securing revenue, reducing credit risk and achieving positive technical performance. Chowdhury and Charoenngam (2008) agree and list common requirements for successful implementation of IPPs. These include the existence of debt financing agreements, support from the development finance institutions, and the existence of purchase agreements as well as credit enhancement of IPP projects.

The "standard model" for organising and restructuring electricity sectors, according to Nepal and Jamasb (2013), in numerous countries has been based on market-oriented liberal policies. It consisted of numerous components; the first one is the vertical separation and unbundling that involves vertical separation of wholesale distribution and transmission components into separate commercial segments. An analysis of the electricity industry begins with the recognition that there are three distinct components to it, which are generation, transmission and distribution (Nagayama, 2009). Once the electricity is generated, either through coal plants, wind turbines or solar panels, it is sent through to local regions through high voltage transmission. In local regions, it is transformed to a lower voltage and transmitted to local distribution channels, and finally to consumers (Borenstein & Bushnell, 2011). The assumption of this model is that that electricity could be generated and supplied by competitive firms in organised markets (and not by the state) and that not all activities of electricity supply are naturally monopolistic. This would help eliminate cross-subsidisation of these institutions. Private ownership entails private commercial entities taking ownership of electricity resources with an understanding that they can better allocate capital resources and manage the system more efficiently.

Another component is the creation of powerful and effective independent regulatory institutions: the regulatory institutions are supposed to assist with improving the competitive landscape and levelling the competitive environment. These institutions will assist in regulating the sector in areas such as market entry, network charges and network access.

Victor (2004) provides certain preconditions for electricity market reforms to take place. These include the existence of factor markets to ensure that a market for production factors such as fuel and labour exist. Independent regulators to provide a level playing field for both state and non-state electricity generators should also be established. Corporate governance and accounting oversight over corporate governance and private investment is essential to ensure that firms adhere to business regulations and legislation. State utilities are usually the pioneers and monopolist in this industry and are already playing a dominant role in electricity generation, transmission and distribution. In order for new entrants to compete, a fair and just competitive environment has to be created. Lastly, finance and investment are usually the key drivers for the electricity industry because they provide a key platform through which governments can raise funds to bridge the capacity gap.

These factors are essential because without the transformation of the electricity market, any endeavours to bring in IPPs will be hampered by a lack of an enabling environment to allow fair competition (Nikomborirak & Manachotphong, 2007). Any study that seeks to make a contribution towards electricity market reforms should review the extent of transformation and efforts towards improving the competitive landscape (Erdogdu, 2011). This will be done in this study by looking at theories, concepts and paradigms pertaining to the role of reforms in creating a competitive landscape in the electricity sector.

Studies such as those by Shen and Yang (2012) and Doove et al. (2001) have researched the key requirements for successful electricity industry reforms. For example, Bacon and Bessant-Jones (2001) concur that requirements include the thorough understanding of political and social factors prevailing in the country, the comprehension of the challenges of the government to create credible regulation, as well as how to reform the electricity sector, whilst easing the fiscal burden on electricity sector debt and subsidies. This includes the ability to attract and keep private sector investments high, as well as devising politically and socially acceptable programmes, as espoused by Forster, Mouly and Sankaran (2013).

Managing the introduction of competition is a key requirement for successful electricity industry privatisation. Berg (1998) describes several regulatory parameters that have to be addressed for successful privatisation efforts. The first one is creating an investment-friendly climate through the determine the structure of the industry prior to privatisation as the evaluation of assets, determining pricing rules and cost containment are pivotal to successful privatisation efforts. Any uncertainties might increase business risk and lead to higher discount rates used to estimate the present value of future cash flows from an investment (Stamminger, 2010). Secondly, establishing market parameters is necessary where regulators need to define market structure parameters such as market conduct (price, availability and quality), assess the rules for competition, decide on the entry rules and the pricing flexibility, monitor outcomes and deal with compensation issues. These decisions are essential because they determine the expectations of investors, consumers, managers and workers. A choice needs to be made on the different electricity models that can be adopted, taking into account local conditions (Shahri, 2011).

Regulator policy has a significant impact on the firm's cost of capital (as well as choice of firms' input mix and cost of production), which is why it is essential for regulatory process to be perceived as fair to all parties. This involves procedural transparency, lack of arbitrary decision-making, and balancing the needs of stakeholders (Zhang, Parker & Kirkpatrick, 2006). Regulators need to determine natural monopoly business activities, such as transmission and distribution. These should be ring-fenced from competitive activities (for example generation) to prevent cross-subsidisation and all business transactions in the ring-fenced entity should be monitored (Shen &Yang, 2012).Incentive regulation is also essential to ensure that a utility implements effectiveness and efficiency goals by establishing reward/penalty systems. These regulations might include cost-based Rate of Returns (ROR), Price Cap Regulations (PCR), and Performance-Based Regulation (PBR) as well as sharing arrangements (Zhang, Parker and Kirkpatrick, 2006).

Price cap regulations measures are designed to ensure that utilities implement measures to cut costs and implement innovative technologies. Price cap measures should only be implemented for essential services that are non-competitive. Most price cap measures are based on the net present value of cash flows with the cost of capital as the key variable in determining prices (Roques & Savva 2006).

2.6.2 Lessons learnt from electricity sector reforms

The requirements were explained above are a result of several lessons that were learnt through previous reform efforts. Lessons learned from privatisation efforts in Europe as espoused by Besant-Jones (2006) are set out below:

- Privatisation through transparent international bidding amongst pre-qualified investors is more sustainable than privately negotiated privatisation deals.
- Investors have to be offered a majority interest and management control in order to allow them to implement prudent investment and operating decisions.
- Labour agreements need to be addressed before privatisation.
- Fuel supply agreements need to be put in place to promote a genuine market for fuels that are used in electricity generation.
- A financial recovery plan might be necessary to address past liabilities such as unrecoverable debts that can undermine the viability of the sector. The assets and customer bases should not be inflated to claim for higher tariffs.
- Bidding documentation should reflect accurate information on the forecasted demand and revenue streams.
- Private shareholders have to be able to exert full corporate control and managers have to able to change business practices of the company.
- The regulator has to be impartial in its practices and allow for the full cost recovery through tariffs.

A study conducted by Doucet (2004) concludes that the experience of energy market reforms that took place in various countries came up with similar conclusions. These include the fact that reforms should examine the competitive potential of each stage of the energy chain, including electricity generation. The benefits of reforms should also be equivalent to the cost of each stage of privatisation. Lastly, there is a need to comprehend the risks of competition and the costs that it generates, taking into account potential risks and costs.

Section 2.6 detailed an overview of the requirements for successful reforms, as well as the lessons learnt from privatisation efforts. The following section will provide a synopsis of the global market reform effort, in particular with regards to experience with reforms in different regions of the world.

2.7 A SYNOPSIS OF THE GLOBAL REFORM EFFORT

The worldwide trend towards deregulation, the opening of world markets and reducing the role of the state in economic activities peaked in the 1990s and became part of the agenda of numerous financial institutions and developing countries. Energy utilities were not left out in this drive for economic change, according to Gabriele (2004).

The liberalisation and privatisation of the electricity sector started in Chile in 1982, according to Nagayama (2009). This privatisation drive spread to other countries in 1990s. This liberalisation formed part of the electricity sector reforms that started in developed countries of Europe, Australia, the United States, Eastern Europe and Asia. This reform was driven by a need to separate the four business activities of generation, transmission, distribution and retail supply of electricity (Pollit, 2007).

Nepal and Jamasb (2013) state that the Chilean privatisation experience started with the establishment of a market regulator, the incorporation of state enterprises, the establishment of law for electricity sector liberations, the unbundling of the sector, as well as the introduction of incentive regulation of electricity networks. This was followed by the establishment of a wholesale electricity market, as well as the introduction of privatisation and the introduction of independent electricity producers (IPPS). The Chilean reform model was adopted by countries such as the UK in 1990 and Norway in 1991.

According to Nepal and Jamasb (2013), the appeal for utility privatisation was prevalent in the transitional economies of Latin America, which experienced massive market-oriented systematic changes of the economy in the 1990s. These structural changes included macro-stabilisation, price liberalisation, the elimination of communist systems and opening up their economies to international trade (Checchi, Florio & Carrera, 2005). These reforms could be characterised as Type 1 reforms, whilst Type 2 reforms included regulation and appropriate institutional support, changes in the establishment and enforcement of laws, and the promotion of market driven reforms (Born, 2005). Extensive economic privatisation, combined with the establishment of legal institutions was the dominant characteristics of these reforms. These were complemented with distinct property rights regimes, as well as functional anti-corruption agencies (World Bank Public Sector Group Poverty Reduction and Economic Management Network, 2000).

The 1990s saw the introduction of a wholesale electricity market for electricity trade between utilities, IPPs and large customers. The intention was to equalise the marginal cost of production of utilities by introducing competition in the prices of electricity charged by utilities to customers (Borenstein & Bushnell, 2011).

Nepal and Jamasb (2013) assert that by the end of the 1990s reforms had spread to most developed countries. At least 70 developing countries had embraced market-driven reforms as a step towards electricity sector reforms. The progression experienced by these countries was transformation from a vertically integrated state-owned monopoly towards an unbundled market that is competitive.

The transmission and distribution sectors have remained largely monopolistic in nature whilst generation has been fundamentally successfully privatised. This view is supported by Fiorio and Florio (2008), who state that the reason that transmission and distribution are natural monopolies is the fact that they have sunk costs compared to a retail supply that has trading and marketing activities that do not entail high costs. The difficulty in privatising transmission and distribution lies in the physical impossibility of duplicating assets between different transmitters and distributors. This will require that firms duplicate each other's cable networks and cables from different companies will have to be interconnected, making it highly inefficient (Borenstein & Bushnell, 2011).

Besant-Jones (2006) affirms the fact that countries that have embarked in electricity sector reforms (for example Chile, the UK and the US) have attained various levels of success which can be categorised under different stages. The first one is a vertically integrated monopolist with IPPs selling electricity to it. A national generation, transmission or distribution entity, or combined national generation and transmission entity operating as a wholesale electricity trader (single buyer) with IPPs selling electricity to it should also be established. Numerous distribution entities and generation entities and a transmission entity formed by the unbundling of the monopolist should be instituted. The transmission entity acts as the single buyer of electricity from generators and IPPs, and sells electricity to distribution entities and large users of electricity.

2.7.1 Electricity reforms in Africa

According to Agboola (2011), Africa is the second biggest continent on the planet and is home to 13% of the world's population. Its energy consumption and production only makes up 3% of

the global total. The continent is lagging behind in terms of people who have access to regular and reliable electricity. Less than a quarter of the population in Sub-Saharan Africa has access to electricity as compared to 50% South Asia and more than 80% in Latin America (Winkler et al., 2011). This is due to underinvestment in the electricity sector in Africa (Eberhard, 2011). Electricity is a necessary constituent of economic development and modernisation. In addition, Eberhard et al (2008) further confirm that Africa has underinvested in generation capacity. The generation capacity of Africa was equivalent to 147 gigawatts in 2014 (International Renewable Energy, 2015). About 25% of this capacity was not currently available for a variety of reasons, including aging electricity plants and a lack of plant maintenance. Adding capacity to the electricity grid in Africa has largely stalled in Africa in the past three decades, with growth rates of half of the rest of the developing world. A general rule is that installed capacity should grow at the same rate as the economic growth rate of a country, according to Koryakovtseva and Mason (2013).

Eberhard and Gratwick (2011) hold that in Africa, until the 1990s, all major electricity-generation activities were financed and undertaken by public institutions, with additional finance being provided by development finance institutions. Due to insufficient availability of funds for new generation and years of poor performance by state utilities, African countries started adopting a new business model for energy generation, largely influenced by successes in the UK, US, Chile and Norway (Karekezi & Kimani, 2002).

In addition, Mkwanazi (2003) affirms that numerous African electricity utilities have been exposed to numerous challenges over a number of years which include poor quality supply and services arising out of poor financial and technical performance, thus not being able to cater for the growing demand. They have also been exposed to a lack of adequate skills for the job and the inability to attract investment in electricity projects and fund expansion projects. Political pressure has contributed to non-cost-reflective tariffs which are below marginal costs. Utilities have also faced challenges of credit unworthiness due to inadequate collection mechanisms.

According to Eberhard and Gratwick (2011), numerous African countries started unbundling their electricity systems and introduced private participation and competition through IPPs. IPPs were considered by numerous African governments as a solution to supply constraints and could be used as a benchmark for the electricity industry players, including state-owned entities.

A report by the Sustainable Energy Regulation and Policymaking Report for Africa (2011) discovered that in Africa, and particularly Southern Africa, reforms have only been concentrated on two reform processes, corporatizing utilities and inviting IPPs to the electricity sector. According to Clark et al. (2005), there appears to be slow progress in implementing reforms that are designed to minimise or withdraw government control of the electricity sector, such as the establishment of independent regulatory agencies, the amendment of electricity laws, and the unbundling and privatisation of generation and distribution sectors. The results of this study are presented in figure 2.1 below.

Figure 2.1 : Summary of status of electricity sector reforms in Africa

Key step	Number of countries (%)
Corporatization/commercialization	17 (35%)
Independent power producers	17 (35%)
New electricity act	12 (25%)
Establishment of regulator	9 (19%)
Unbundling	6 (13%)
Privatization of distribution	3 (6%)
Privatization of generation	1 (2%)

Source: Sustainable Energy Regulation and Policymaking for Africa Report (2011: 5)

According to the figure above, a majority of the reforms were focussed on corporatisation, the introduction of IPPs and the introduction of the new electricity acts. There were few reforms that went as far as unbundling the sector or the privatisation of distribution and generation. This confirms the view above by Clark et al. (2005) those reforms in Africa are concentrated around the first three steps on the table.

According to Malgas and Eberhard (2011), electricity sector reforms in Africa have yielded different results from those that were intended, in that nowhere in Africa was a fully unbundled, privatised and competitive energy market. According to Eberhard et al. (2008), what has emerged in Africa has been a hybrid electricity market where the state-owned enterprises have retained a dominant position with IPPs occupying peripheral status. As explained in Rosnes et al. (2011), these new hybrid markets posed new challenges such as attracting new investments and determining who is responsible for generation planning, procurement and contracting. Generation planning has always been a state utility

responsibility, and the tendency was to build more capacity than necessary in order to ensure the adequate supply of electricity. These entities ended up facing financial difficulties as investment costs became high (Wilson & Biewald, 2013). With the entry of IPPs it became unclear who is responsible for energy planning and expansion with uncertainty as to whether the private sector would respond to demand for additional electricity capacity (Byrne, 2003). Experience in Africa has demonstrated that if strict procurement procedures and competitive bidding processes are not put in place, electricity sector reforms in Africa will be undermined and potential investors might pull out of potential deals (Karekezi & Kimani, 2002).

The previous section looked at how electricity reforms evolved globally from the 1980s. The following section will provide an overview of the evolution of the IPP market globally as well as the electricity reforms in South Africa.

2.8 THE ROLE OF GOVERNMENTS IN ELECTRITY REFORMS

The growth of the electricity industry outside the industrialised world developed after World War II, corresponding with the end of colonial rule (Gabriele, 2004). According to William and Ghanadan (2006), governments in various countries owned and operated electricity utilities with the aim of driving economic growth and extending infrastructure and services on behalf of the local population (Schewe, 2007). Key roles of state utilities included national industrialisation, rural electrification, and the introduction of new technologies (Sutton, 2007). In addition, economic efficiency was not one of the key drivers of utilities then. Governments subsidised their national economies through low electricity prices, and the success of this state model was largely due to the fact that it was supported by the Cold War superpowers and development agencies such as the World Bank (Velde & Warner, 2007). During this period, public ownership of utilities succeeded because of economic growth, international development aid and expanding national budgets (Glaeser & Goldin, 2006).

Guma (2013) and Curristine et al. (2007) agree that the traditional profile of numerous governments worldwide has been characterised by substantial bureaucratic machinery which operates inefficiently, is unresponsive and is associated with high costs. One of the major drivers for public-sector reform has been the need to introduce effective and efficient systems of government (Lufunyo, 2013).

Other reasons put forward by Uchida and Filipovic (2005) for privatisation are to reduce the size of the government bureaucracy, as well as to allow the government to pay off their existing debt and reduce the interest rates and reduce expenditure as well. These reasons are based on the assumption that private institutions are driven by the incentive motive through costless bargaining and cost-benefit analysis that leads to the most cost effective solution Filipovic (2005).

According to Mfundisi (2011) and Sarker and Alam (2010), Electricity supply has been relied on by numerous governments and their people as a driver for economic growth, the provision of employment, and improvement of the quality of life of its citizens. This has contributed substantially to numerous states such as Brazil and India believing that electricity generation should be a domain of state utilities, and hence their governments have substantial electricity in the three areas of energy generation: generation, transmission and distribution, as espoused by Nathan Economic Consulting (2013). The economic progress of such countries is tied to their efficient utilisation of electricity as a key enabler of economic growth. According to Winkler (2006), in South Africa, the electricity sector plays a significant role in the social and economic development of the country.

Governments, especially in developing countries, were unable to maintain and extend the electricity infrastructure, as shown by Dagdeviren (2009). In addition, public utilities in numerous countries suffered from poor revenue collection, technical losses, decaying networks and escalating costs of operation (Kessides, 2006).

In the South African context, The PDI (2013) report states that several Cabinet pronouncements since the 2000s were instrumental in shaping and giving direction to the electricity sector reforms. The first one was that Eskom needs to remain dominant in the current generation market sector in order to meet the government's developmental and social objectives (Pickering, 2010; Nassif, 2015). Private sector participation must be introduced within the existing electricity generation market sector (Montmasson-Clair & Ryan, 2014). The involvement of Black Economic Empowerment (BEE) within the generation sector should be about 10% of generation capacity (Davidson & Winkler, 2003).Open, non-discriminatory access to the transmission lines should be ensured through the establishment of an independent Transmission Company with ring-fenced transmission system operations and market operations functions (Pickering, 2010).

Further government pronouncements included a requirement that a regulatory environment to bring about the participation of IPPs and diversified primary energy resources should be established. This was made possible, according to Montmasson-Clair, Moilwa and Ryan (2014), by policies such as the 2003 White Paper on Renewable Energy Policy of the Republic of South Africa, The National Integrated Energy Plan (2003) and the Electricity Regulations on New Generation Capacity (2009). There must be support of and encouragement to the Southern African Power Pool (SAPP) for it to be developed into an independent system operator for the southern Africa regional grid system. This would ensure that public and private generating companies participate in the pool. South Africa committed to this by signing the memorandum of understanding to establish SAPP (Beta, 2013). The role of the regulatory system should be adapted to take into account the role of the national energy regulator, the development framework for licensing, the adaptation of the price-setting routine and the creation of the capacity to monitor the reformed electricity sector (Montmasson-Clair & Ryan, 2014).

This section looked at the role of governments in public sector and electricity reforms. The following section provides an overview of the global evolution of the IPPs.

2.9 GLOBAL EVOLUTION OF IPPs

The global deregulation and reforms of the power markets that started in the 1990s set the background for the independent power market (IPPs). Between 1990s and 2000s the IPP sector grew in size and power plant construction grew sporadically (backed by commercial banks and development finance institutions) (Ireland, 2005). An independent power producer (IPP) is a privately developed power plant that sells power to the electricity grid, normally to a state-owned company, through a power purchase agreement (Woodhouse, 2005). The emergence of IPPs was encouraged by a need to bring private investors to introduce recent and new technologies, reduce the bureaucracy that was experienced within state-owned institutions, and in the long run improve the quality, reliability and sustainability of power generation (Idigbe & Igbinovia, 2010).

According to Ibrahim and Ventures (2007), the electricity market reforms that took place in developed and developing countries were the major drivers for the promotion and growth of IPPs. In North America, Europe and Australia, government reform policies were a major contributor towards the successful introduction of IPPs in these regions. White (1996) credits the 1978 Public Utilities Regulatory Policy Act of 1978 (PURPA) for the introduction of the

IPP market in the US, which is credited for introducing the concept of IPPs in the energy industry. The Act was designed to promote renewable energy sources and efficient cogeneration technologies, and helped to open competition for the new generation by giving IPPs the right to sell to vertically integrated utilities. This law allowed US electricity utilities to purchase power from small generators or qualifying facilities (QFs). This law was a break from a tradition that electricity generation is a natural monopoly and could not be separated from transmission and distribution (Binz et al., 2012). This led to a dramatic growth of IPPs in the US and worldwide as IPPs started searching for new markets outside the US.

Phakde (2009) is of the view that up until the 1980s, vertically integrated state utilities were responsible for ownership and management of the electricity sector in most countries. Since the start of the 1990s, numerous developing countries allowed IPPs to build and operate power plants as one of the essential steps in reforming the power sector (Singh, 2007). Since then IPPs have grown rapidly until they reached their peak in 1996 (Bram, 2011). Between 1990 and 2004, the private sector invested more than $250 billion in the electricity sector in developing countries (World Energy Outlook, 2006). About 70% of these went into power projects mostly built by IPPs (Sing, 2007).

Kergman (2002) is of the view of that in the emerging markets the volatile economic environment has been a major challenge to IPPs' commercial and economic viability. Such challenges were likely to be triggered by a major change in the host country's economic environment, for instance the sharp devaluation of the local currency, the slowdown or economic collapse of the economy, or a significant contraction in demand for electricity (Doucet, 2004).

Phakde (2009) affirms that the role of IPPs has sometimes been controversial as well. For example, a number of IPPs have been accused of overcharging public utilities, with the consequence that the generation costs of utilities became higher than IPPs'. This has led to IPPs shifting most of the risk to either utilities or host governments. Albouy and Bousba (2009) agree that IPPs have been charging electricity prices that are higher than those charged by public utilities when analysing the cost recovery over the term of PPAs. To shield the price shocks IPPs have had a tendency to minimise or to avoid unpopular rate hikes for residential and agricultural customers while overcharging commercial and industrial users (2009). Takahashi (2009) agrees that IPPs have contributed to increased electricity prices in the short terms, but suggests that the main reason for this is the fact that there are numerous indirect

costs that IPPs incur when they set up projects in foreign countries, such as due diligence costs and legal documentation. Other reasons for increased expenses are that lenders require higher returns because of uncertainty over cash flow, and longer negotiation periods.

2.9.1 Asia and Middle East

According to Ronquillo-Ballesteros and Teske (1999), the motivation for the introduction of IPPs in the power sector in Asian economies took place in the 1990s when economic growth led to growth in electricity demand. Tightening government budgets, low electricity prices, cross-subsidies, as well as the pessimism of international lenders made it difficult for traditional state-owned entities alone to be able to finance the power demand, whilst maintaining or improving the standard of service. Auld (2010) additionally states that reforms have largely been pursued in Thailand, Malaysia, Philippines and Indonesia as means for government to reprioritise its energy needs to allow competition for fiscal resources, attract foreign investment and foreign participation, increase local partner participation, and increase regulatory transparency and fuel source diversification as well. Asian governments initially tried to invite foreign investors to build and maintain independent power projects to supplement state generation as part of electricity reforms (Wu & Sulistiyanto, 2008). It was revealed that the performance of power utilities was sub-optimal and something needed to be done to improve it (Lefevre, 2000).

Ronquillo-Ballesteros and Teske (1999) further state that this led to the reforms that included bringing in IPPs to supplement electricity generation by inefficient state-owned utilities. These utilities were unable to finance rapid expansion in power generation capacity. The government provided incentives for foreign investors and established procedures for bidding (solicited and unsolicited), as one of the measures to overcome non-price behavioural barriers (Gross, Heptonstall & Blyth, 2007). These incentives included exemptions from import duties, favourable tax regimes, government guarantees for profit repatriation, land use rights and easier employment of foreign nationals (Newberry, 2007). Through the 1990s, Asian governments were engaged in promulgating legislation to provide a legal framework for IPPs. Additionally, according to Ronquillo-Ballesteros (1999), this included provisions for procuring the services of IPPs and the establishment of a contractual framework between IPPs and state utilities. In addition they were engaged in efforts to privatise state utilities as a means to improve their performance (Choynowski, 2004).

According to Woodhouse (2005), in the 1990s, private investment in the power sector through IPPs was a lucrative business in developing countries. Power markets in China, India, Indonesia and Pakistan were flooded with private investors who were looking for IPP investment opportunities during this period. This market collapsed during the Asian financial crisis of 1997. Gray and Schuster (1998) confirmed that the Asian crisis triggered a stock market and currency slide, thus stalling economic growth and investment in the power sector in that region. During this period only $3 billion private investment deals were closed in 1999, as compared to $14 billion in 1997. Vaglisindi (2013) confirmed this fact by mentioning that activity as measured by the number of projects and investments declined after the Asian financial crisis. For example, in Indonesia 27 newly established IPPs faced financial ruin to such an extent that they had to be either suspended or cancelled by the government off-taker, and according to Wu and Sulistiyanto (2008), countries such as Indonesia and the Philippines reneged on their power purchase agreements and efforts to renegotiate the terms of the contracts were unsuccessful.

Table 2.2 below shows certain experiences of IPPs in the 1990s to mid-2000s in Asia. Several countries experienced cancellation of contracts, renegotiations, refusal to honour contracts, as well as regulatory and other forms of expropriation, according to Woodhouse (2005).

Table 2.2: IPP experience in selected Asian countries

Government action	Examples
Cancellation	Indonesia (several contracts cancelled)
Renegotiation	Philippines, Thailand, Malaysia, China (most contracts renegotiated)
Refusal to honour contract	India (refusal to honour state guarantee of Dhabol project)
Regulator or other expropriation	Pakistan (delaying commissioning/permits, imposing new taxes, slowing fuel delivery) Indonesia (artificially pegging exchange rate for indexing IPP payments)
Otherwise altering leverage	China (hiding existence of competing plant from Miezehouwan investors), Philippines (unbundling rates and passing through full IPP contracts to consumers).

Source: Woodhouse (2005: 12).

The Asian market experience reveals that the independent power market is quite volatile, and any changes in the macroeconomic environment might impact the financial viability of this

sector. This requires that risk management strategies have to put in place to militate against such business risks.

2.9.2 Africa

Eberhard and Gratwick (2011) postulate that by 2011, approximately 23 grid connected projects, with a capacity of more than 40 MW (megawatt), had been developed in Sub Saharan Africa. These IPPs hold long term power purchase agreements (PPAs) with state-run power utilities and added generating capacity to existing state utilities. In total, 4100 MW of capacity has been added by IPPs in Africa. Even though IPPs are an essential source of investment in the power sector in a number of African countries, they still represent a small proportion of the overall generation capacity in Africa (West & Frankish, 2015).

Based on the IPP experience of African projects, it was shown that projects have been delivered and the contract obligations have been maintained, according to Eberhard and Gratwick (2011). Some projects have reached financial close, whilst others are still under construction. On the other hand, there have been a number of negative events having an impact on the success of IPPs in Sub Saharan Africa. Certain projects have ended up in litigation in Tanzania and Nigeria and certain project costs have escalated in Tanzania due to unplanned expenditure and disputed PPAs (Riungu, 2009). Other projects were marred by escalating investment costs (in Nigeria) (Abimbola, 2010), as well as financial challenges, the reduction of capacity charges and several technical challenges leading to project delays (Kapika & Eberhard, 2013) .

The IPP sector in Africa is still in its infancy and a market vacuum exists for new entrants, once the challenges that permeate this sector have been addressed. From the exposition above it becomes evident that the introduction of IPPs in Africa faces several challenges that need to be addressed to ensure that this effort becomes successful.

2.9.3 Europe

According to Branston (2002), the United Kingdom was the first country to reform its power sector in the 1990s by unbundling and privatising the power sector. Twelve regional electricity companies (RECs) were established and the transmission grid was transferred to a new company called the National Grid Company (NGC). Transmission and distribution were regarded as natural monopolies, but generation was opened up to private power generators

(Woo, Lloyd& Tishler 2003). By 2001, new capacity from new private generators (IPPs) had reached 22.9% of the power generation in the UK.

Krishnaswamy and Stuggins (2003) state that multilateral donors and Development Finance Institutions (DFIs) were convinced that unbundling the vertically integrated utility and privatising the unbundled entities was the best way to implement power sector reforms in Europe. The EU countries were required to achieve full liberalisation of their power markets by 2010, according to Pollitt (2009). A 2003 EU directive required that full retail market opening should have been implemented by 2009. Under the directive concerning the "common rules for the internal market in electricity and gas" the European countries has to fully open up their electricity markets to competition, and allow wholesale and residential customers to be able to choose their supplier by 2005 (Euroelectric, 2002). This led to the sector being unbundled into independent generation, transmission and distribution entities. Large consumers are free to choose their supplier, whilst the rest of the consumers could only buy from their area distribution utility.

IPPs were gradually introduced in the 1990s in countries such as Hungary, Poland and Turkey (Euroelectric, 2013). Countries such as Russia, Ukraine and Moldova experienced challenges in the 1990s during power sector reforms. These challenges are attributable to the fact that power sector reforms, and specifically unbundling and privatisation, were difficult to implement during the political turmoil experienced by Ukraine and Moldova, for example. Kurronen (2006) affirms that reforms in Russia were delayed largely due to policy uncertainty and the complexity of the power sector, which made unbundling difficult. Kuleshov et al (2012) focus on the uncertainties in generation as well the uncompetitive regional markets in Russia, and Hubert (2003) focuses on the impact of reforms on the increase in electricity prices in both Russia and Moldova. Moldova's reforms were plagued by differences from various stakeholders who have argued that these reforms have not benefited the poor in that country. According to Jungle et al. (2004), the poor have been negatively affected by the increase in the price of electricity, which was necessary to ensure that tariffs are cost-reflective and can attract private producers. Reforms in Moldova have led to an improvement in service delivery as well as reduced government deficit due to the introduction of private players.

From the explanation above it is clear that as much as Europe has been at the forefront of power sector market reforms, there are still a number of stumbling blocks towards full market

liberalisation. These include the complexities around unbundling, regulator and policy uncertainty, as well as the impact of reforms of price of electricity. This means that any countries that have embarked on the process of electricity sector reforms need to take heed of these challenges and put up measures in place to address these challenges.

2.9.4 North America (US)

Eckenrod (2008) affirms that apart from the impact of the Public Utilities Regulatory Policy Act of 1978 (PURPA) in introducing utilities to the power sector in the USA, the Energy Policy Act of 1992 introduced the wholesale generation competition and assigned authority for bulk transmission systems to the Federal Energy Regulatory Commission. This Act, together with a series of orders issued between 1996 and 2000, mandated that the transmission systems should be openly accessible to wholesale generators. These orders separated wholesale generation functions from transmission functions (Federal Energy Regulatory Commission, 2010).

The US electricity industry comprises over 3000 public, private and cooperative utilities, and more than 1000 independent power generators (Binz et al, 2012). Giles (2014) affirms that about 75% of the US population is served by investor owned utilities (IOUs). On the other hand, Canada had 35 utilities in 2014 accounting for 4028 MW of electricity generated. Phillips (2014) is of the view that the IPPs market in the US has not grown since 2004, because of overinvestment in this sector that occurred from the 1990s up until the September 11, 2001 attacks. This boom in new power plant construction occurred because, prior to that, there was no new investment in power generation for a decade before, and therefore a backlog for new power construction was created (Holburn & Spiller, 2002; Borenstein & Bushnell, 2011). In addition, State-owned utilities were forced to divest a substantial amount of generation assets. The September 2001 attacks as well as the weakened financial ratings of companies in the power sector to three notches above junk status (Binz et al., 2012) were reasons for the reduction in new IPPs investments. In addition, market prices of electricity have forced discounts of 20-50% of returns from the construction of new plants, which discourages new investment in this sector (Binz et al., 2012).

The electricity sector reforms in the US has led to a proliferation of independent power producers and the opening up of the wholesale and retail markets to competition. The sector faces challenges such as reduced investment in the sector as well as the financial indicators demonstrating a reduced appetite for investment in this sector.

2.10 THE IPP BUSINESS MODEL

IPPs represent a unique sector and segment in the electricity market. It is essential to understand the business dynamics and operational indicators of this market in order to analyse its viability for potential investment. This section will try to provide more clarity on this sector and the nature of business entities operating in the sector through the analysis of key performance indicators, business risks and returns pertinent to this industry. Due to the fact that this is a new industry in South Africa, data from other regions, including North Africa performance data, will be utilised to provide a measurement benchmark.

This role of IPPs is substantiated by Woodhouse (2005) who states that the purpose of the IPPs is to bridge the electricity supply gap by generating electricity and selling it under long-term contracts to an entity, usually a state utility. IPPs can earn additional revenue by selling excess capacity to independent distributors or large companies. Traditionally IPPs are financed on a project basis where a special purpose entity is established to manage and own the IPP (Chowdhury, 2012). The company will set up equity using domestic and foreign enterprises and secure finance from banks using the expected cash inflows as a basis for securing finance (PWC, 2011). These institutions are highly leveraged and are relying largely on debt for their balance sheet, according to Semple and Turley (2013).

According to Frost and Sullivan (2013), potential investors need to understand the business environment in which they want to invest, in order to improve the chances of success in that industry. In the IPP industry, countries need to investigate numerous factors which include economic and political markets to ensure sure that the investment climate is favourable. They also need to ensure that there is a coherent power sector linked to procurement contracting and that fuel is abundant at low cost and fully available with secure contacts. Lastly, the legal and regulatory framework has to demonstrate the existence of a clear policy framework in order to give fair direction and oversight to the market is essential.

There are project-specific factors that investors must consider before making a decision on whether to invest in a power generation project, according to a Frost and Sullivan report (2013) these include the development of PPAs to ensure an adequate and secure stream of revenue through cost reflective tariffs. There has to be a favourable debt and equity arrangement. The fuel type has to be agreed to with the off-taker. All power plant options and types have to be considered and the most effective has to be selected.

The IPP business model has face criticism for a number of reasons. For example the IPP contracts have complications, according to Woolf and Halpern (2001). The first one is their long term duration of PPAs which can have a duration of 5-20 years (US Department of Energy Efficiency and Renewable Unit, 2011). PPAs also have a fixed prices which are designed to create stable revenue streams for IPPs. In addition, prices provide a certainty of revenue for a seller and security of supply for a purchaser (Nehme, 2013). IPPs assume less market risk and the fact that they have security of revenue for the seller means that a certain level of market risk is removed. There is still a certain measure of risk such as the payment and collection risk, insufficient or low income or dispatch priority (Nehme, 2013).IPPs have contract provisions that are less demanding than market rules that are supposed to encourage efficiency and competition. This is because the PPA guarantees revenue, thereby limiting the demand and supply forces and reducing an incentive for reducing cost (Arizu, Maurer & Tenenbaum, 2004).

The literature review demonstrates that the proper management of contractual obligations is important in the management of an IPP business. This required that hypothesis be proposed to test the components of the proposed business model in addressing the contractual and legal requirements. Therefore, several hypothesis were proposed in this regard;

$H3_0$ - Proper management of an EPC contract is essential for the success of an IPP during project management and the operational phase.
H3a - Proper management of an EPC contract is not essential for the success of an IPP during project management and the operational phase.

$H8_0$ - Management of regulatory/legal affairs is essential for IPP plant successful performance.
H8a - Management of regulatory/legal affairs is not essential for IPP plant successful performance.

Additionally other disadvantages and challenges of IPPs according to Bayliss and Fellow (2000) include the fact that the terms of PPAs can be fixed for decades, up to 35 years. The business environment can change drastically, or the years multiply whilst PPAs tie governments into buying the same amount of power irrespective of the fluctuations in demand and supply or the existence of alternative sources of supply. These terms might be difficult to change because governments do not want to scare off potential investors. In a purely

competitive unbundled environment this is mitigated by the fact that IPPs are required to sell their electricity in an open wholesale market. Ferrey and Moreno (2013) agree that the length of the term of PPAs has a potential to expose both parties to the risk of economic change, such as the changes in taxes and fees, as well as changes in economic events. The PPA must ideally state which party will assume risk for these changes.

Furthermore, most IPPs insulate investor risks by committing utilities to buying all the power from IPPs whether or not it is needed (off-taker agreements), and payments are supposed to be made in specific currencies, usually dollars. The possibility of incurring losses as a result of movements in the exchange rate exists, according to Basha (2013). To counteract this risk the payment formula has to be structured to increase the amount payable in local currency during large currency fluctuations. "The Deutsche Gesellschaft für Internationale Zusammenarbeit" (GIZ) (2013) affirms that a number of financial instruments exist to hedge against this risk, but the private sector is not willing to provide the same instruments for currencies that are not traded frequently. This has made it difficult for certain governments to meet their payment obligations in countries such as Malaysia and India.

Woolf and Halpern (2001) assert that numerous countries, particularly Canada, Thailand, the US and Ireland, have attempted to address and integrate existing IPP contracts with new market structures, through the introduction of wholesale structures to act as a competitive force for the benefit of customers.

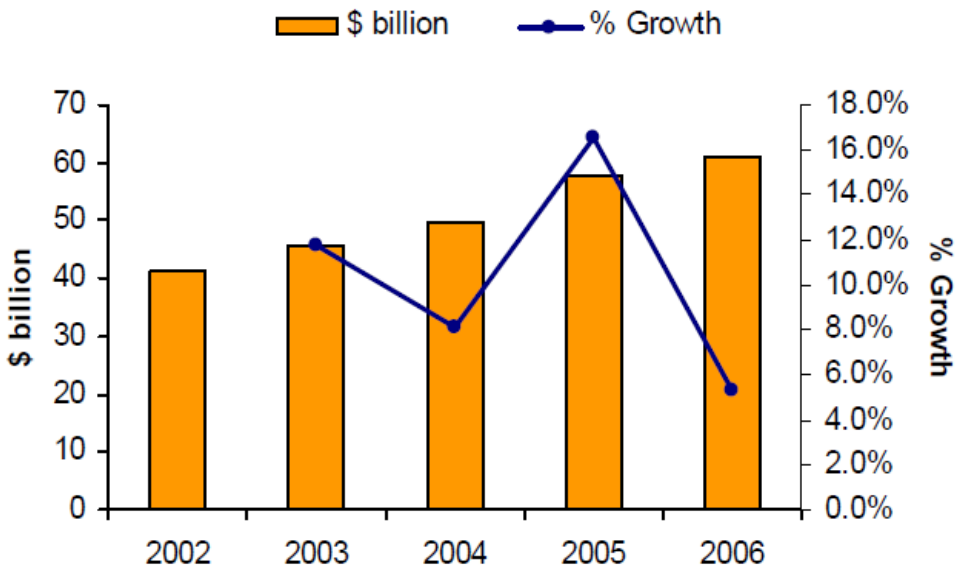
2.11 THE MARKET FOR IPPS

This section will provide an overview of the IPP market it terms of its size, revenue, as well as key business indicators such as profit margin analysis, return on investments and return on assets. The report utilised for this section was a once-off report published by Frost and Sullivan; after contacting analysts responsible for the publication, it was discovered that the institution has not published any reports since then. The Frost and Sullivan (2011) report titled "Assessment of Independent Power Projects in results (Middle East and East African)" looks at various business indicators as discussed below. USA IPPs are compared to the Middle East and East African region, because the IPP sector has matured in the USA and is fully developed. The Middle East and East African market has a number of IPPs that have been operating for more than five years from which performance data can be extracted. In addition, in Southern Africa there are very few IPPs and none of them are public companies, therefore they are not required by law to provide company financial records.

2.11.1 IPP market and size

Understanding the IPP market is important for this study because this sector is new in South Africa therefore it's important to understand how it has evolved as global level. The financial performance of this sector globally will be indicate of the extent of success that can be realised in South Africa and the risks and opportunities that are inherent in this sector. Some of the lessons learnt globally can contribute towards understanding the critical components of the proposed business model. By 2006, the global IPP and energy traders sector had grown by 7.5 % to reach $36.8 billion in revenue, with the US controlling 67.3% of global revenues, according to Frost and Sullivan (2011). Figure 2.2 depicts the growth of the IPP sector as measured by revenue between 2001 and 2006.

Figure 2.2: The global IPPs and energy traders sector value: $ billion, 2001-2006



Source: Frost and Sullivan (2006:8)

The growth of IPPs' revenue over the period mentioned above is an indication that this market is growing at a fast pace and that it will continue to play an integral part of the power sector in the future.

2.11.2 Key financial indicators

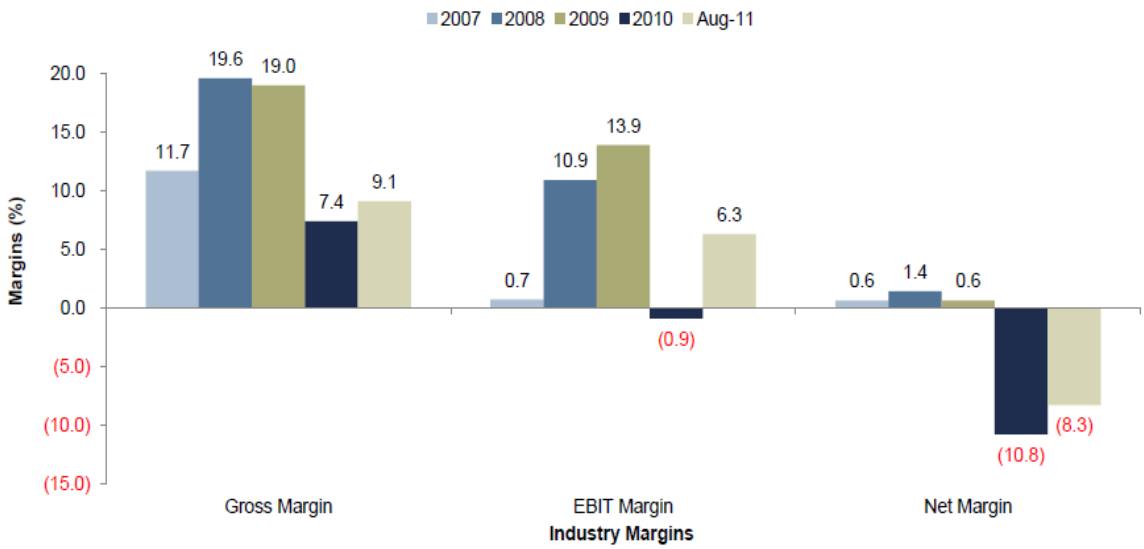
Key business parameters are necessary to define the IPP market as a viable business environment. The South African IPP market is still new (Montmasson-Clair & Ryan, 2014),

and as a result benchmarking needs to be done in order to provide an indication of the performance of this sector.

- Profit margin analysis (2007- August 2011)

The Middle East and East African Market results, as depicted in Figure 2.3, accordingly reflect the a number of trends such as the fact that the IPP market generated an average gross profit margin of 13.37% for this period. They also generated an average EBIT of 6.2% for the period under study and a net profit margin of -3% for the relevant period. The Edison Electric Institute data from 2008 to 2011 (2014) shows the operating income/gross profit margins of the privately-owned power generators in the US. The average gross margins for these IPPs were 16.6% for this period. The Middle East and African IPPs have underperformed in relation to their USA counterparts. In addition, the IPPs in the Middle East and East Africa were not able to generate positive net profit margins for this period; this was attributed to high operational expenses as well as high interest obligations.

Figure 2.3: The profit margin analysis of North Africa and the Middle East



Source: Frost and Sullivan (2011: 32)

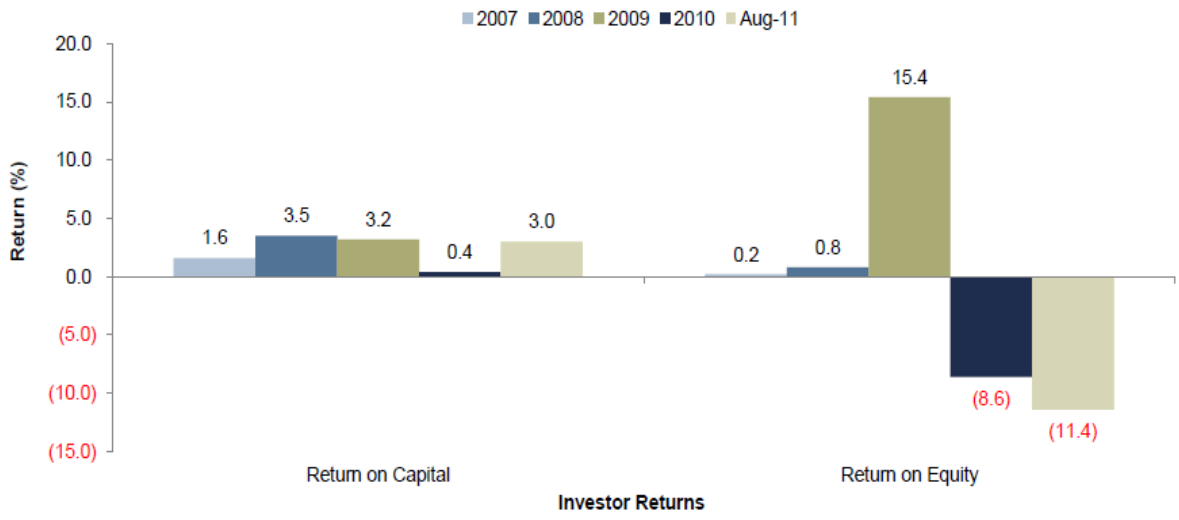
The profit margins were affected by disturbances in Egypt and Tunisia in 2011 (The Arab Spring political uprising) as well as temporary increases in the cost of debt (Frost and Sullivan, 2011). This is an indication of how sensitive the IPP market is to the political environment. Nepal is another example as cited by Jamasb and Nepal (2013).

- **Investor returns**

The IPPs generated returns for their investors in the North Africa and the Middle East region for the period between 2007 and 2011. The average return on capital for the relevant period was 3.9% and the average return on equity for the period was -3.6% (Frost & Sullivan, 2011).

Figure 2.4 depicts the changes in ROI and ROE of the markets under study from 2008 to 2011.

Figure 2.4: Investor returns for IPPs in North Africa and the Middle East.



Source: Frost and Sullivan (2011: 34)

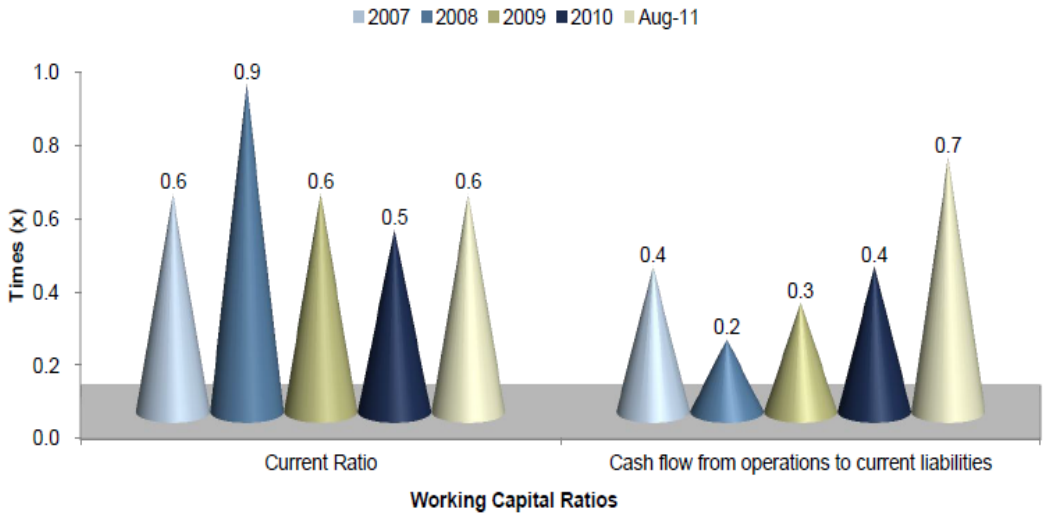
The period under review saw the return on investment being eroded because of negative net income experienced for this period. Asset turnover declined 0.4 times in 2007 to 0.2 times in 2011, negatively affecting the return on equity (ROE) (Frost & Sullivan, 2011). This performance is in stark contrast to that of US IPPs which have successfully generated an average ROE of 10.3% and ROI of 9.5% from 2008 to 2011 (Edison Electric Institute Data, 2014).

- **Liquidity ratios**

The period under review saw IPPs current ratio settling at 0.6 times and cash flow from operations/current liabilities averaging 0.4 over the period (Frost & Sullivan, 2011). These ratios showed a slight improvement from 2009 as a reflection of the reduction of the cash

conversion cycle and working capital efficiency. This indirectly refers to the efficiency of the state electricity boards in paying IPPs (Frost & Sullivan, 2011).

Figure 2.5: liquidity ratios for IPPs in North Africa and the Middle East



Particulars	2007	2008	2009	2010	Aug 2011
Cash Conversion Cycle (Days)	34.3	24.6	18.1	16.4	NA

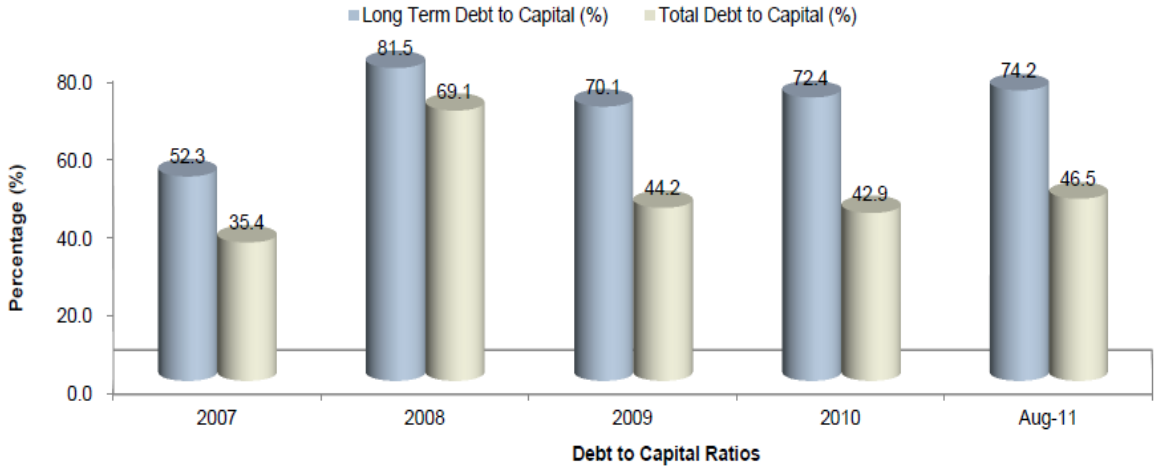
Source: Frost and Sullivan (2011: 35)

Figure 2.5 demonstrates the liquidity ratios for the period under study. The financial data for USA IPPs' liquidity could not be obtained, but free cash flow data shows that free net cash from operating activities was positive for the period, an indication that the utilities were in a position to meet short-term and long-term obligations when they become due (Edison Electric Institute Data, 2014).

- **Debt Ratios**

The industry is exposed to interest rate risk and therefore long-term debt to equity makes up a significant proportion of the balance sheet of IPPs. The average debt to equity ratio for the period under review (2008-2011) was 77% for the Middle East and North African region as compared to 57.6% for the IPPs in the USA. A low debt equity ratio is preferable to a high one as it signifies the level of risk the firm has in its ability to repay debt when it becomes due (Figure 2.6).

Figure 2.6: Solvency ratios for IPPs in North Africa and the Middle East.



Particulars	2007	2008	2009	2010	Aug 2011
Total Liabilities to Total Assets (%)	64.2	85.9	76.4	79.4	80.8

Source: Frost and Sullivan (2011: 35)

Potential investors in the IPP sector need to set benchmarks against which the business performance of IPPs can be measured. This section has highlighted essential business indicators and the fact that Middle East and North African IPPs were not performing as well as the USA industry during the period under review. These financial indicators can be used for business performance benchmarking for the new IPPs in South Africa as well as to provide a benchmark against future projects.

2.11.3 Financial performance trends of IPPs

As demonstrated above, the financial performance of IPPs faces several challenges that make it difficult for them to meet expected financial results. High operating expenses and high interest payments affect the gross and net profit margins negatively; thus it is essential for managers to keep these in check. Reduced revenues are a major factor contributing towards the negative ROE and ROI of IPPs as well. The financial performance of IPPs has been negatively affected by their inability to collect accounts payable, thereby negatively affecting their cash conversion as well as the capital efficiency capabilities. IPPs need to watch their debt equity ratios to ensure that debt levels do not become unmanageable to such an extent that servicing them affects the ability of the firms to make interest payments. Largely economic and political conditions have a huge impact on the viability and bankability of IPPs as business entities, and require a thorough risk assessment before any decision is made to commit huge financial resources.

The financial indicators discussed in this section revealed that IPP's financial performance did not meet the requirements of management and shareholders. This makes it necessary for this study to develop hypothesis that test the ability of South African IPPs to achieve these financial indicators. Financial performance is a key indicator of whether an organisation delivers value for its shareholders, therefore the study proposed hypotheses to be tested in terms of how whether the proposed business model components adhered to the requirement of delivering value.

The hypothesis proposed for this theory are the following;

$H6_0$ - The management of plant operational costs is essential for successful plant business success.
H6a -The management of plant operational costs is not essential for successful plant business success.

These management of operational costs is essential for efficient financial performance of an enterprise and the proposed hypothesis is relevant for this study.

$H14_0$ - Return on investment is an essential value proposition for the IPP business model.
H14a - Return on investment is not an essential value proposition for the IPP business model.

The return on investment is an important measurement of whether a business delivers value and therefore this hypothesis was proposed in response to this requirement.

2.11.4 The nature of IPP contracts

This section highlights the essential features of contracts and why it is essential for IPP managers to secure the most favourable contract terms to mitigate the risk of IPP projects. The proposed business model needs to incorporate all critical aspects and understanding the risks inherent in IPP contracts becomes necessary. Woolf and Halpern (2001) state that traditionally IPP plants earn revenue through a power purchase which was mostly awarded through a competitive procurement process. The PPA is entered with single buyers, a typical integrated utility with captive or committed retail customers. These contracts were established based on the requirements of the debt repayment schedule and the equity investor on an off-taker agreement, and were indexed to compensate for inflation (Institute for Energy Economics and Financial Analysis Briefing Note on Indian Power Prices, 2014)

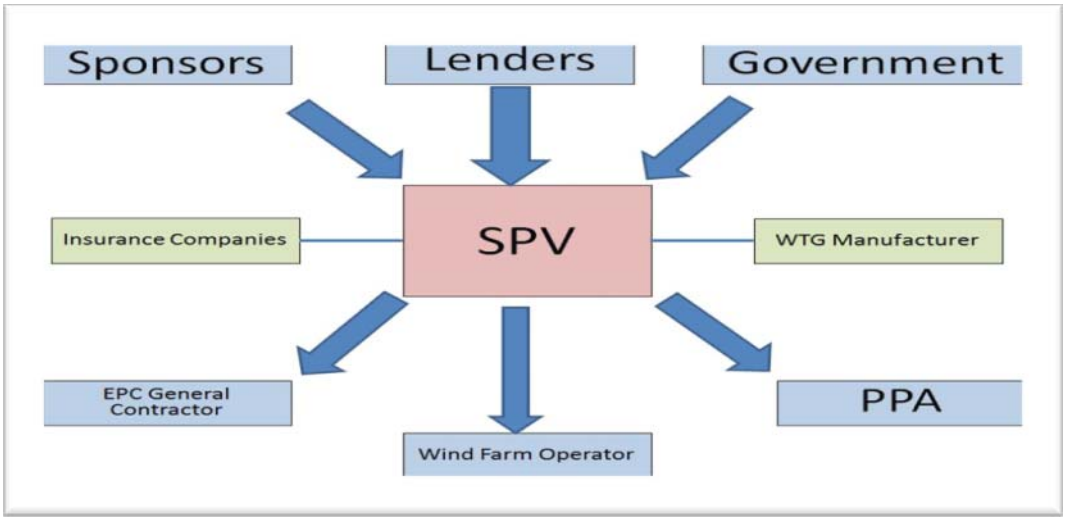
2.11.5 Project financing

According to Frost and Sullivan (2013), project financing is used in Africa and most developing countries to develop natural resources. Project financing is long term financing that usually involves a number of sponsors and lending institutions, such as banks that provide financing in a form of debt, equity and multiple variations and combinations of the two.

The HSBC (2013) describes project finance as a financial mechanism that involves the raising of finance on a limited recourse basis of developing large scale capital intensive infrastructural projects. This means that the repayment of debt is limited to revenue generated by the project and if it fails to be viable, the creditors do not have recourse to the sponsors' own funds, and sponsors are not expected to use extra money outside the project to cover revenue shortfalls. The borrower is a special-purpose vehicle, and the future cash flows from the project are used for repayment of the capital amount borrowed.

The Eskom Project Development Intelligence (PDI) (2013) report titled "Analysis of Limitations of Power Generation Options Pertaining to the South African Integrated Resource Plan 2010" describes project finance as when "the project is realised and financed via a legally and financially standalone project company called the special purpose vehicle (SPV). The role of the promoter(s) is usually that of a strategic partner (for example a shareholder). The financing partners are exposed to the credit risk of the project only." Figure 2.7 demonstrates a project finance structure for a wind power plant.

Figure 2.7: A typical project finance model for a wind power plant



Source: Eskom Project Development Intelligence (PDI) (2013: 5)

A typical power project will have different market players taking on the development of a project:

- A project sponsor: an equity investor and owner of the project company. It can be a single party or a consortium of sponsors. Sponsors may include subsidiaries, which may act as subcontractors or off-takers to the project company (HSBC, 2012).
- Government: In Public Private Partnership projects, the government/procurer may retain an ownership stake in the project and, therefore, be a sponsor (HSBC, 2012).
- Lenders: Project lenders are debt holders that are interested in the cash flow of the project to ensure that debt service takes place. These include banks, multilateral agencies, development finance institutions (DFI), capital market for bonds, and Export Credit Agencies (ECAs) (Switala, 2013).
- Insurance companies: the role of insurance companies in a project is to cover and reduce the risk of loss in an event of a default (Switala, 2013).
- WTG manufacturer: this is the wind turbine manufacturer.
- Engineering Procurement and Constructor (EPC) general contractor: an EPC general contractor is obliged to deliver the complete facility to a developer who only needs a key to start operating the facility. It is known as a turnkey contract (Schram, Meiner & Weidinger, 2010).
- Power purchase agreement (PPA): this is the purchase agreement as discussed above.

2.11.6 Business risks

As is the case with any business, the electricity industry has several inherent risks that firms, as well government institutions operating in it should be aware of. An enabling business environment can only be created when different players are aware of these inherent risks. According to Woodhouse (2005) these risks include cost overruns and under-performance by contractors. Ogutuga (2006) additionally explains that these risks can be mitigated by, amongst other things, the use of EPC contracts which include a fixed price clause. Cost overruns and underperformance are potential risks faced by IPPs. Ogutuga (2006) mentions low performance, changes in law and force majeure as risks. The author states these risks can be mitigated through operation and maintenance contracts or borne by the supplier through a PPA. Market and political risks are related to the existence of a single buyer through a long term PPA specifying quantities and prices. Risks include currency fluctuations, regulatory risks, government provisions and legal constraints. Market risks can be mitigated through the

use of "off-taker" agreements, which specify that the power purchaser is obliged to pay for the availability of a plant, whether it wants power or not (Ogutuga, 2006).

This view is supported by Ibrahim (2007), who affirms that in the global context, several IPP projects experienced business challenges and risk. These challenges and risks can be categorised into two types; the institutional and operational. Institutional include the reliance on a single customer, the challenges arising from systems planning, and the unilateral change of contract terms and conditions (Siddiqui, 1998). The operational challenges and risks include rising costs of equipment and labour, project approval delays, operational cost overruns as well maintenance challenges. Certain IPPs in East Asia were exposed to technological risks emanating from the use of unconventional and unproven technology, construction delays, poor plant performance and high interest costs (Siddiqui, 1998).

Victor (2004) states that the experience from the international studies shows that a number of IPPs failed due to various challenges that are inherent to the energy industry. These challenges include the inability to recover operation costs, because tariffs are not cost reflective, the lack of equity partners, unfavourable debt arrangements, insufficient revenue stream and lack of business experience and strategic focus.

Pegels (2010) affirms that the Department of Energy Integrated Resources Plan (IRP) of 2010 is largely based on increasing renewable energy as a component of generation mix. Renewable technologies pose several risks that are not experienced by conventional technologies such as coal. For example, the market for renewable energy is quite young, thus subject to volatility and market risk, and according to Michelez et al (2010) this is because conventional energy project developers have been developing and refining methodologies for risk assessments for many years (APEC Energy Group Project, 2008). The number of concentrating solar plants operating in the world is small, for example (Pool & Coggin, 2013), and the challenges that this technology will face in South Africa are not known. Financial institutions factor in these issues in the credit risk profiling, thus pushing up the cost of financing (Edkins, Winkler & Marquard, 2009). This may be aggravated by the fact that renewable energy experience makes it difficult for entrepreneurs to utilise private capital market funding. Figure 2.8 below further highlights the key risks associated with renewable energy

Figure 2.8: The renewable energy lending cycle

Source: Pegels (2010: 49).

According to the figure above, renewable energy projects are exposed to market risks, technology risks, reputation risks, the risk of a change of legislation and the high cost of lending. Financial institutions, on the other hand, influence corporate rating and costs of capital based on the technology risk profile (Pegels, 2010).

The risks identified above makes it necessary for a proposed business model to mitigate against these risks. To test these components of the proposed business model in their ability to factor in these risks, a number of hypotheses were tested;

$H1_0$ - The pre-investment phase of planning for an IPP is essential for IPP business success.
H1a - The pre-investment phase of planning for an IPP is not essential for IPP business success.

$H2_0$ - Post-financing activities for an IPP are essential for the success of an IPP.
H2a - Post-financing activities for an IPP are not essential for the success of an IPP.

A number of pre-investment and post-investment activities exposes IPP enterprises to a risks such as construction risks, technology risks and market risks. Additionally, certain operations of the IPP are also identified as having potential to impact on the operational and financial performance of an IPP (technology and operational risks). Proposed hypothesis in this regard are the following;

$H4_0$ - Grid access management is an essential for successful plant operations.
H4a - Grid access management is not essential for successful plant operations.

$H5_0$ - The management of O&M operations is essential for successful IPP plant performance.
H5a - The management of O&M operations is not essential for successful IPP plant performance.

$H7_0$ - The management of supply chain operations is essential for successful IPP plant operations.
H7a - The management of supply chain operations is not essential for successful IPP plant operations.

Market risk emanated as one of the business risks of IPP and therefore the proposed business model should be tested against its ability to limit the business from being exposed to this risk. Hypothesis were developed to analyse the extent to which the business model addressed this risk;

$H9_0$ - Management of community affairs is essential for IPP plant success.
H9a - Management of community affairs is not essential for IPP plant success.

$H10_0$ - Unbundling of the power sector is an essential requirement to enable effective and efficient performance of the IPP sector.
H10a - Unbundling of the power sector is not an essential requirement to enable effective and efficient performance of the IPP sector.

$H11_0$ - Opening up the IPP sector for smaller players will make the IPP sector more attractive to SMMEs.
H12a - Opening up the IPP sector for smaller players will not make the IPP sector more attractive to SMMEs.

$H13_0$ - More access to funding for smaller players will encourage diversity in the IPP sector.
H13a - More access to funding for smaller players will not encourage diversity in the IPP sector.

A report by Bayliss and Fellow (2000) lists a number of governments where IPPs have been established and have experienced difficulties. For example, IPPs in countries such as Pakistan and Indonesia have been engaged in protracted legal battles with their respective governments. In the Philippines and the Dominican Republic, electricity utilities have been crippled by payments due to IPPs. The general terms offered to IPPs have led to questions being asked about the generosity of such terms and attempts to limit the damage caused by such arrangements in countries such as Croatia and Hungary.

2.12 INTRODUCTION TO THE SOUTH AFRICAN POWER SECTOR

In 2008, South Africa experienced load shedding (power interruptions), because more than 20% of Eskom's generating capacity was not available (Centre for Development Enterprise, 2010). Gold and platinum mines had to suspend operations for several days to prevent the national grid from crashing. The electricity interruptions lasted until May 2008, and caused an immense interruption of the economic system (Public Protector, 2008). The mining sector output contracted by 21%, and manufacturing, services and tourism were badly affected (National Energy Regulator of South Africa, 2008). This led the GDP growth to fall to its lowest rate in six years, and business confidence to reach a 24 year low, as confirmed by Rabobank (2009).

Yelland (2014) explains that there has not been enough investment to increase generation capacity in the past twenty years in South Africa, leading to the reduction of the reserve margin to 1.7% by 2014, well below the required level of 15%. This requires an addition of 4000-5000 MW to ensure that South Africa has a comfortable reserve margin (Trollip et al., 2014). South Africa needs competition and private sector investment (in the form of IPPs) to ensure the continuity of supply, according to the South African government. It needs an independently owned and operated transmission grid (Pickering, 2010).

Mfundisi (2011) concurs that the history of this energy deficit can be traced back to low prices of electricity in South Africa. The government favoured capital and energy-intensive industries, and therefore heavy industry was able to flourish in South Africa. Residential customers were dependent on low-cost electricity for their daily needs. In addition, after 1994 Eskom received a mandate from the government to extend electricity access to households which had previously no access to electricity through the apartheid state (Davidson, 2006). Even though there was an increase in demand, Eskom had not invested in new capacity since

the 1980s and there was a backlog in the maintenance of power plants, transmission grids, as well as distribution power lines to municipalities (Lloyd, 2013). In addition, price discrimination occurred because industrial customers and large mining customers were in a position to negotiate lower fees, which were not enjoyed by residential customers.

The Wood Mackenzie Report on South Africa's Power Market (2013) states that in 2010 the DOE developed and published the Integrated Resource Plan (IRP 2010), which provides a proposed generation plan for South Africa until 2030. This plan provides for the introduction of IPPs through a competitive bidding process and the signing of PPAs to sell electricity to Eskom and an entity that will be established later for this purpose.

2.12.1 The current structure of the South African electricity market

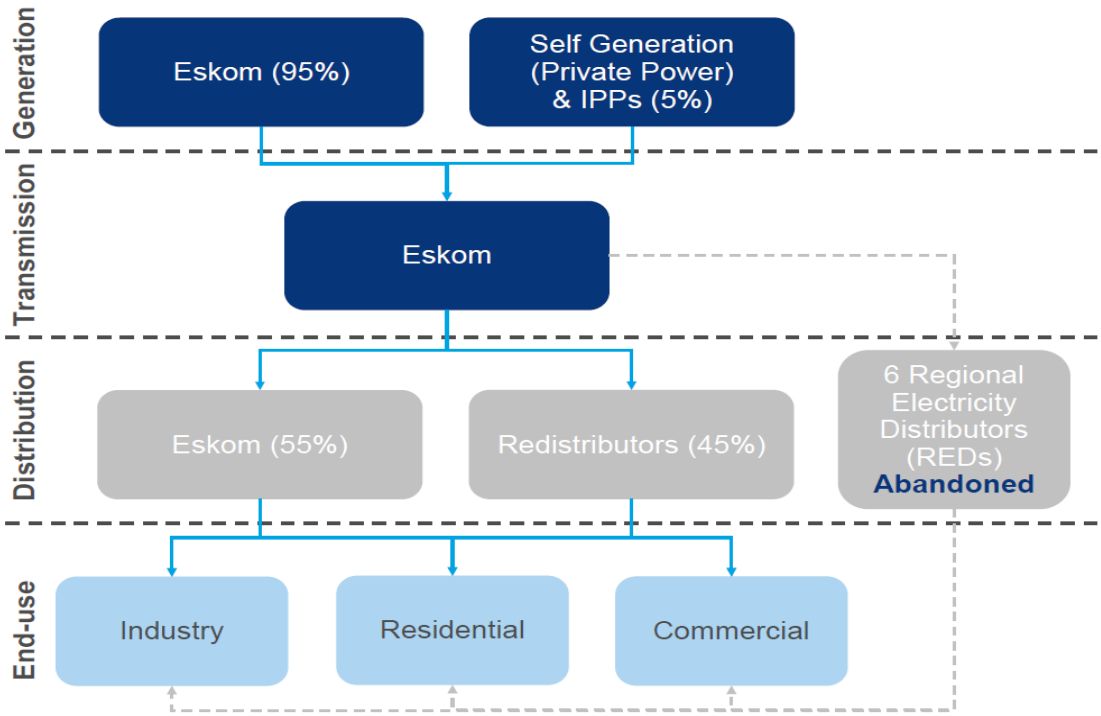
The Wood Mackenzie Power Sector Report (2013) states that Eskom is the predominant player in the South African electricity market and generates 95% of the electricity in South Africa. The National Energy Regulator (NERSA) is responsible for pricing, infrastructure planning and the enforcement of licence conditions.

During 1996 the government had planned to restructure the current structure of the South African electricity supplier by the introduction of six distribution regions (Regional Electricity Distributors - REDS) to take over the distribution of electricity from the municipalities and Eskom. Lloyds (2013) affirms that this plan was preceded by the Energy White Paper which hoped to achieve a number of objectives that include a need to give customers a right to choose their electricity supplier and to introduce competition in the industry, especially the generation sector. Another objective was to permit open and unlimited access to the grid and to encourage private sector participation in the industry.

The Renewable Energy Feed-in Tariff Act of 2006 was introduced as a means to allow renewables IPPs to participate in the power sector (Musango, Bakimole & Brent, 2011). This plan was abandoned in 2010 as it was deemed unconstitutional and did not attract enough attention from IPPs.

Figure 2.9 overleaf shows the current structure of the South African electricity sector.

Figure 2.9: The South African electricity market



Source: Wood Mackenzie (2013: 66)

Figure 2.9 demonstrates the electricity sector as envisioned in the White Paper on Electricity. It is characterised by both IPPs and Eskom playing a prominent role in the power sector. Instead of Eskom dominating the generation sector, this will be shared with the IPPs. In addition, the distribution market will be shared between Eskom and Redistributors who will distribute electricity to industrial, residential and commercial customers.

The Electricity Supply Industry (ESI) is organised along the lines of a traditional public monopoly model, with Eskom being responsible for power generation, distribution and transmission (Gaunt, 2005). From the time Eskom was established until 2004, it operated as a non-profit (dividend free) and tax-exempt public utility with explicit and implicit government guarantees for its debt (Nel, 2011)

Mfundisi (2011) states that Eskom has always had a monopoly in the power sector since it was formed in 1923, providing electricity from coal-based sources. It has been vertically integrated covering all the main domains of electricity provision: generation, transmission and distribution (distribution is performed in conjunction with municipalities.)

Eberhard (2001) explains that this assisted Eskom in managing to charge low prices for a long period, giving the impression that it was efficient and hence that there was no need for

reforms. In actual fact, the low prices and the ability to fund electrification were a result of the fact that Eskom received a subsidised forward cover from the SA Reserve Bank that helped them to keep the cost of generation low (Marquard, 2006). Low debt and lower financing costs also helped Eskom to keep its financing costs low (Steyn, 2006; Bekker et al., 2008). In addition, municipal distributors experienced problems with numerous of the smaller municipalities having been poorly managed and having poor financial controls, leading to them not being able to raise finance and having poor operational efficiencies (Conradie & Smith, 2000).

One of the main criticisms levelled against the current structure of the electricity industry in South Africa is that Eskom owns the transmission infrastructure and the amount and speed of new connections is dependent on Eskom's investment into the expansion of the grid's capacity (McRae, 2016). Additionally, with Eskom responsible for 95% of electricity generated, it is still a monopoly, determining the price of electricity (subject to the limitations of Energy Regulator). Pricing constraints still exists where municipalities cannot buy power at rates above Eskom rates which do not take the business operating costs associated with electricity down-time into consideration (Promethium, 2016).

The traditional vertically integrated utility does not respond fast enough to the changing market dynamics. This is attested to by Njikelana (2014) who state that Eskom has not been able to respond to emerging technologies such as embedded generators and off-grid systems by residential and commercial customers. This will lead to a situation similar to that of when mobile phones replaced land lines. If this situation remains unchecked, it might lead to situations where Eskom is reduced to supplier of backup power. Other criticism labelled against the current structure of the industry is that the dependence on coal for the majority of power generated has negative environmental impact in terms of carbon and other emissions. There is also limited ability to attract investment in a sector that is still monopolised by Eskom, and access to energy for the poor is still limited because of the escalating costs of electricity (Teljeur et al , 2016).

According the South African Department of Energy (DOE) (2012) tenders were awarded to companies that would build and operate power plants to generate and sell electricity to Eskom in 2011. Forty-seven (47) companies were awarded tenders in Window 1 and Window 2 of the bidding process. These companies are either new start-ups in the energy sector in South Africa or have experience outside South Africa and are entering the SA energy industry for

the first time. The DOE strategic plan envisages that IPPs should be contributing 30% of the country's generating capacity by 2030, which should meet the energy requirements for South Africa (Nel, 2010).

2.13 THE SOUTH AFRICAN POWER SECTOR REFORMS

Wenzel (2007) acknowledges that government policy in South Africa, since 1994, has shifted its focus towards the implementation of the Washington Consensus aligned policies that emphasise developmental effectiveness towards Thatcherism and the notion of lean state efficiency. Scott-Samuel et al. (2014) define Thatcherism as the adoption of key neo-liberal strategies such as financial regulation, trade liberalisation, and the privatisation of goods and services, concepts which were popularised by then UK Prime Minister Margaret Thatcher. Wenzel (2007) questions the reasoning behind this shift from a developmental state to neo-liberalism. (Scott-Samuel, 2014) defines neo-liberalism as a political program that includes the deregulation of the labour and financial markets, the privatisation of main utilities and state enterprises, amongst others, and whether this perspective was justified considering the country's huge social needs and limited state capabilities. Reitzes (2009) defines the developmental state as the state that, inter alia, recognises the indispensable role of the state in providing goods and services, implementing a comprehensive security system, and implementing a comprehensive developmental strategy.

2.13.1 The historical development of the electricity sector in South Africa

Inglesi-Lots and Blignaut (2011) summarise the state of electricity sector reforms in South Africa as consisting of three phases; phase one lasted from the late 19th century to the 1900s and consisted of the existence of small electricity systems that were set up by local authorities as well as by the mines. The second phase, from the late 1900s to the 1920s, consisted of the development of a generation monopoly in the Witwatersrand region responsible for the provision of electricity in the mining industry. Phase three has lasted from the late 1920s until the present, and consisted of the establishment of the state utility, Eskom. It led to the transition towards an integrated national system with Eskom as the generator, transmitter and main distributor of electricity.

Eberhard (2001) describes the historical development of the South Africa power sector as consisting of numerous phases. The first phase commenced in 1882 with the first electric street lights, and the development of municipal, mine and power stations. According to

Inglesi-Lots and Blignaut (2011), this phase was characterised by the existence of small electricity systems set up by local authorities in cities, as well as large electricity systems from self-producers. Steyn (2006) adds that a diverse range of provincial acts and municipal by-laws governed the electricity supply industry, due to the lack of national legislation.

The second phase commenced in 1922 with the promulgation of The Electricity Act, creating ESCOM (Electricity Supply Commission), the Electricity Control Board. This phase lasted from the late 1920's until early 1940s and led to the development of a generation monopoly that was designed to provide electricity to the mining sector in the Witwatersrand (Inglesi-Lots & Blignaut, 2011). ESCOM was, according to Steyn (2006), intended to be financially independent from the state from its inception and function as a semi-autonomous corporation.

In 1948 ESCOM outlasted the major private generator, and competition is extinguished. Marquard (2006) and Gentle (2006) state that this era was defined by the decision by ESCOM to acquire the assets of the Victoria Falls and Transvaal Power Company (VFTPC), which was an independent power generator supplying the mining sector in the Witwatersrand. This consolidated ESCOM as having a monopoly and eliminated all competition. In 1973 the national grid is integrated, with increased economies of scale. Marquard (2006) states that this era was notable because of a series of events: the extension of the ESCOM supply areas as well as the construction of the national grid.

The 1970-80s was characterised by overinvestment. This era was characterised by low cost electricity, which was an integral part of South Africa's economic and industrial development (Trollip et al., 2014).1983-7 the establishment of a government commission and the new Electricity Act took place. The De Villiers Commission was established because of the energy crisis in the 1980s, which was the result of the steep increase in Escom's tariffs and its impact on the cost structure and competitiveness of the South African economy. The Commission recommended that Escom be restructured and that the capital expansion programme be slowed down (Bekker et al., 2008).

In the 1980s new governance, commercialisation, reduced investment. Marquard (2006) states that this era was characterised by ESCOM taking over the control of electricity distribution in most urban and rural areas, which were previously under "black local authorities." The Electricity Act was amended in 1987 and allowed for the scrapping of ESCOM and the establishment of Eskom, a state-owned utility (Gentle, 2006). The international transmission

grid network was established in Southern Africa to allow for limited regional trade. In the 1990s numerous political reforms took place; Reconstruction and Development Programme (RDP), self-imposed structural adjustments, Growth, Employment and Redistribution (GEAR) policy, and reform of state-owned entities. Eberhard (2001) and Davidson (2004) are of the view that the biggest challenge of the democratically elected government of the ANC in the 1990s was to tackle the legacy of apartheid, mainly through widening the access to affordable electricity services for the period between 1994 and 1999, which can be classified, from a policy and institutional point of view, as a transitional period, according to Bekker et al (2008). Only 30% of the South African population had access to electricity, and a key RDP goal was to make 2.5 million new connections to the grid. In addition, the capital costs of power plant construction were subsidised by the government and were funded by Eskom.

Eberhard (2001) supports this view in that the dominant trend in the evolution of the power sector in South Africa was that Eskom consolidated its growth and developed into a large, powerful and integrated state monopoly (Gentle, 2006). In the process, Eskom took over most of the early power producers and became responsible for new energy supplies. The main drivers for Eskom to occupy a central role in power generation were that the government wanted to realise the economies of scale of power plants and tap into the enormous amounts of capital that could be accessed through government guarantees, in addition to that, electricity became an essential ingredient of the state's industrial policy (Marquard, 2006).

Eberhard (2001) further explains that industries such as telecommunications, rail, and sea transport, air, water, nuclear energy and coal based synthetic fuels were becoming dominated by the state. The state decided to hold on to the assets which were deemed essential to the realisation of the state socio-economic imperatives, and according to Macdonald (2006) this included the iron and steel industry. These were thought not to be suitable for competition and private ownership, and the state viewed these industries as key instruments for industrialization, employment creation, and economic development.

Mfundisi (2011) states that the main industrial and commercial customers had traditionally bought their electricity from Eskom, whilst a substantial proportion of residential customers have done so through municipalities (as distribution agents). Eskom pursued a comprehensive build programme in the 1970s aimed at boosting the generation capacity of the utility (Hansen, 2002). This saw Eskom add a significant number of coal-based plants to its fleet (Strategic Leadership for Africa's Public Sector, 2013). This led to excess capacity when

demand did not grow as much as expected, leading to an increase in tariffs to fund the expansion programme. From the 1990s to the 2000s there was no addition to generational capacity because of excess capacity, and the price of electricity gradually decreased, because of this excess capacity (Strategic Leadership for Africa's Public Sector, 2013). Up until 2004, South Africa had the lowest electricity tariffs in the world, backed by a reliable electricity supply and an abundant supply of coal (Kessides, Bogetic & Maurer, 2006).

2.13.2 Rationale for reforms

According to Thopil and Pouris (2013), because of the ability of electricity supply utilities to control access to electricity and the price of electricity, and because of their monopolistic nature, their performance and regulation has received attention to since the 1990s (Karekezi and Kimani, 2002). In addition, access to and cost of electricity supply and capacity are vital for economic growth.

According to Eberhard (2001) and Jerome (2004), the reforms in the electricity sector in South Africa are taking place against the backdrop of radical transformation of the political, economic, and social institutions in South Africa. The main challenges of the economy were increasing the level of private sector investment, improving economic growth rates, creating employment, and increasing the rate and quality of service delivery to the poor. A number of legislative prescriptions have been approved since 1994 to address the socio-economic and political challenges that the country faces. According to Reitzes (2009), these include the Reconstruction and Development Programme (RDP) of 1994, The Growth, Employment and Redistribution (GEAR) policy of 1996, and South Africa's commitment to the Millennium Development Goals (MDG) of 1999. According to Jerome (2014), these reforms had a natural impact on the state-owned Enterprises (SOEs) and the electricity sector, in that the government viewed SOEs as tools to drive national economic and social goals. For example, Telkom and Eskom were tasked with the acceleration of the rollout of their services to the poor, and according to Ayogu (2001:14) the state regarded these institutions as tools to achieve "efficient, effective and powerful engines for socio-economic development." Phaahlamohlaka (2006) affirms that at the same time the thrust of government policies such as GEAR were directed towards the liberalisation of markets and increased competition and privatisation, which meant gradual reform and liberalisation of the SOEs.

Kuye (2006) asserts that reforms in South Africa have to be understood from the confines of historical perspectives and political accommodation. Such changes can occur as a result of

economic developments (positive or negative), social changes, urbanisation (for example in the 1930s) or political change (for example pre- or post-1994). In addition, according to Eaton, Kaiser and Smoke (2010), reforms are seen as creating the devolution of responsibilities away from a centralised bureaucracy through transformation of structures, policies, human resources capacity and financial viability.

According to Mosley and Adefulu (2002), the Electricity White Paper identified issues limiting the ability of the electricity sector to serve its customers effectively and efficiently. These included the fragmented electricity industry, the existence of 120 municipalities that supply fewer than 1000 customers, and more than 90 municipalities earning less than a million Rand per annum. The municipalities had differing financial strengths and there were wide disparities in the prices paid by customers, which were not in line with the costs associated with the electricity supply (Kessides, Bogetic & Maurer, 2006). Other issues identified in the White Paper include the inability to capture economies of scale from power generation, skill specialisation and the inability of poor regions to fund electricity infrastructural programmes.

According to Wilson and Adams (2006), security of supply is one of the key issues facing the electricity industry in South Africa, including the government and customers. The key aspect in securing the security of supply is the need for the accessibility of adequate generating capacity to meet demand at any given time, and a dependable transmission system to distribute electricity to all customers throughout the country (Trollip et al., 2014). This task of providing a reliable power supply is a trade-off between the costs involved in providing secure electricity, and the economic loses and customer benefit associated with power interruptions (Foster & Steinbucks, 2009).

The World Future Council report (2010), titled "Renewable Energy Policies in South Africa," affirms that the objectives of the White Paper on Energy Policy, which was published in 1998, gave a clear indication of the challenges the power sector reforms are meant to address. They were supposed to address the energy requirements of the poor would as a result improve social equity. They should provide low-cost and high-quality electricity inputs to industrial, mining and other sectors would assist in enhancing the efficiency and competitiveness of the South African economy. Lastly, short and the long-term usage of natural resources would assist in achieving environmental sustainability.

The World Future Council (2010) further asserts that The White Paper emphasised the importance of ensuring energy security by diversifying supply. Furthermore, it is stated that the success of the electricity supply sector is dependent on government considering various developments over time, including the consumers' ability to choose a supplier, the introduction of competition in the industry (especially the generation sector), allowing non-discriminatory access to the system and encouraging private players to participate in the power sector.

According to the Trade and Industrial Policy Strategies (TIPS) report titled "Competition and Regulation in the Electricity Supply Industry in South Africa" (2002), the Minister of Minerals and Energy stated further government reform objectives at the 2000 Ministerial Workshop on Electricity Supply Industry Reform as to reduce prices by increasing economic efficiency in investment decisions and operations, making it possible for the government to achieve financial and economic returns from the electricity supply industry. It was also to allow black economic empowerment to take place, and to ensure that the poor have more access to energy, that energy efficiency initiatives are ongoing, and that R&D and environmental sustainability continue to benefit the public.

A report by Eskom's Project Development Intelligence Department (PDI), titled "Analysis of Energy Policy" (2013), asserts that The Eskom Conversion Act was another essential milestone in the electricity sector reforms in South Africa. This Act converted Eskom into a public company, with its majority share capital held by the state. This Act required Eskom to pay dividends and taxes to the state and was an essential step towards bringing about more efficiency and competitiveness in the running of Eskom and exposing it to global trends (Gentle, 2006).

Eberhard (2001) further provides an indication of what South Africa needs to reform including the need to address generation and distribution efficiencies and prices: Eskom prices are currently below economically sustainable levels and government will want to ensure that price increases are stable over time (Nel, 2011). With large capacity constraints experienced in South Africa, price fluctuations might be experienced until the next capacity investments are made to relieve constraints. Reforms are needed to ensure that imperatives for BBBEE are realised, and to deal with investment inefficiencies. Eskom generation assets provide an opportunity to ensure that the majority of people can participate in the economy and the BBBEE transformation imperatives are realised (Davidson & Winkler, 2003).

Eberhard (2001) asserts that within this context there was a need to deal with macro-economic reforms and be aware of international trends in electricity supply reforms. In addition, Eskom and other state utilities have provided little financial return for the government; but on the other hand Eskom has financed the vast electrification programme. Phaahlamohlaka (2006) affirms that the restructuring and reforms of the South African electricity sector and other countries in Africa are designed to ensure that the government can extract value from these public utilities in the form of annual cash flows or lump sum payments on liquidation. Such an income could be used to reduce government debt.

Sampsons (2008) states that energy planning is a key driver of electricity market reforms. The key challenge is to make electricity available to users at the right price and time, and to ensure that demand does not outstrip supply. Planning means the ability to anticipate and react to change early enough to ensure continuity of supply. Long-term planning provides the ability to cater for changes in technology that will see old coal and nuclear plants being replaced by gas power and offshore wind and solar energy (Eskom Gas Strategy Briefing, 2014). Government planning is faced with several challenges that stall projects to such an extent that potential investors become reluctant to invest in government projects, especially in the power sector (Presidential Infrastructure Coordination Commission, 2012). Energy planning means good demand forecasting methodologies, making predictions about future fuel prices, as well as choosing the best technology in terms of efficiency and addressing capacity constraints.

South Africa's domestic savings levels are low and the country needs to attract more international capital into fixed domestic investments (Arvanitis, 2006). Capital markets have an interest in investing in well-regulated electricity markets (International Energy Agency, 2003). There is a general expectation that Eskom can contribute positively towards regional and African development, as it is the biggest utility in Africa and one of the top 20 utilities in the world in terms of generation capacity (Globaldata, South Africa Power Market Outlook, 2014). For example, Eskom, in partnership with Duke Energy, is developing a roadmap for the electrification of Southern Africa, with the intention of ensuring that 500 million people have access to modern energy services by 2025 (Eskom Sustainable Development Unit, 2013). In addition, the creation of an investment and competitive market in the region would encourage investment, particularly in the hydro-power and natural gas-fired plant technologies (Creamer, 2012).

This section has examined the rationale for power sector reforms, in South Africa and attempted to address the key reasons and drivers for the reforms. The following section will look at how the reforms were structured, and the nature and type of these power sector reforms.

2.13.3 The structure and nature of reforms

According to Narsiah and Ahmed (2011), the root of South Africa's public sector reforms lies within the global neo-liberalisation phenomenon that has taken place in numerous developing countries. This neo-liberal drive has prompted developing countries to transform their public utilities and assets into corporate controlled property, and promulgated the introduction of free market policies to most of the developing countries' markets (Wenzel, 2007). The failure of the Keynesian discourse in the 1960s was largely due to the failure of government intervention in the private sector to deal with macroeconomic crises, such as stagflation and instability in the global commodity markets and business. Keynes believed that governments were instrumental in job creation and economic growth through increased government spending, designed to expand consumption and economic growth (Ebeling, 2004). After the macro-economic crises of the 1970s, numerous countries realised that transformation of the economic sector was necessary to free economies through private participation and the reduction of the role of the state in the macroeconomic environment (Eatwell, 2011). This era is known as that of neo-liberalism and was largely driven by Margaret Thatcher in the UK and Ronald Reagan in the US (Scott-Samuel et al., 2014).

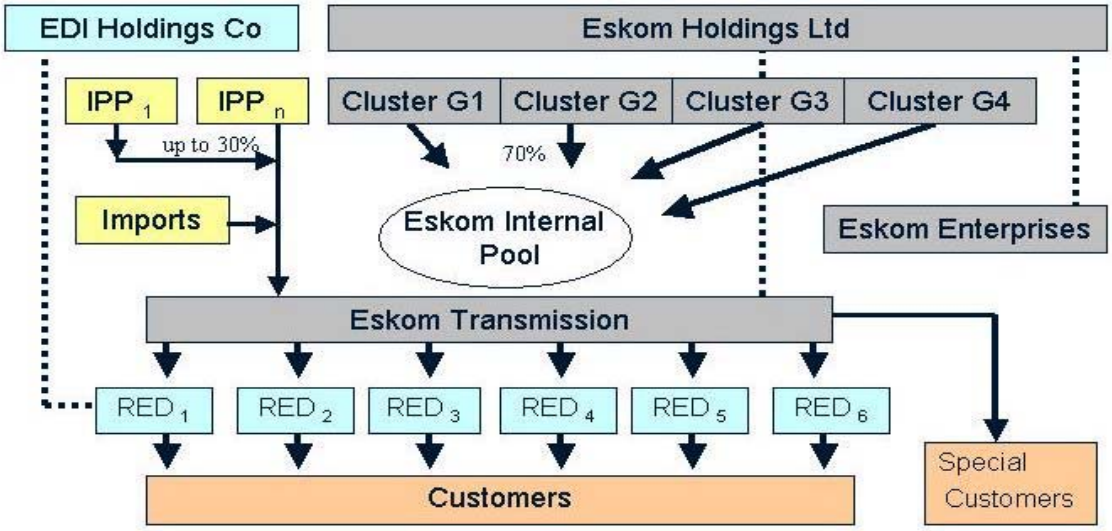
Narsiah and Ahmed (2011) further state that the neoliberal determination was evident in the Reconstruction and Development Programme (RDP) blueprint that was adopted by the ANC government in 1994. This programme was designed to improve the macroeconomic position of South Africa through reduced fiscal deficit, the introduction of intensive labour market reforms, increasing government capital expenditure and the containment of government expenditure in real terms as well as reducing the government dissaving. The RDP White Paper provided the foundation for later economic policies such as the National Strategy for Growth and Development (NSGD) and Growth, Employment and Redistribution (GEAR) which were instrumental in driving this neo-liberal agenda through such measures as the reduction in the government deficit, as well as the restructuring of state assets (Visser, 2004).

According to Ayogu and Hodge (2001), GEAR has a component that focusses on asset restructuring which was directed at the privatisation of state-owned enterprises to use them to

augment revenue and to improve economic efficiency. The extra revenue from privatisation would be used to reduce the budget deficit, allow social expenditure levels to be sustained and would mean improved delivery of social services through improved competition (Jerome, 2004). The asset restructuring programme, however, only managed to produce a sale of a 30 percent equity stake in both the telecommunications operator and the airports company. The key government enterprises in the energy, transportation, and telecommunications sectors were not successfully reformed (Jerome, 2010). This is an indication that any future endeavours to privatise key state enterprises might be met by resistance, and Eskom will remain a key state asset for the short to medium term.

Mosley and Adefulu (2002) state that The White Paper on Electricity released in 1998 recommended that Eskom be unbundled and sell 30% of its generation assets, to build new capacity through IPPs. The reform would be initiated through the establishment of six distribution companies which would take over the distribution of electricity from Eskom. These distribution centres would be created from the amalgamation of Eskom and the relevant municipal distributors into a company called EDI holdings. The proposed distribution centres were chosen with the intention of balancing off implementation costs and financial independence, each consisting of a mix of urban and rural customers supported by a single urban load centre (Marquard, 2006). The White Paper provided the mechanism for the transfer of employees, assets, liabilities and rights and obligations of Eskom and municipalities to the six unnamed distribution companies. Lastly, the White Paper intended to provide for the introduction of retail competition and for customers to choose their supplier (Newberry, 2007). The figure below shows the proposed restructuring plan according to The White Paper on Energy Policy of 1998 (Eberhard, 2001).

Figure 2.10: The proposed restructured electricity sector



Source: Eberhard (2001: 16)

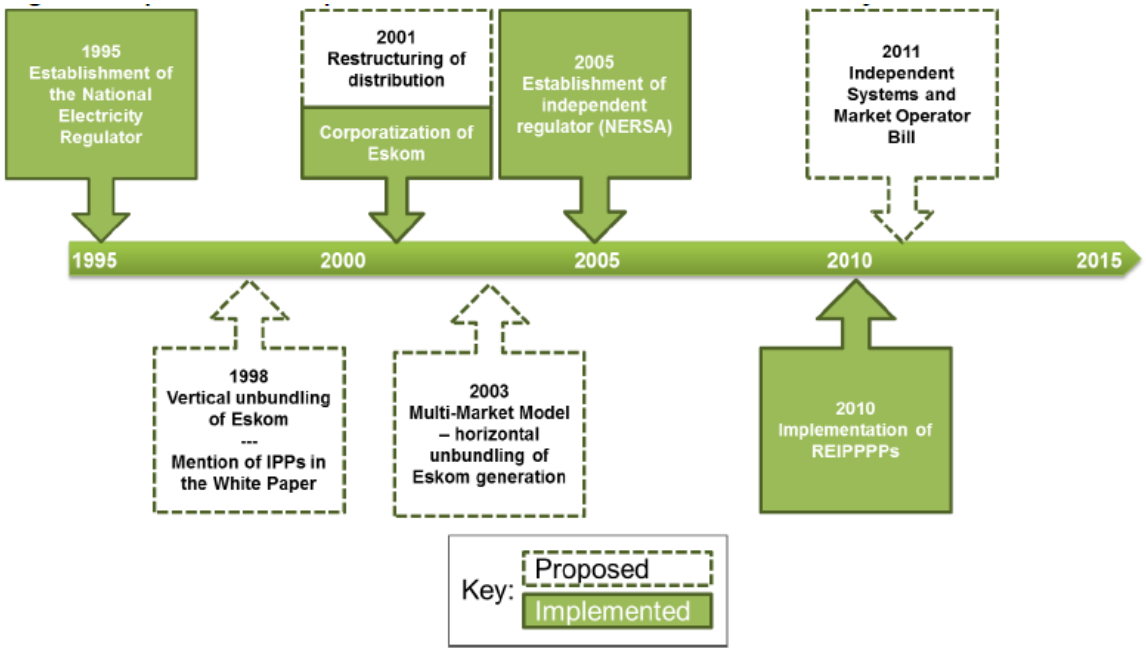
In this structure it was envisaged that Eskom would continue to generate power, supported by a number of IPPs. The Eskom transmission will be responsible for transmitting and selling power to the REDS. These REDS will then sell to customers.

Mosley and Adefulu (2002) state that the government was not successful in introducing IPPs, because it could not attract investors as a result of low electricity pricing based on the marginal cost of producing electricity by Eskom. These would not have offered IPPs a return on investment to encourage their participation at that time. Eberhard and Kolker (2014) support this view and state that in 2009 the government began to explore feed in tariffs (FITs) for renewables energy, but these were rejected in favour of competitive tenders.

Clark et al. (2005) are of the opinion that electricity sector reforms have consisted of a multi-stage process in South Africa, with four major developments: (1) the paradigm shift in energy and electricity policy; (2) the establishment of an independent regulator (The National Energy Regulator, founded in 1995); (3) the corporatisation of Eskom; and (4) the restructuring of the distribution sector planning for the managed liberalisation of electricity markets and

preparation of the tenders to attract IPPs. Figure 2.11 below depicts the timeline of the reforms of the South African power sector since 1995.

Figure 2.11: Implemented and planned reforms in the South African power sector



Source: Teljeur et al (2016:6)

The previous section has provided an overview of the power sector reforms that have taken place in South Africa since 1994. The following section will focus specifically on the introduction of IPPs as part these reforms. The introduction of IPPs is an integral part of the electricity reforms and forms the crux of this study.

2.13.4 The introduction of IPPs in South Africa

The DOE IRP 2010 document and the Renewable Energy Policy document provided a platform for renewable energy IPPs by setting targets as to how much power will be produced from renewables by 2030 (Eberhard & Kolker, 2014). This was done to mitigate the impact of emissions on the environment and to reduce the carbon footprint of Eskom. This target is a combination of solar, wind, hydro, gas, biomass and bagasse technologies (Montmasson-Clair & Ryan, 2014).

Eberhard and Kolker (2014) assert that the failure of Renewable Energy Feed in Tariffs (REFIT) resulted in the establishment of the Renewable Energy Independent Power Producer Procurement Programme (REIPPP). By May 2014, a total of 64 projects had been awarded to the private sector with an investment totalling 140 billion Rand, with the capacity to generate 3922 megawatts (MW) of renewable power. Figure 2.12 overleaf provides a breakdown of

projects for Window 1 and 2, the different technologies financed, the project size, the average tariff awarded, as well as the project capital costs.

Figure 2.12: Summary of the results of Window 1 and 2 of the REIPPP

	Wind	PV	CSP	Hydro	Biomass	Biogas	Landfill	Total
WINDOW 1								
Capacity offered (MW)	1850	1450	200	75	12.5	12.5	25	3625
Capacity awarded (MW)	634	631.5	150	0	0	0	0	1415.5
Projects awarded	8	18	2	0	0	0	0	28
Average tariff (SAc/kWh)	114	276	269	N/A	N/A	N/A	N/A	N/A
Average tariff (USc/kWh) ZAR8/$	14.3	34.5	33.6					
Total investment (ZAR mill)	13312	23115	11365	0	0	0	0	47792
Total investment (USD mill) ZAR8/$	1664	2889	1421					5974
WINDOW 2								
Capacity offered (MW)	650	450	50	75	12.5	12.5	25	1275
Capacity awarded (MW)	562.5	417.1	50	14.3	0	0	0	1043.9
Projects awarded	7	9	1	2	0	0	0	19
Average tariff (SAc/kWh)	90	165	251	103	N/A	N/A	N/A	N/A
Average tariff (USc/kWh) ZAR7.94/$	11.3	20.8	31.6	13				
Total investment (ZAR mill)	10897	12048	4483	631	0	0	0	28059
Total investment (USD mill) ZAR7.94/$	1372	1517	565	79	0	0	0	3534

Source: Eberhard and Kolker (2014: 14)

Based on the figure above both Window I and 2 received successful bidders across all approved renewable technologies, which included wind, solar, CSP, hydro, biogas and landfill. The table displays the different capacities offered and awarded for each technology in megawatts, the number of projects awarded, the average tariff in American and South African cents as well at the total capital investment in Rands and dollars.

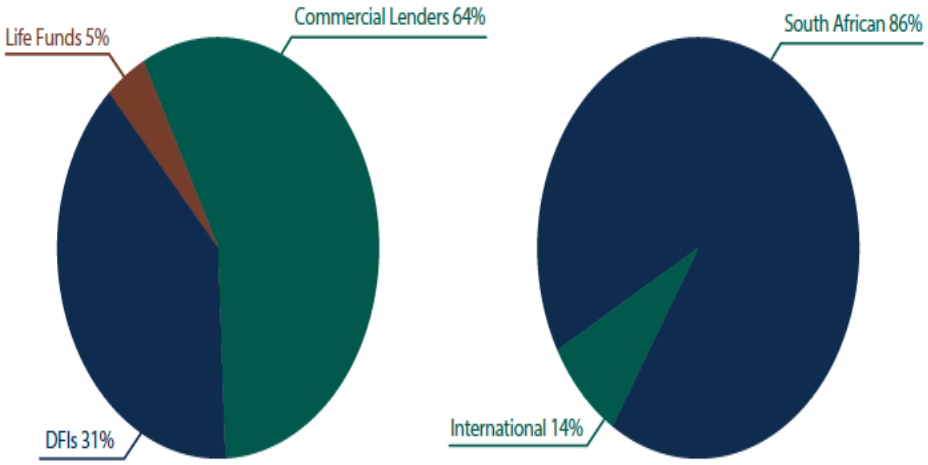
The DOE document titled the "Renewable Energy IPP Procurement Programme" (2013) states that the initial Request for Proposals (RFP) was first published in August 2011, and ultimately 28 preferred bidders were selected, offering 1416 MW of electricity, with an investment of close to 60 billion Rand. Major contractual agreements were signed in November 2012 and most of the projects reached financial close thereafter. The first projects started coming online in November 2013. These projects include the 75 MW Khathu solar plant in the Northern Cape, which came online in May 2014 (Engineering News, 22/02/2015). Other projects which had been connected to the grid by July 2015 include the Solar Capital 75

MW solar project in De Aar in the Northern Cape, The Acciona Energy 40 MW Solar project in the Northern Cape and the Scatec Solar 40 MW project, which started operating in July 2014 (Engineering News, 27/02/2015). Tenders were evaluated taking into account different parameters such as the environment, land, commercial and legal, economic development, financial and technical factors (South African Department of Energy, 2013). Commercial consideration, for instance, took into account the project structure and bidders' acceptance of the Power Purchase Agreement (South Africa Department of Energy, 2013). The second level of bidding was split into two, with bid prices contributing 70% of the requirements, while 30% took into account requirements such as job creation, local content, ownership, management control, preferential procurement and socioeconomic development (South Africa Department of Energy, 2013).

The South African Department of Energy (2013) further states that the second round of bidding started in November 2011. Nineteen (19) bids were selected for this round for implementation. Power purchase and direct agreements were signed for these bidders. This round saw prices becoming more competitive, and bidders offered better local content terms. The third bidding round commenced in May 2013 and 17 preferred bidders were selected, totalling 1456 MW (Montmasson-Clair & Ryan, 2014). Prices continued to fall and the local content requirements were further improved.

Eberhard, Leigland and Kolker (2014) state that the first three rounds of the REIPPP saw domestic and international project developers, sponsors and equity shareholders taking part. The successful bidders involved a combination of over 100 shareholder entities, which included banks, insurers, Development Finance Institutions (DFIs) and even international utilities. In addition, debt funding consisted of commercial banks (ZAR57 billion), DFIs (ZAR27.8 billion) and pension and insurance funds (ZAR4.7 billion). Figure 2.12 below shows the share of projects financed in the three Windows of bidding.

Figure 2.13: Share of debt financing of the REIPPP rounds 1, 2 &3



Source: Eberhard, Leigland and Kolker (2014: 14)

Figure 3.11 depicts the breakdown of different debt financers for Windows 1-3. Commercial lenders made up the bulk of lending at 64%, followed by DFIs at 31%, and lastly life funds contributed 5% to the funding of these projects. Most of the funding was sourced from domestic markets, which made up 86% of the pie, and the rest was taken up by international funders.

The REIPPP is targeted to create 20 000 temporary construction jobs and approximately 35 000 operational jobs (Montmasson-Clair, Ryan, 2014: 510; DOE, 2013). Local content requirements and ownership requirements assist in supporting local manufacturing by making it compulsory for certain components and parts to be sourced locally (Montmasson-Clair & Ryan, 2014). In addition, ownership requirements oblige international companies to partner with local businesses to enhance capacity building and skills transfer (Montmasson-Clair& Ryan 2014). Lastly, the program is expected to contribute to socioeconomic development with successful bidders expected to take into account the economic and social situation of the surrounding communities. The companies must find ways to make a contribution towards social and economic development of the communities through the income generated from these projects (Eberhard, Leigland & Kolker, 2014).

2.14 SUMMARY

This chapter has provided an overview of the IPPs' business model and how the IPP market is structured. The key business indicators and business risks of the IPP business unit were studied by looking at certain IPPs that operate in North Africa and Middle East. It ha highlighted certain pertinent issues, trends, drivers and restraints of the IPP business sector. The South African power sector and the reform process were described in order to provide a perspective on how the reform process justifies the IPP as a prominent part of this sector. Lastly, the key business indicators and business risks of the IPP business unit were studied by looking at certain IPPs that operate in North Africa and Middle East, as well as the REIPPP procurement programme.

The key reform issues, trends and concepts were also highlighted in this chapter. These are essential because they provide a framework through which the role of IPPs within the electricity industry could be understood. Reforms within the electricity sector were driven by the need to improve operational and economic efficiency, to reduce government expenditure by bringing private partners and IPPs in and to create a competitive electricity industry. This chapter has highlighted the key drivers, benefits and shortcomings of market reforms as well as key success factors.

CHAPTER 3

BUSINESS MODELS AND VALUE CREATION

3.1 INTRODUCTION

The previous chapter highlighted the public sector reforms that took place globally and in South Africa and how these reforms were a prelude to further electricity reforms, as well the introduction of IPPs. This chapter explores the concept of a business model as a representation of how businesses generate revenue and value for their owners and shareholders. This chapter is key to this study because it will assist the researcher in conceptualising the findings from the primary data collection of IPPs into a framework that represents the business model of IPPs in South Africa. A business model is a representation of how businesses earn revenues and capture value for their customers. A number of business models exist in different sectors, including the energy sector (Root, 2014).

Sillin (2004) explains that the traditional utility business model has failed due to disruptive forces emanating from threats such as new technologies, energy efficiencies, and changing customer needs. This has necessitated the establishment of a new business model that can attract capital to the electricity sector to be invested in new generating assets. This model should enable the utility to generate the required rate of return for investors, and provide economic and political stability for investors. The basic IPP business model is an alternative business model that has the potential to change the electricity sector in South Africa.

This chapter expounds on the business model concept and provides various theories and definitions of business models as a business management tool. It also describes the business model components. Different types of generic business models will be explored, as well as utility business models. Gaps between the business models will be identified to allow for an IPP business model to be developed that will effectively address certain identified gaps. Lastly, an overview of the three chapters of the literature review will be provided, showing the key themes emerging from each chapter as well as the relevance of each chapter to this study.

3.2 BUSINESS MODEL CONCEPTS AND KEY LITERATURE

This section explores the concept of a business model in detail, including the definitions theories and the components of business models. Understanding the different

conceptualisations, definitions and components of business models is essential in developing a framework and structure from which a business model for IPPs can be constructed.

3.2.1 Introduction to business models

This section provides an introduction to key business models. There are numerous business models representing a number of industries and combination of elements within each business model. The number of models covered in this section is not exhaustive. The researcher attempted to cover key business models that are provided in different literature sources, taking into account a number of industries.

The traditional balance between customers and suppliers has changed over the past couple of decades due to developments in the global economy in areas such as global trade and technology. These have led to customers having access to more alternatives, transparent supply options, and quality products and services. Enterprise are now under pressure to be more customer-centric, and to re-evaluate the value propositions they present to customers in many sectors. The supply side driven logic of the industrial era has become no longer viable (Teece, 2010). According to Amit and Zott (2010), a business model is a definition of the manner by which the enterprise delivers value to customers, entices customers to pay for value, and generates returns from those payments. It thus reflects management's premise about what customers want, how they want it, and how the enterprise can organize to best meet those needs.

Shafer, Smith and Linder (2004) hold that over the past decade business models have become a prominent feature of the business vocabulary and a positive tool for corporate management; yet there is general confusion as to what business models are and how they can be used. Casadesus-Masanell and Ricart (2011) are of the view that the expression "business model" has been part of the business world for a long time, yet there are still disagreements as to what the term means. They cite Peter Drucker (1954) as the earliest adopter of this concept, but state that the concept only gained prominence amongst academics and practitioners in the last decade or so. Sahut, Hikkerova and Khafallah (2013) assert that the concept of the business model goes back to the 1960s, but re-emerged in the 1990s due to the development of internet services as well as information and communication technology.

Shafer, Smith and Linder (2004) state that that this lack of consensus about the definition of business models may be partly attributed to the fact that interest in this subject draws interest

from various disciplines (for example e-business, strategy, technology, and information systems) which have found a connection to this concept. The authors further provide a definition of a business model as a representation of a firm's underlying core logic and strategic choices for creating and capturing value within their network.

The Technical Task Force of the International Integrated Reporting Council (IIRC) background paper for International Reporting (2012:1) defines a business model as "the chosen system of inputs, business activities, outputs, and outcomes that aims to create value in the short, medium and long term." Wells (2013: 23) supports the definition and describes a business model as "nothing else than the architecture of a firm and its network of partners for creating, marketing and delivering value and relationship capital to one or several segments of customers in order to generate profitable and sustainable revenue streams."

3.2.2 Theoretical foundations of business models and key literature

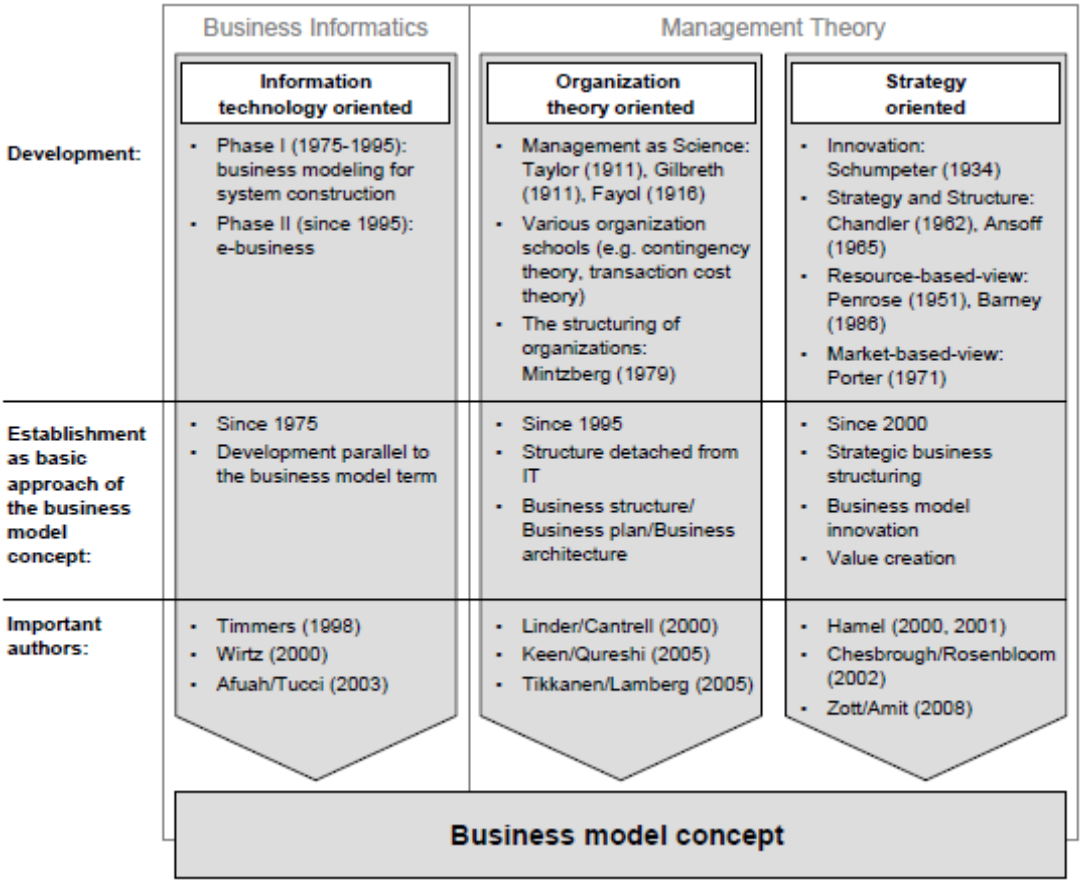
Searle and White (2013) claim that the emergence of business models as a research topic coincided with the growth of online markets and changes to commercial practices in the digital era. The non-existence of an agreed-upon definition of the business model has led to certain authors putting forward ten business model definitions, categorised into four broad areas: e-business, strategic issues, innovation, and technology management. The authors postulate that the most popular definition of a business model is that of Osterwalder and Pigneur (2005:12), who state that a business model "describes the rationale and infrastructure of how an organisation creates, delivers and captures value".

Morris, Shrokova and Shatalov (2007) state that the evolution of business models has gone through four stages. The first stage, which the authors term the appearance stage, occurred in the 1980s. This was part of the computer information system literature, as a way through which the general business operations of a company, including information requirements, accounting needs, and computer technology, might be charted. The focus of these efforts was to explore the ways that web-based companies captured value. This view is supported by Korsaa and Jensen (2010) who further state that by the early 2000s, the use of the concept became prevalent outside internet commerce, and it was recognised that every business has a business model. This was followed by a general increase in publications focussing on describing business models for different firms. Later on, work on this concept expanded to include underlying characteristics of models to serve as a source of innovation, competitive advantage, and economic value.

Amit and Zott (2010) concurs with this view and further argue that the driving factors for the emergence of a business model concept include the emerging knowledge economy, the growth of the Internet and e-commerce, the outsourcing and offshoring of many business activities, and the restructuring of the financial services industry around the world. In particular, the way in which companies make money nowadays is different from the industrial era, where scale was so important and the capturing value thesis was relatively simple. The enterprise simply packed its technology and intellectual property into a product which it sold, either as a discreet item or as a bundled package. The existence of electronic computers that allow low cost financial statement modelling has facilitated the exploration of alternative assumptions about revenues and costs (Teece, 2010).

Lambert (2008) iterates that the development of a business model concept occurred over a long period of time during which it was associated with a number of streams of research and schools of thoughts. This lead to an outcome that in academia there are a number of theoretical approaches to the business model concept, a view supported by Teece (2010). Wirtz (2011), classifies the development the business model theoretical concept into three elements, information technology orientation, organisational theory orientation, and strategy orientation. Figure 3.1 below depicts the different phases of the development of business model theory, the basic approaches to the business model concepts and important authors within each phase.

Figure 3.1: Basic theoretical approaches for the business model context



- **Information technology orientation**

Trimmers (1998), for instance, focussed on providing a framework for the classification of internet electronic commerce business models. This framework was developed on the basis of current commercial internet business and experimental work in European R&D programmes. Afuah and Tucci (2003) explored several models of technological change that are helpful in formulating and executing business models as firms create or respond to technological change. Mutaz, Debei & Davidson (2001) expound that with this stage the business models acted as the base system from which the detailed and operational business process model along with its information systems are derived. A business process is defined in terms of process elements (activities) whose united behavior allows the provision of a particular service information system. The author further argue that although business processes and information systems are derived from the business model, the latter does not define precisely how processes and IS are executed and run in a specific environment. It implies options on which to design different business processes and IS.

Lambert (2008) adds that information systems managers were interested in aspects of the business model that impact on the information technology resources of the entity. They might require a view, for instance, of the business model that shows the division and its relationship with the rest of the business model both inside and outside the organisation. In considering an e-commerce initiative, management need to model the impact of that initiative on the rest of the organisation.

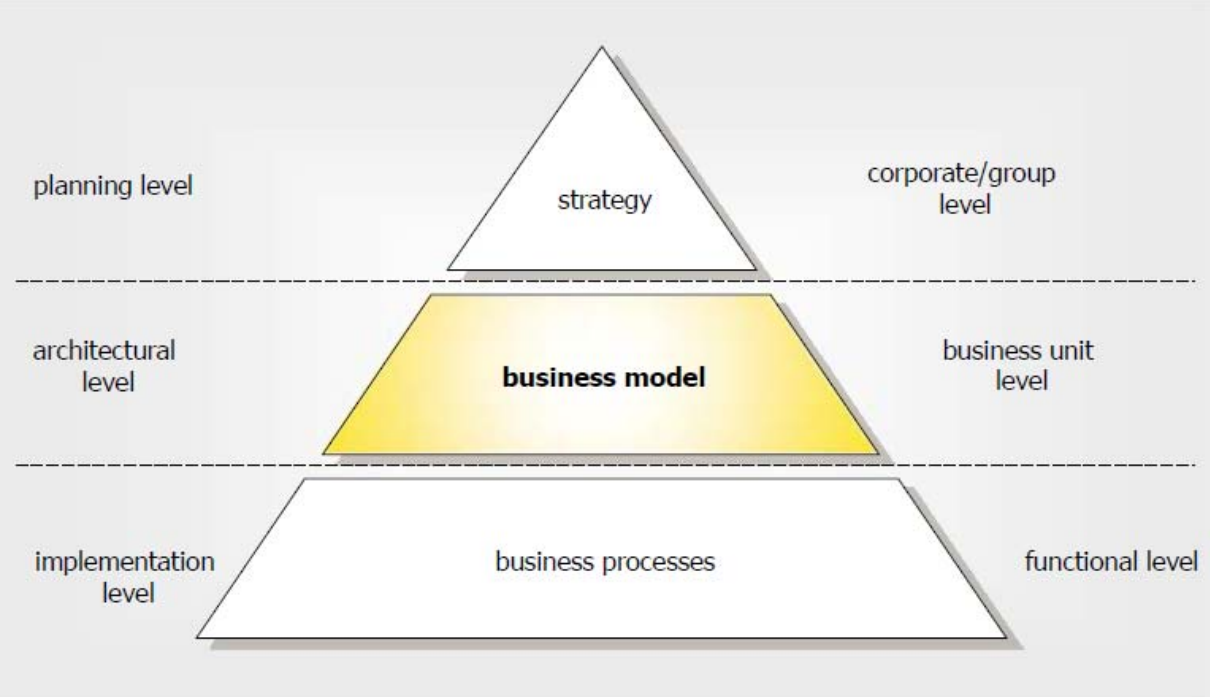
- **Organisational theory orientation**

Wirtz (2011) defined this phase as when authors were attempting to define business models within the broader framework of organisational theory and business school of thoughts. They also set to define business models within the structure of the organisation and business architecture. Prominent authors such as Keen and Qureshi (2006) analysed the business model concept and where and why it differs from more established concepts of business strategy. They illustrated how the application of business models has transformed organisations and the guidance for business model design and the insight it provides into business models and their effects on organizations. The authors also demonstrated how business models can transform organizations, as well as recommendations for business model design. Tikannen and Lamberg (2005) outlined a generic framework for the business model and illuminated its linkages to managerial cognition. They also explored literature focusing on the actions and evolution of a firm and built a synthesis that describes the different components of a business model. The main findings of their study were that a business model is essentially both a cognitive phenomenon as well as being built on the material aspects of a firm.

- **Strategy orientation**

Rajala and Westerlund (2012) view a business model as part of the business planning, business strategy planning and execution process. Figure 3.2 demonstrates that business strategy helps businesses to define means for achieving strategic objectives, and defines what resources and inputs should be utilised to achieve these objectives. At the business level a description exists of the basic concept of how a company aims to put its business idea and business strategy into operation. This includes the description of markets and customer needs, competition, a marketing plan, finances, product development, risks, strength, opportunities and threats.

Figure 3.2 : Positioning the business model concept



Source: Rajala and Westerlund (2012: 35)

Antonio (2014) cautions against relying on business models to drive strategic management. Even though the business model incorporates a number of elements that belong to a number of diverse strategic decisions and planning levels, this makes strategic management more obscure, rather than simplifying it. This element can distract practitioners from vigorous and effective strategy analysis. A business model is not a substitute for strategic management and should not replace exercises such as SWOT (Strengths, Weaknesses, Opportunities and Threats) analyses. Lastly, a business model does not provide an answer to a number of questions, such as industry's structural attractiveness, contextual opportunities and threats, the firm's relative position to the market, the firm's cost and value advantages or disadvantages, competitive strengths and weaknesses or a firm's business strategy alternatives. This view is supported by Ghezzi (2014) who also states that a business model is not an answer to everything because it does not provide an answer to a number of strategic questions, such as the industry's structural attractiveness, the contextual opportunities and threats and the firm's relative position to the market.

Sachsenhofer (2016) assert that the business model is founded on the principles of value creation which arises of value chain analyses of a business. Porter's (1985) value chain

framework analyses value creation at the firm level. This view is supported by Lüdeke-Freund (2009) who state that value chain analysis identifies the activities of the firm and then studies the economic implications of those activities. It includes four steps; defining the strategic business unit, identifying critical activities, defining products, and determining the value of an activity. The main questions that the value chain framework addresses are; what activities should a firm perform? What is the configuration of the firm's activities that would enable it to add value to the product and to compete in its industry?

Wirtz (2011) posits that value chain analysis explores the primary activities, which have a direct impact on value creation, and support activities, which affect value only through their impact on the performance of the primary activities. Primary activities involve the creation of physical products and include inbound logistics, operations, outbound logistics, marketing and sales, and service.

Hammel (2001) explored how adopting an intra-organizational evolutionary perspective, impacts on the the roles of key change agents inside and outside the organization in driving and shaping four processes—motivation, invention, implementation, and theorization and labelling—that collectively define a model of how management innovation comes about. Zott and Amit (2002) researched business model innovation as a toll for managers to generate value during times of economic change. Business model innovation involves designing a new or modified activity system, and relies on new or existing business partners of a firm. It does not require significant investment in research and development. The findings of the authors also included conclusions that there are numerous dependencies are amongst business model activities and business model design elements, including how content, structure, and governance interrelate. Business models create value for the firm, its partners, suppliers and customers. For firms to capture that value, they need to adopt a relevant revenue model.

3.2.3 Business models and innovation

Technology and innovation can facilitate the development of new business models. An example made by Cerreta, Reis and & Rocha (2016) is the example is the way the invention and development of steam power facilitated the mass production business model. As noted, work on classifying business models has proceeded along two lines. First, there are researchers and commentators who see the business model concept as part of the strategy lexicon and intertwined with technology. They talk of "novel" and "efficient" business models if a new technology is incorporated into a business to produce a superior. Secondly,

there are researchers who see the concept of the business model as potentially separable from technology and strategy and examine how understanding business models and business model innovation might shed light on core strategy and technology questions. This latter approach, according to Casprini (2014) has the potential to answer the long-standing challenges posed by those who asks when a novel technology requires a novel business model, and when the combination of a novel technology and a novel business model leads to competitive advantage.

Recent advancements and earlier insights into business model literature associate the distinct concept of business model design with innovation where business model design plays an especially its important role in commercializing technology. Research has begun to empirically show the positive effects of business model design on firm performance and scholars have also started to analyse its role in commercializing technological innovations (Hoflinger, 2014).

Saebi and Foss (2014) argue that pursuing open innovation is likely to affect a company's business model in a number of ways include the content (the set of elemental activities of the company), the structure (the organizational units involved and the ways in which these units are linked), and governance (the mechanisms for controlling the organizational units and the linkages between the units) of a company. Casprini (2014) further argues that open innovation can affect the content dimension of the business model as collaborating for innovation with external partners may lead to a new value proposition and thus alter the set of elemental activities which the company performs. Open innovation can further affect the "structure" dimension of companies' business model as integrating external knowledge sources into the company's innovation processes may change the linkages between organizational units and the role they play in the company's (innovation) activities. Collaborating with external knowledge partners changes the way linkages are governed within the company and between the company and its stakeholders. This may require alterations to the governance dimension of the business model (Lüdeke-Freund, 2009).

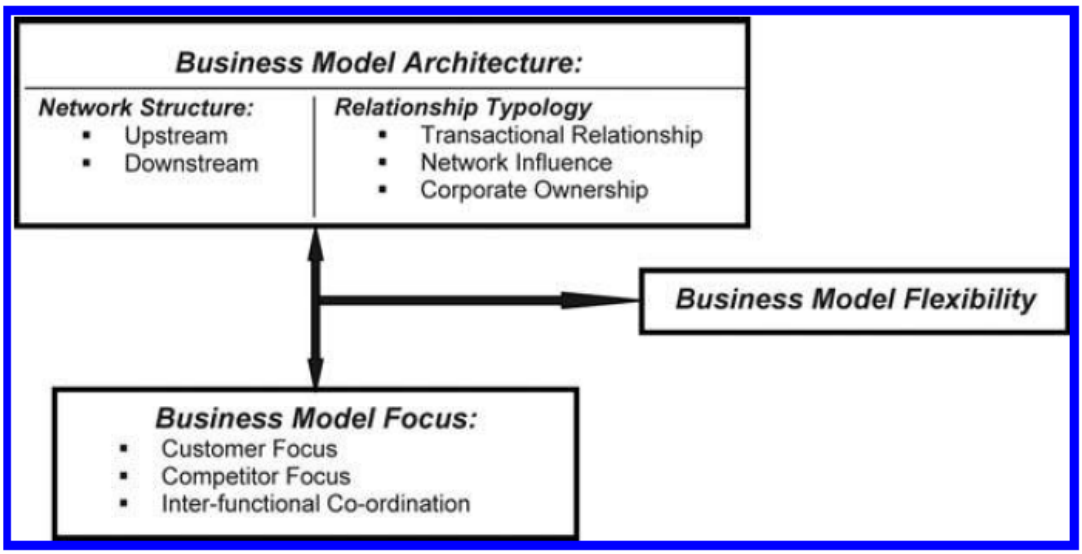
According to Anderson (2015) a business model is a mediating link between technological innovation and firm performance; the business model is able to link two important dimensions of the firm, value creation and value capture. As a firm initiates or responds to technological change, this has a potential to alter its business model. Even though entrepreneurial firms are likely to experiment with new business models, the conditions under which established firms

alter their business model is less clear. Additionally, it is not always possible to separate a firm's core innovation from its business model. Recent research suggests that the business model and technological innovation are two separate constructs. Anderson (2015) also suggests that the link between technological innovation and the business model is contingent on the nature of the shifting structure within the firm's technology strategy and product portfolio. Factors that influence business model change within a dynamic, technology-intensive environment may provide deeper understandings into ways that firms adapt besides simply developing new technological innovations.

3.2.4 Key components of business models

This section highlights the key components of business models. Mason and Mouzas (2012) posit that to explain a business model, the architecture of the business has to be put forward. This architecture consists of certain variables to explain business models and the relationships between these variables that impact on decision-making processes. Figure 3.3 is a graphical representation of these variables.

Figure 3.3: Business model architecture and focus



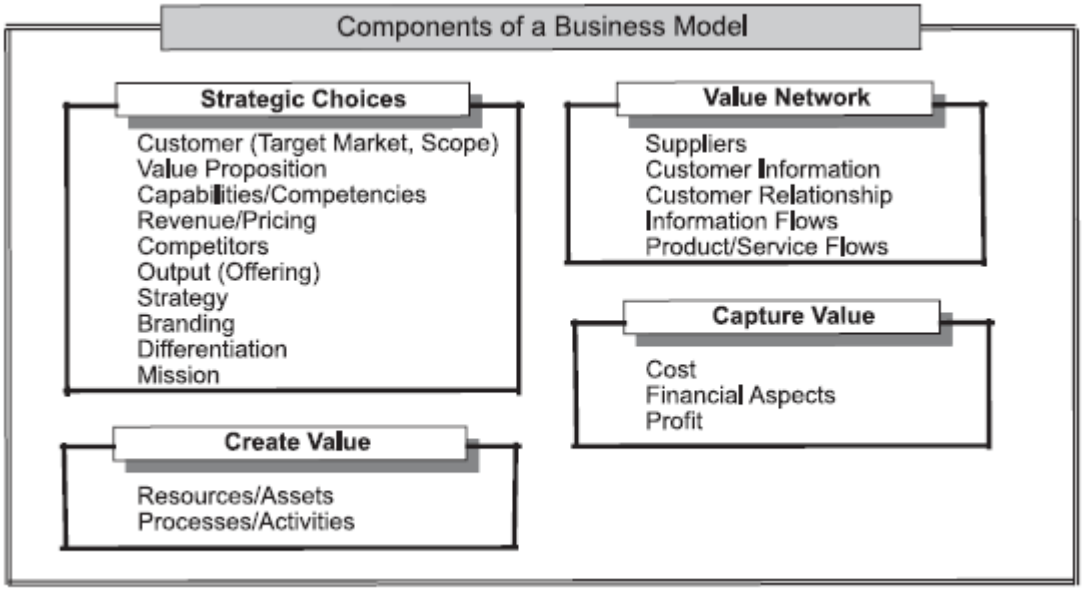
Source: Mason and Mouzas (2012: 1348).

The business model architecture consolidates three categories of relationships: network influence, transactional relationships, and corporate ownership. It identifies two relationships: a downstream and upstream relationship within the business network. The combination between the business model architecture and business model focus allows for business model

flexibility, which is the ability of the business network to sense and respond to market changes (Mason & Mouzas, 2012).

Shafer, Smith and Linder (2004) state that business models are required to have certain key components. Figure 3.4 identifies the essential components of business models.

Figure 3.4: Components of a business model



Source: Shafer, Smith and Linder (2004: 202)

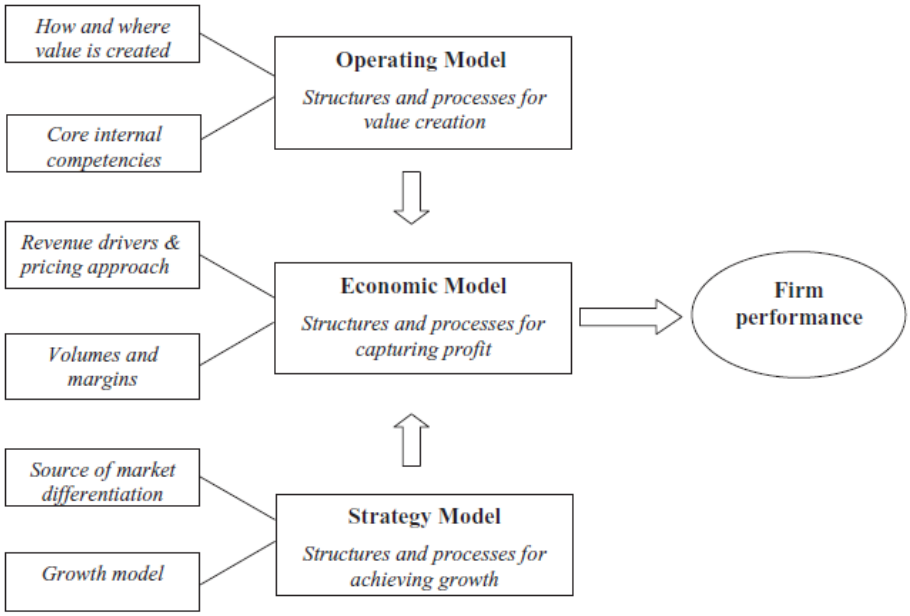
Figure 4.2 depicts the components of a business model which include the following:

- Strategic choices: making decisions such as the customers that will be targeted by the business, the value proposition that will be offered to customers, the competitors of the firm, as well as the strategy for competing in a specific market.
- Create value: this describes how the company intends to create value through its processes and activities.
- Value network: this is the network of suppliers, customer data, information and products and service flows that form an integral part of the firm's supply chain.
- Capture value: describes how a firm intends to capture value through either its cost structure, its financial aspects or how it will attain profitability (Shafer, Smith and Linder, 2004).

Morris, Shirokova and Shatalov (2007) state that three conceptualisations of business models have emerged. The first is the economic perspective, which approaches business models as a

statement of how firms make money and sustain profits from time to time. The focus of this concept is on a firm's method of revenue capture or income generation, for example, how eBay charges for its online auctions and generates revenues. The second approach focusses on a company's operations, specifically the internal processes and infrastructure design that allow companies to create value. The third approach focusses on the overall strategy, including how the company defines its market position, selects customers, and differentiates its offering and its options for growth. Hence a business model should be a representation of how these interrelated variables are addressed to create a sustainable competitive advantage. From this synthesis it is possible to develop key components of a business model which can be used to analyse a firm. Figure 3.5 depicts a business model as espoused by Morris, Shirokova and Shatalov (2007).

Figure 3.5: Scheme for company business model analysis



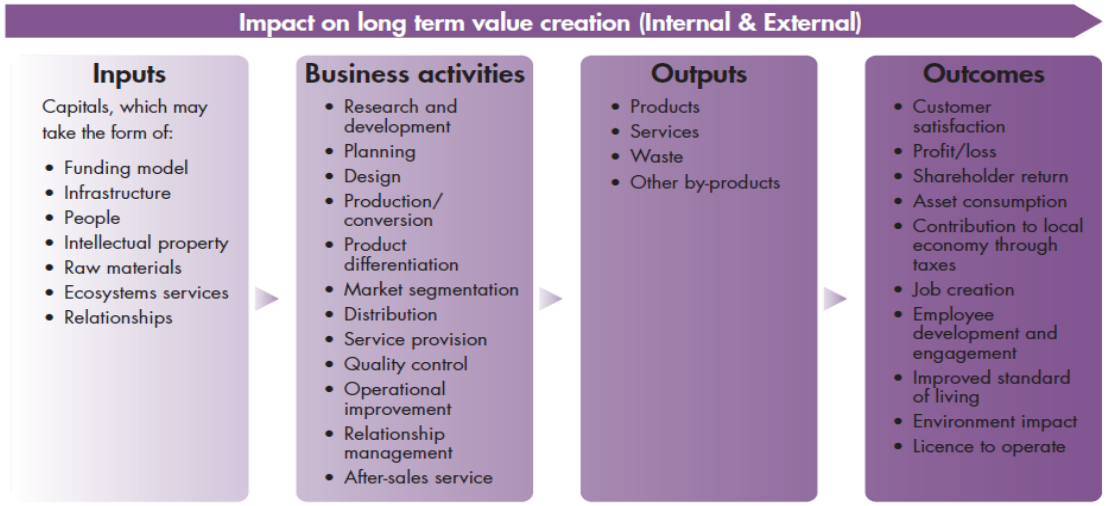
Source: Morris, Shirokova and Shatalov (2007: 47)

The key elements of this framework is that determining how value is created and for whom through operational decisions, determining how value is captured and profits earned through economic decisions, and determining how growth is achieved through strategic decisions. The operating model resides at business level and defines the processes and internal competencies for converting inputs into outputs. The economic model operates at macro level and incorporates how a business utilises resources, such as human and capital resources, to convert them into outputs. This involves the regulatory environment that defines how a

business is organised (for example state-owned or privately owned). Lastly, the strategic model defines the vision and growth of a business and the structure necessary to achieve this.

The IIRC (2012) background paper for International Reporting states that business models are a representation of key inputs which may include the funding model, infrastructure, and human resources. These inputs are converted into outputs in terms of products and services and result in specific outcomes such as customer satisfaction, profit/loss or shareholder return. Figure 3.6 shows the business model closure map. The closure map depicts the visualisation of a business model, beginning with inputs such as human resources and raw materials. These are converted into outputs through business activities such as research and development, product differentiation and quality control. Lastly, outcomes such as customer satisfaction and shareholder return emerge from outputs. This model is useful in conceptualising how revenue is generated and how a value proposition for the consumer is developed by a business.

Figure 3.6: Business model closure map



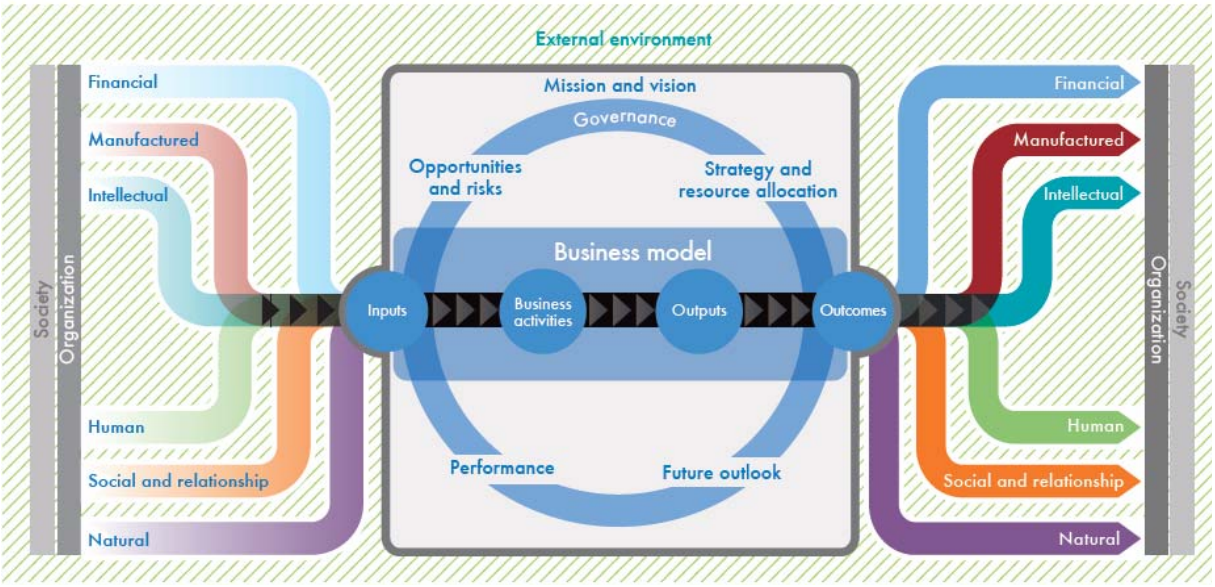
Source: Source: (IIRC) background paper for International Reporting (2012: 8)

Nenonen and Storbacka (2010) state that it is possible to ascertain similarities between different business models. These views are supported by Kindstrom and Kowalkowski (2014), Kolk and Buuse (2012), and Ghezzi (2014). Firstly, a majority of the definitions of business models include customer value creation as one of their core elements, meaning that business models should explain how a business creates value for the customers. Secondly, business models should explain how the business generates profits from its operations. Thirdly, business models discuss how a business captures value through the value network it has with its suppliers, partners, and external stakeholders. Fourthly, business models discuss

the resources and capabilities that a firm has. Lastly, business models discuss certain strategic decisions, choices and principles such as target markets, competitive strategy, and rules. From this discussion it becomes clear that a business model developed for IPPs should encompass and capture the elements described above.

The business model of an organisation draws on capital as input and through business activities converts those inputs into outputs of products and services (IIRC Background Paper for International Reporting, 2012). Figure 3.7 shows the relationship between the organisation on one hand, and on the other, the business environment from which the organisation draws its inputs and converts them into outputs, which become available to society as products and services.

Figure 3.7: The position of a business model in relation to other system elements



Source: IIRC Background Paper for International Reporting (2012 :8)

According to the IIRC (2012) Background Paper for International Reporting, there are several essential elements which are necessary to complete the business model. These include external factors or context, capital, governance, strategy and resource allocation, opportunities and risk, performance and future outlook

This view of a business model incorporates essential elements which have not been included above, such as opportunities and risk, and future outlook. Risk is essential for IPPs, since as demonstrated in the previous two chapters of this study, managing operational, institutional and market risk are essential success factors for an IPP.

Wells (2013) asserts that most business model definitions do not fully cover the scope of what a business model is. The most essential element in defining a business model should be establishing if a business model is new or part of an existing model which has progressively evolved over time. To do this, it is essential to conceptualise whether a business model applies only to one firm of an industry. Each industry should be understood to be an economic structure through which materials are transformed into products that are distributed and sold to consumers. These industries establish institutional arrangements that transcend the boundaries of a firm to value adding systems. These institutional configurations and arrangements can be seen as business models. From these dynamics emerge a shared sense of "this is how we do business in the industry," which comprises a set of expectations, norms, attitudes, beliefs, and value chain linkages that accompany industrial activity and results in the characteristics of a business model. For example, the IPP sector is a presentation of a business model that utilises private power generators who sell power to a state-owned entity at macro level. A business model can be developed to look at the key components of how IPPs generate value utilising inputs which they process to outputs at micro level.

Vives and Svejenova (2011) acknowledge that several organisations that embark on the creation and evolution of business models take into account the multi-dimensional nature of business models in that they transcend fields of strategy, entrepreneurship, and organisational design. In addition, business models can be depicted as a lifecycle that consists of various stages: origination, design, operation, and change. These phases are explained below:

- Origination: this phase is what motivates the establishment of a business model. Several motives can be advanced for the establishment of a business model, such as to achieve growth and profitability from business enterprises to social needs.
- Design: this phase entails making decisions as to who the valued customers are, the value proposition of the business, the activity system, as well as the assigning of resources necessary to achieve the desired outcomes.
- Operation: this phase includes the orchestration of activities and resources to achieve the desired outcomes. Articulation of profit and growth provides the mechanism for the replication of rules that allow for monetisation, sustainability and scalability of the new business model.
- Outcome: This phase leads to specific outcomes which can include value creation and capture, as well as competitiveness.

Wells (2013) further states that in spite of the fact that there is some similarity in the structure of business models of various firms in the same sector, business models change over time. New organisational or technological innovations that better align with value creation and capture configuration of the needs of the market have the capacity to change business models. Market changes have the capacity to make previously successful business models redundant. Certain business models enjoy a degree of durability and capacity to force out other business models around them and create entry barriers for other models. Models have a capacity to continuously improve themselves through efforts to reduce costs per unit, drive up revenues, and expand the market through continuous improvement methods.

According to Sitoh, Pan and Yu (2014), strategic elements must be tied to a business model needs to ensure competitive advantage. A business model should be conceived as a result of strategic choices, either the realisation of a chosen strategy or a representation of aspects of a firm's strategic choices. A business model is a result of strategic choices about governance, assets, policies, and their associated consequences (Ghezzi, 2014).

On the other hand Wells (2013) states that even though business models cannot be equated with strategy, they may help to define the possibility of a strategy, or in certain instances be merged with a strategy. A business model may assist a business to formulate a competitive advantage by defining the space within which strategy occurs (Searle & White, 2012).

Antonio's (2014) solution to this dilemma is that strategic planning should integrate the business model and should be done through implementing the following steps:

- Step 1: Sharpen the strategic business idea through a preliminary business model
- Step 2: Define the business industry's foresight, strategic intent and goals
- Step 3: Perform a SWOT strategy analysis
- Step 4: Formulate the strategy (for example differentiation, cost leadership, hybrid)
- Step 5: Execute the strategy through a detailed business model
- Step 6: Evaluate the strategy by controlling and monitoring business performance
- Step 7: Innovate and experiment on the strategy through business model evaluation.

Business models and their role in providing a framework for the value generated by the business were discussed above. The section highlighted the different components of business models as well as the different variables within the business model that help companies create

a sustainable advantage. The key themes emerging from this section will be instrumental in assisting the researcher in developing a framework for the IPP business model.

3.3 KEY GENERIC BUSINESS MODELS

The crux of this study is focussed on utility and IPP's business models. An overview of generic business models is essential because the components and concepts from generic business models are applicable and relevant in the utility sector.

Chatterjee (2013) delineates business models into four categories:

- Efficiency based: businesses in this category rely on human or capital resources to produce commodities. Examples of these resources are airlines, law firms, utilities, mining and hospitals.
- Perceived value based: this model involves firms positioning their outputs as wants and commanding a price premium for goods and services. Firms pursing this model invest in professionals such as engineers, scientists, programmers and data experts.
- Network value (loyalty based): this model entails a business creating value by supplementing the profit logic of the value-based model with attributes that attract and retain customers while keeping competitors out. At the same time the businesses have to keep the customer acquisition costs low.
- Network efficiency: The core resource for this model is that transactions between buyers and sellers are facilitated through this hub. The increase in the volume of transactions is the generic value capture logic for this model. Companies such as Visa, eBay, or the Chicago Mercantile Exchange are examples of pure exchange platform examples of this model. As more and more buyers and suppliers use the hub, volume will increase, and efficiencies will be realised across the network.

The IPP business model is represented by the efficiency-based business model because IPPs produce a commodity (electricity) utilising human and capital resources. Mason and Mouzas (2012) cite certain types of business models based on different firms operating in the UK:

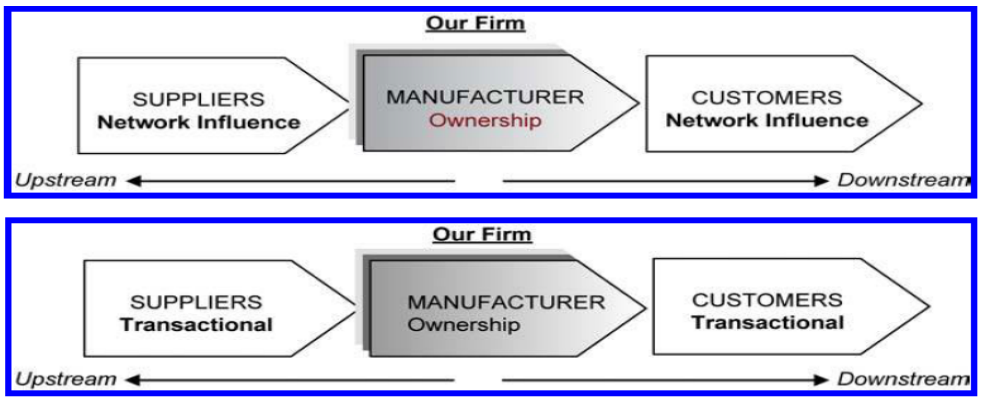
- The network influence business model: this model is prevalent in firms that display strong, long term, inter-firm relationships with both upstream and downstream elements. This model is predominant in raw materials and component suppliers. Downstream customers include retailers and wholesalers.

- The transactional business model: this model represents firms that buy and sell based on delivery agreements, price and quantity. Raw materials and component (commodity product) suppliers represent upstream transactional, whilst retailers and wholesalers are part of the downstream customers.

From this model IPPs can be categorised within the transactional business model that is part of the upstream transactional relationship within a commodity supplier.

Figure 3.9 shows both the network influence and the transactional business model.

Figure 3.8: The network influence and the transactional business model



Source: Mason and Mouzas (2012: 1323)

Mason and Mouzas (2012) cite the fact that traditional business models are simplistic enough, but do not cater for the changing dynamics of the business world. These models are based on a simple supply chain relationship. An example of this is a sequential business model as is depicted in Figure 3.10. This business model organises added value processes through a carefully timed sequence of events.

Figure 3.9: The sequential business model

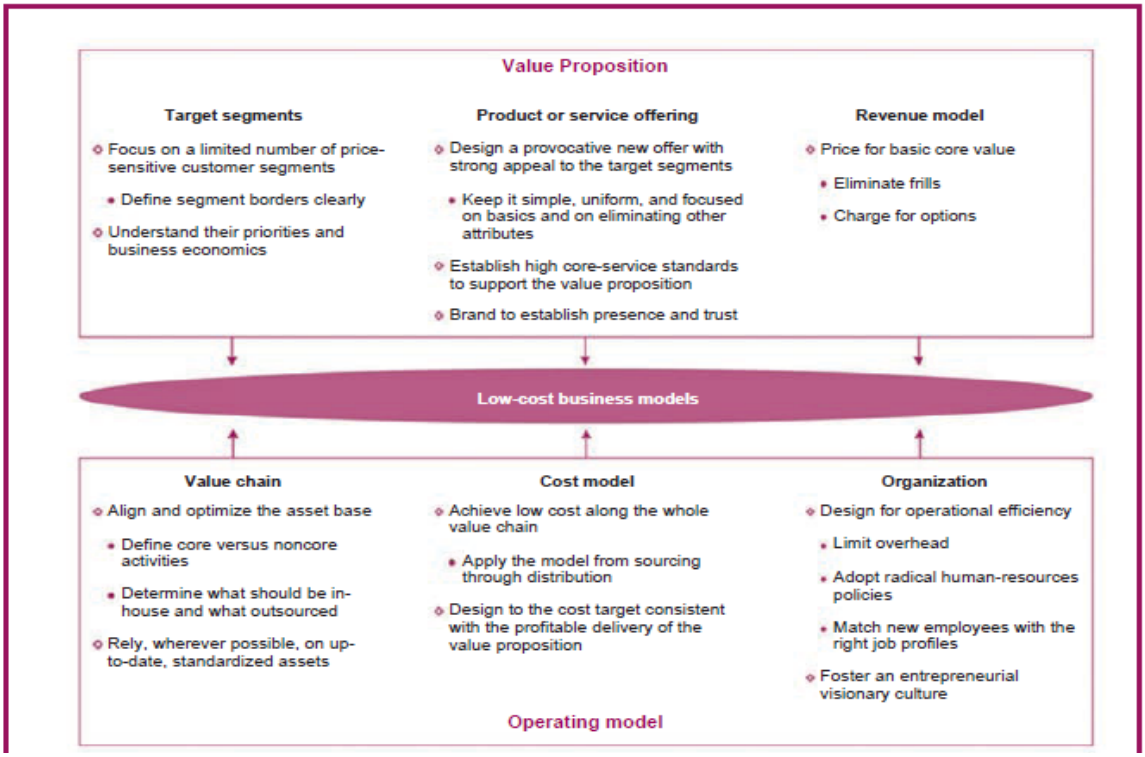
Source: Mason and Mouzas (2012:1324)

Mason and Mouzas (2012) cite these additional business models:

- The franchise business model: this model is characterised by the relationship between a supplier and owner based on a relationship whereby a franchisee has a licensing agreement to produce or sell the franchisor a product or service at a fee.
- The agent business model: this model is based on an agent representing the interests of buyers and sellers through a relationship that involves limited risks.
- The sales oriented business model: involves firms that provide sales services to different enterprises by sales and promotion activities.
- The retail business model: this is a model that provides an intermediary relationship between manufactures/wholesalers and consumers.

Kachaner, Lindgart and Michael (2011) propose a low cost business model that is relevant in the current recessionary environment. This model provides an opportunity for customers to buy the same goods at a lesser price by providing a value proposition that is based on both addressing the needs of existing customers and offering a limited range of products without compromising quality. Figure 3.11 depicts the key features of low cost business models. This model can be applied to any business sector.

Figure 3.10 : Integrated low cost business model



Source: Kachaner, Lindgart and Michael (2011)

The low cost business models are based on common characteristics. These businesses focus on price-sensitive customers with a focus on customers that are out of reach for more traditional business models. They also focus on keeping the product or service as simple as possible, focussing on key basics and eliminating all the frills that add to costs. The revenue model is based on an assumption that pricing should be clear and reflect the basic core value of the product or service. Value chain business models are designed to depend on a lean value chain aligned to deliver the value proposition only. Costs models deliver profitability and then work it backwards to achieve it.

This section has highlighted key generic business models and their components. From the above it becomes conspicuous that even though business models are a representation of different businesses within different sectors, there are common elements within each business model. For example, generic models link the relationship between the firm's suppliers, the firm and its customers. Business models are a representation of the value proposition of a firm to its customers through a product or service offering. The section highlighted the essential fact that even though certain models are not specific to the electricity sector, the products and services produced by a utility represents the form of a business model. This finding is essential in ensuring that the business model to be developed out of the findings of this study takes into account all these dynamics.

3.4 KEY UTILITYBUSINESS MODELS

This section provides an overview of the evolution of electricity models globally. This section is critical for this study in order to understand the evolution of economic model for the electricity sector, which form the basis for the IPP business model.

3.4.1 Electricity economic models

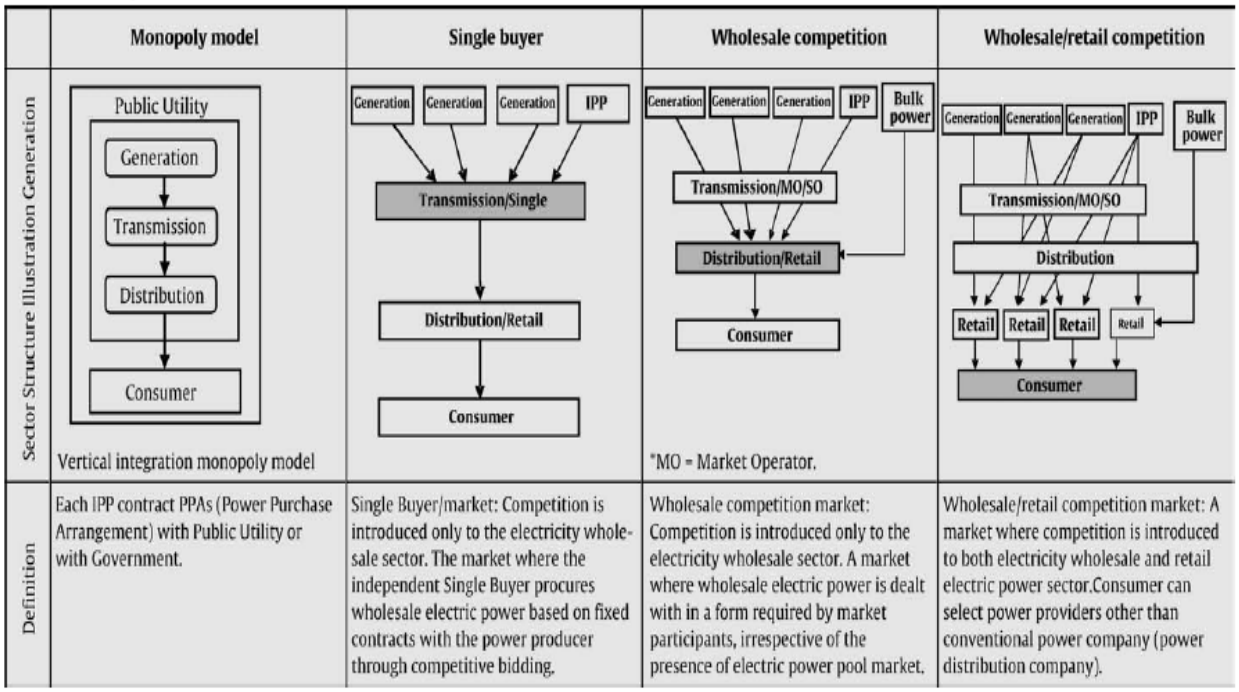
Nagayama (2009) provides a breakdown of the several models in the reform process. These are the following:

- Monopoly model: this is the phase where there is no competition, or before competition.
- Single buyer model: this is where unbundling between generation and transmission is implemented or a mid- or long-term competitive bid is introduced to the generation business only.

- Wholesale market model: this is a when the wholesale market is established.
- Retail market model: when the retail market is freed up for competition.

Figure 3.12 below depicts a graphical representation of these phases.

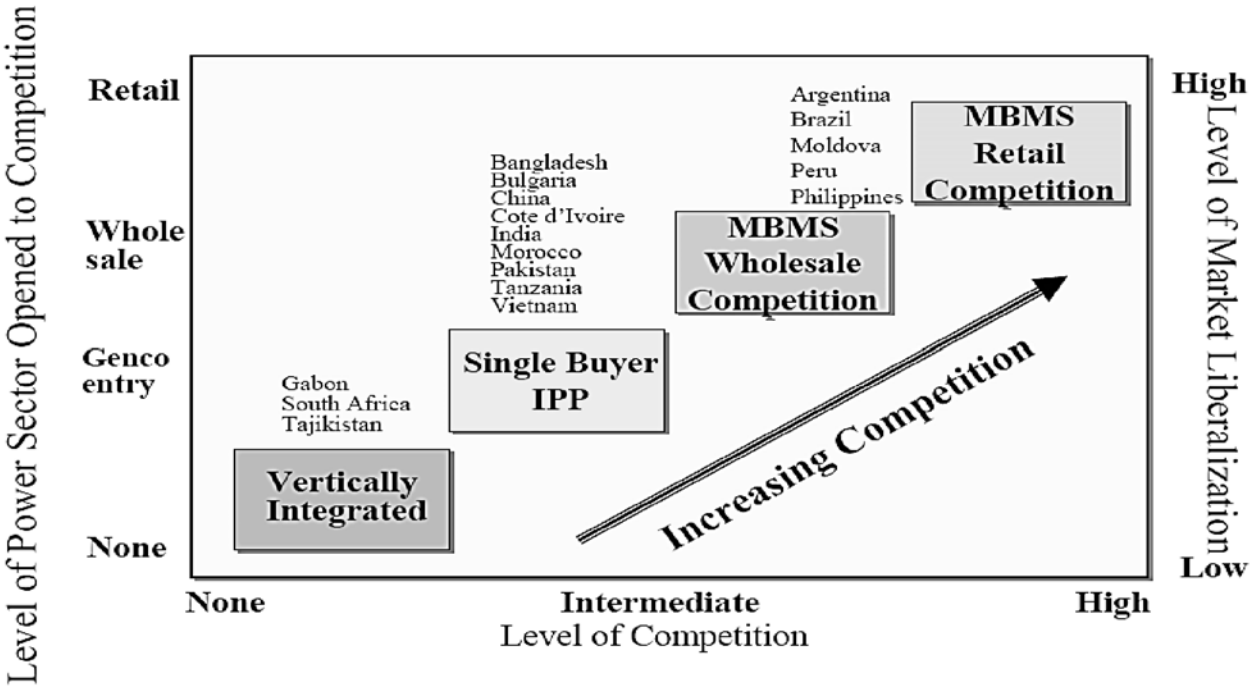
Figure 3.11 : The phases of market reforms



Source: Nagayama (2009: 466)

Figure 3.13 shows that the market-based reforms for different countries progressed towards the introduction of competition at wholesale and retail level (MBMS) with the single buyer model, with IPPs being the dominant model used (in numerous Asian and African countries).

Figure 3.12: The electricity reform model



Source: Nepal and Jamasb (2013: 5)

There are different levels of electricity sector reforms. These are listed below:

- Vertically integrated model (Monopoly): each IPP contracts PPA with the utility or government.
- Single buyer: competition is introduced only to the retail sector. The electricity producer produces wholesale electricity based on fixed contracts with the electricity producer through competitive bidding.
- Wholesale competition: competition is introduced only to the electricity wholesale sector. The electricity is produced in a form required by market participants, irrespective of the presence of an electricity market.
- Retail competition: competition is introduced to both the electricity wholesale and retail sectors. Consumers can select electricity providers other than the conventional electricity company (Nagayama, 2009).

A report by Energy Futures Australia (2004) lists a range of possible structures for electricity sector reforms, with a continuum from vertically integrated monopoly utilities on the one hand to unbundled business with full competition on the other. Accordingly, the Task IV of the International Energy Agency (2008) developed four models for the structure of electricity industries. The four models are:

Model 1- vertically integrated monopoly

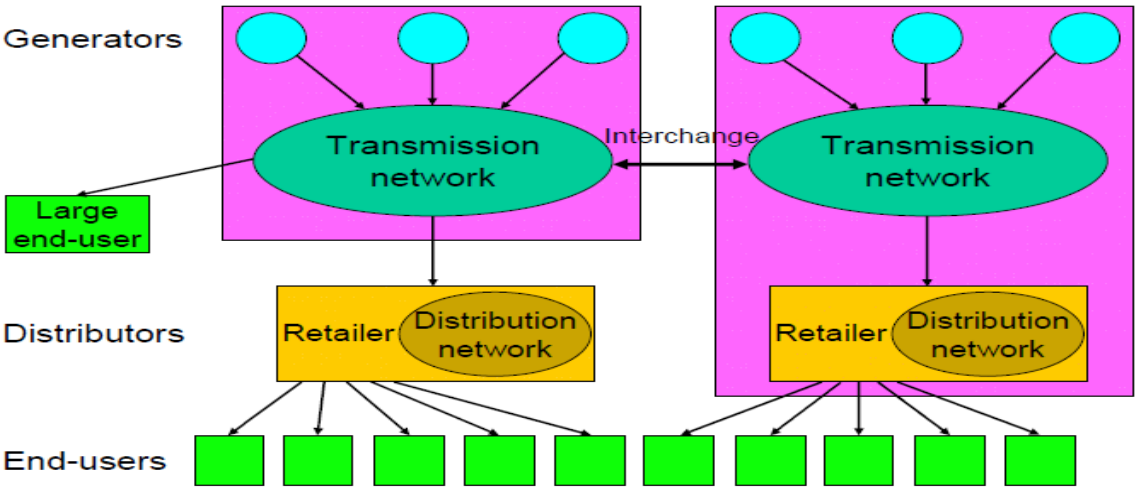
Model 2 - unbundled monopoly

Model 3 - unbundled, limited competition

Model 4 - unbundled, full competition

Figure 3.14 below shows Model 1, the vertically integrated monopoly. The electricity utility controls and undertakes all business functions of generation, transmission, distribution, wholesale and retail energy supply and services. Competition does not exist and the government regulates the utility to prevent monopoly abuse and all customers buy energy from that utility (Energy Futures Australia, 2004)

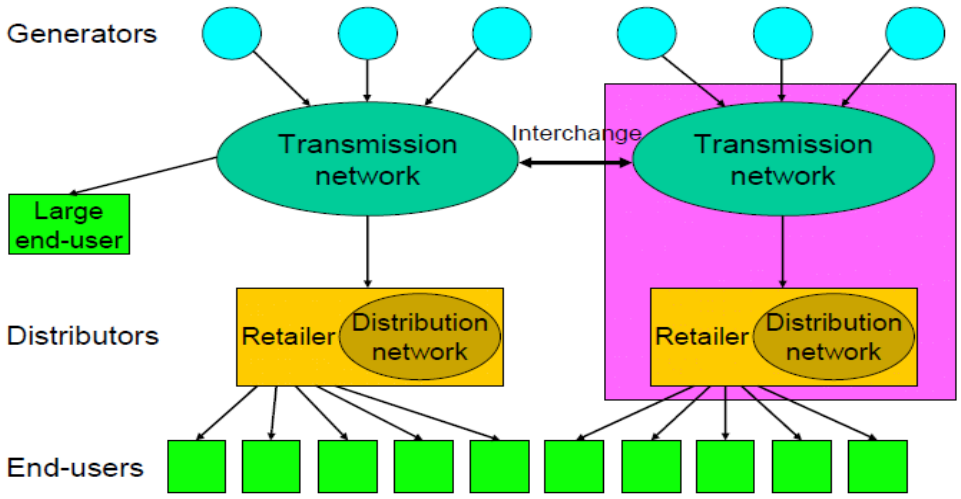
Figure 3.13: Model 1: Vertically Integrated Monopoly



Source: Energy Futures Australia (2004: 2)

Figure 3.15 demonstrates the unbundled monopoly where generation is separate from all other functions with several companies serving distribution companies. Generators and distributors maintain a monopoly status with each having a monopoly to serve customers in their respective areas. Government regulates the monopolies to prevent abuse of electricity and competition may happen at generation level. Competition is non-existent at retail level (Energy Futures Australia). According to Eberhard (2001) the biggest challenge with this model is that the effective regulation is difficult and consumers could be victims of private monopoly abuse of dominance. This model makes it difficult to allow private equity participation without first introducing competition.

Figure 3.14: Model 2: The Unbundled Monopoly

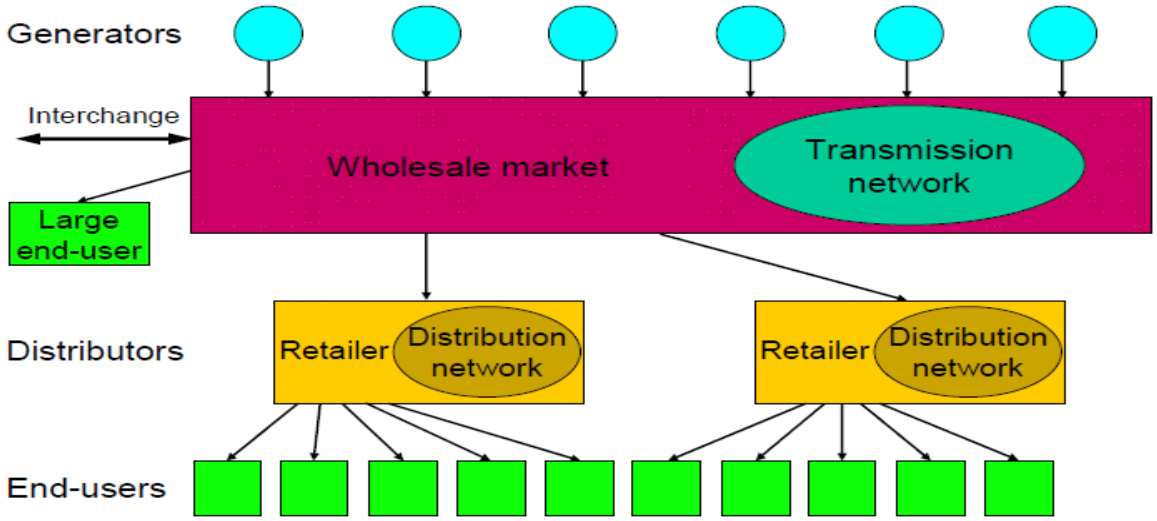


Source: Energy Futures Australia (2004: 2)

In this model (Figure 3.16) generation is separated from natural monopoly functions (transmission and distribution). Generation companies serve distribution companies and major industries through a competitive wholesale market. Generators have open access to the transmission and distribution grid and transmission is provided by generators, distribution companies or separate entity or entities. There is competition at the wholesale level amongst generation companies and there might be competition through self-generation by customers (Energy Futures Australia, 2004).

Sen, Jamasb and Nepal (2016) state that this model will give potential investors greater confidence. However there are concerns that a state owned utility might still be able to exert undue market power through its subsidiaries, and will be able to manipulate prices. The above models involve limited privatisation and hence reduced opportunities for the state in terms of economic empowerment and fiscal revenues (Eberhard, 2001).

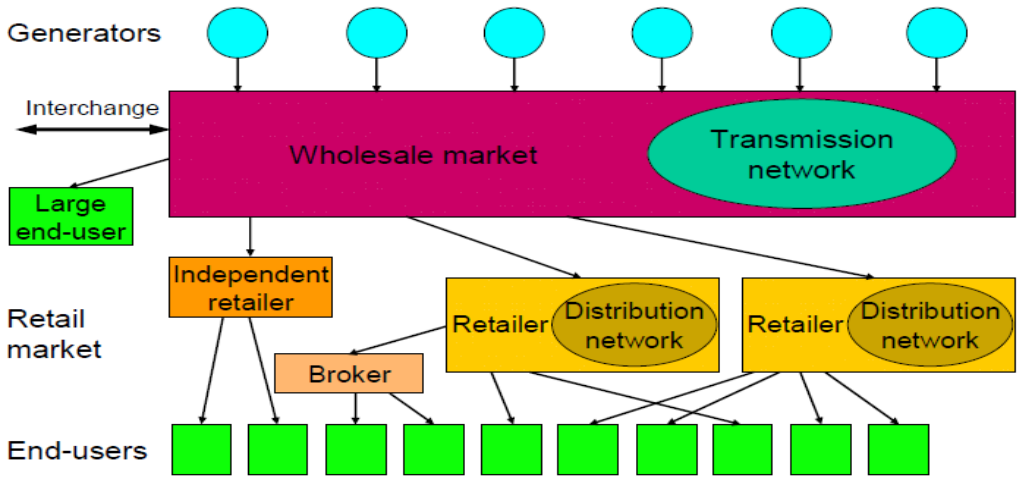
Figure 3.15: Model 3: Unbundled, Limited Competition



Source: Energy Futures Australia (2004: 4)

Model 4 (Figure 3.17 below) represents full competition where generation, transmission and distribution functions are separate. There is competition amongst generators and they have open access to the transmission and distribution networks. At retail level there are retailers who purchase electricity from wholesalers and sell it to end-user markets, and brokers that provide a similar service without owning electricity. Government has certain oversight of the wholesale and retail markets to ensure a more efficient operating market and to prevent the abuse of electricity in the market (Energy Futures Australia, 2004). This model allows for fiscal revenue for debt reduction. Significant inward investment could also result. Financial and economic returns are significantly greater than in the previous models. The state owned utility will be forced to compete, and a management culture and practice might be established improved. The fact that the state retains ownership of a portion of generation would enable it to intervene more easily in new generation investments, should this be necessary, if the market fails to respond to growing demand (Eberhard, 2003).

Figure 3.16: Model 4: Unbundled Full Competition



Source: Energy Futures Australia (2004: 5)

Proponents of this model argue that competition is likely to result in improved efficiency and lower prices than the previous models. This model also provides additional fiscal revenue for debt reduction. Significant inward investment is possible with this model and financial and economic returns are significantly bigger (Eberhard, 2001).

3.4.2 Ownership structures

There are several businesses operating structures that are used as means to develop and operate infrastructure for electricity generation, as Gabriele (2004) asserts. These range from those where a private institution buys and operates an electricity entity to where an entity is built and then transferred to the state. These models are classified under the following options:

- Build-own-operate (BOO): A model that represents full privatisation and entails a private institution buying existing assets from the state, of which it retains ownership and operates and exploits the facility for an indefinite period of time.
- Build-transfer-operate (BTO): a private agent transfers ownership of the asset or facility to the state once it is completely constructed. The state takes over operation thereof.
- Build-operate-transfer (BOT): this entails a private agent building and retaining ownership of the facilities for a specific period of time, enough for it to recover construction, operating and financial expenditure. Once this has been achieved, ownership reverts back to the state.

The reform model structures and business model were explained to depict how IPPs fit into the picture and how the introduction of IPPs is linked to other reforms that are pertinent in the electricity sector.

3.4.3 Key utility business models

Traditional power utilities have been organised as an integrated business model where a utility provides a product and services along the electricity supply chain (generation, transmission and distribution). This traditional business model has been changing over the years as reforms occur within the power sector. There are models which have been designed to capture the key performance indicators, drivers, support tools and outputs of utilities. There are also models that capture the key relationships between the firm and its environment in terms of its customers, suppliers and its various stakeholders. This section expounds on the business models that depict the utility business in terms of its variables, drivers, key performance indicators and value propositions.

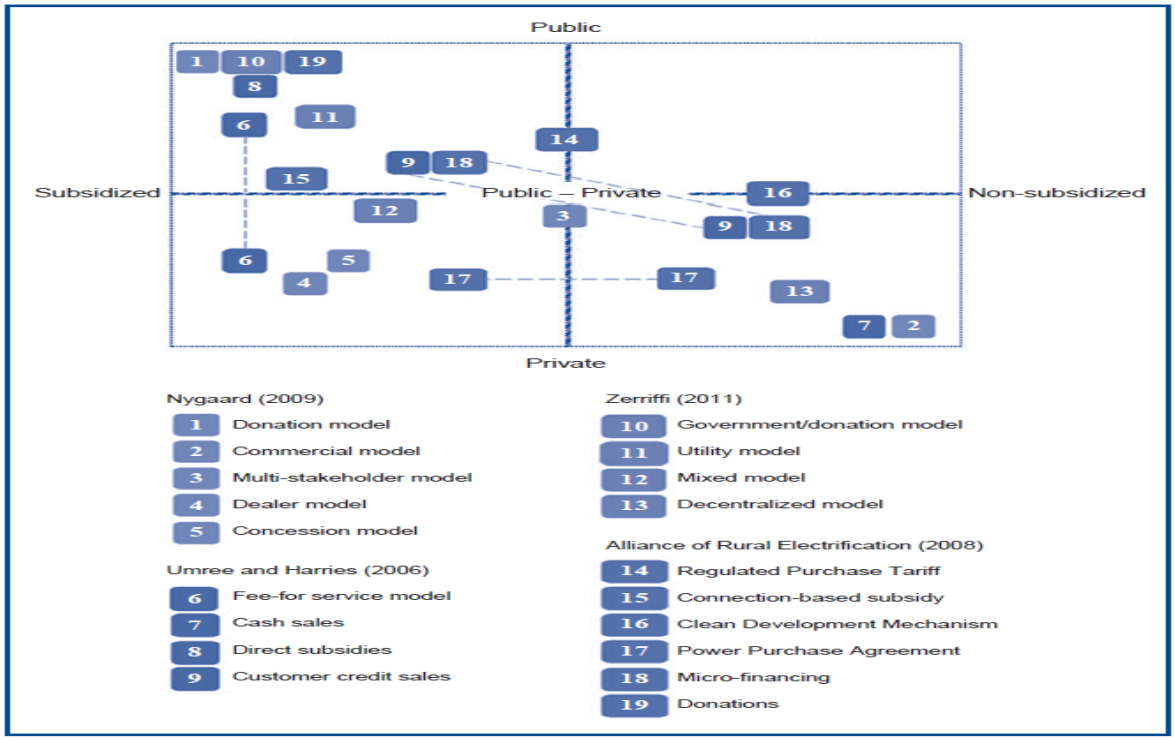
Valocchi, Juliano and Shurr (2010) are of the view that the changing nature of the business environment of energy utilities is putting pressure on the traditional business model. Transformations occur from different areas of the business environment of utilities. As consumers need to have more control over their energy usage to conserve energy, they are demanding more from their energy suppliers. They also have a need to have more, save money and reduce the environmental impact (Houareau, 2015). Climate change, energy security, economic growth and employment dynamics are putting pressure on governments to drive policy shifts around issues of energy efficiency, conservation, and renewable energy. The emergence of new technologies: the introduction of distributed generation, smart grid, storage technologies, as well as the presence of new participants, such as IPPs (who provide strong competition for revenues) has brought complexity to the business model and business environment of energy utilities (Houareau, 2015).

In addition, Houareau (2015) asserts that increased energy efficiency, distributed generation, inefficient and old infrastructure, stricter environmental requirements, and weak balance sheets are drivers and disruptive forces on the utility business model. Tarbert (2013) supports this view and emphasises that pressure from expanding regulatory control and expensive renewable energy mandate policies are forces that put pressure on traditional IPPs. In addition, the management of generation costs' recovery process in the structured power markets could create affordability issues and impact on financial margins. Due to these

challenges it becomes necessary to examine the current business model/structure of power utilities to examine if the traditional business model is equipped to deal with the challenges of the 21st century.

Kolk and Buuse (2012) distinguish between delivery and financing models. Financing models provide frameworks through which existing policies stimulate and provide financing mechanisms for investments in energy projects. The delivery model focuses on how energy projects are developed and implemented. The authors graphically present a range of spectrums of these different models as depicted in the figure below.

Figure 3.17: Positioning of financing models



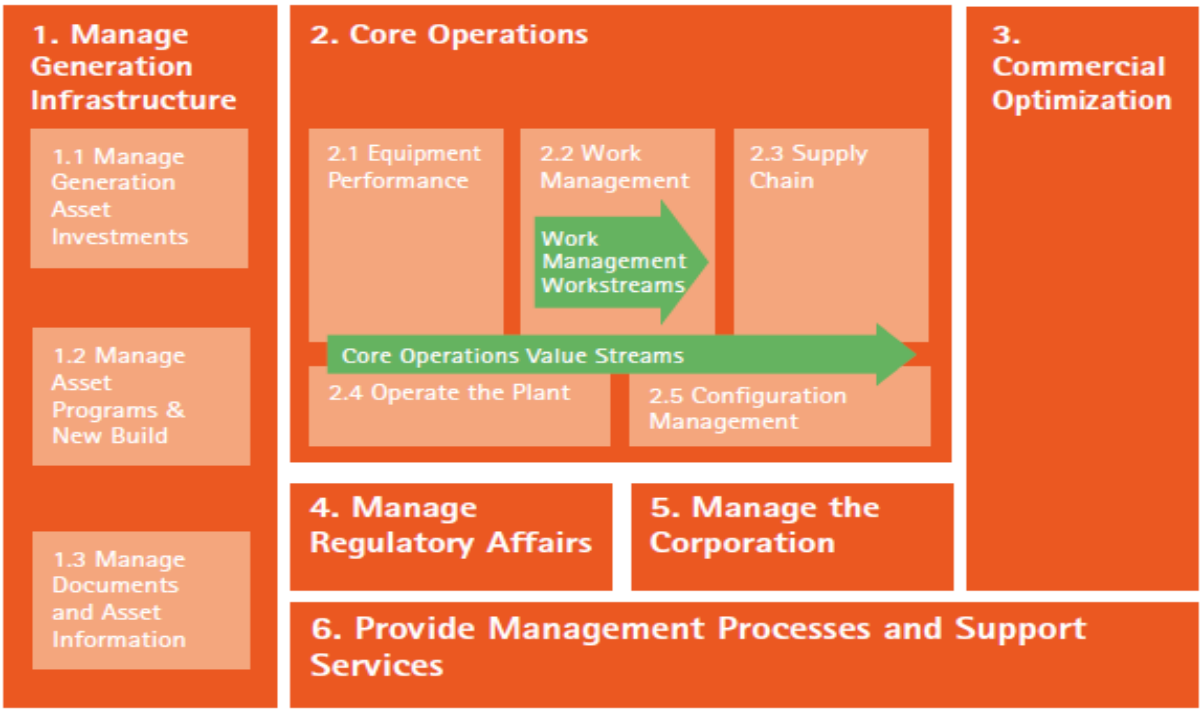
Source: Kolk and Buuse (2012: 555)

At one extreme there is a donor-driven model which consists of developed countries providing to developing countries on a project basis (Lawson, 2013), where the governments are fully in charge of the electrification system. At the other extreme are commercially-led delivery models based on cash sales with zero subsidies, as found in Turkey, the Philippines and Brazil (IMF, 2013). Model number 11 is the utility model that involves a state entity providing electricity along the whole supply chain (for example, Eskom) (Michaels, 2004). Included in this diagram are models which are termed free-for-service models in which a national utility or an IPP owns, finances and maintains the installation and is responsible for

maintenance of the system and infrastructure whilst charging households for usage (Prasad, 2007).

The High Performance Utility Model (HPUM) designed by Accenture (Accenture, 2012) is intended to provide a framework through which state utilities can improve operational efficiency, enhance adherence to regulatory requirements and meet customer expectations. This model helps utilities assess performance against industry leaders in order to identify areas for improvement. The figure below shows the components of the HPUM.

Figure 3.18: The high performance utility model (Hpum)



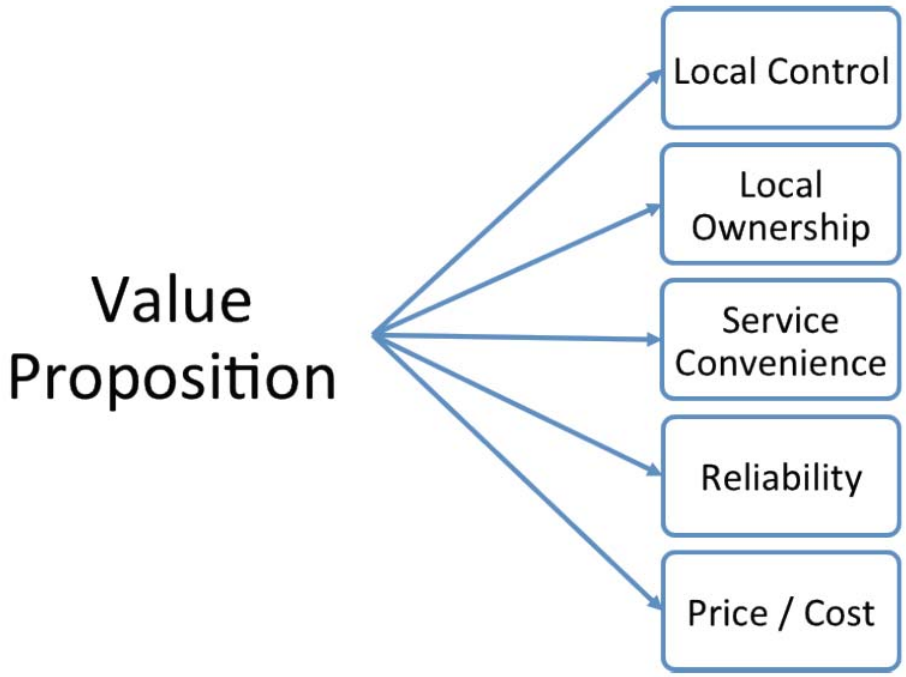
Source: Accenture (2011: 3)

According to Accenture (2011), this model outlines several business areas that utilities need to focus on in order to be able to improve their business performance. These areas include the management of assets and infrastructure, managing customers, managing revenues and tariffs, managing the metre operations and managing regulatory affairs.

Tarbert (2012) illustrates the public power utility business model. Its value proposition is based on delivering tangible and intangible services to customers through lower rates, higher

reliability, excellent customer service, and the unique elements of local ownership and control. Excess revenues are returned to customers as lower rates, invested back into the utility for systems improvement, contributed to reserve accounts for future needs or emergencies or transferred to the state as payments in lieu of taxes or to cover the cost of shared services. The public power business model is depicted in the figure below.

Figure 3.19: The public power business model



Source: Tarbert (2012: 7)

According to Tarbert (2012) the public power business model should have the following components:

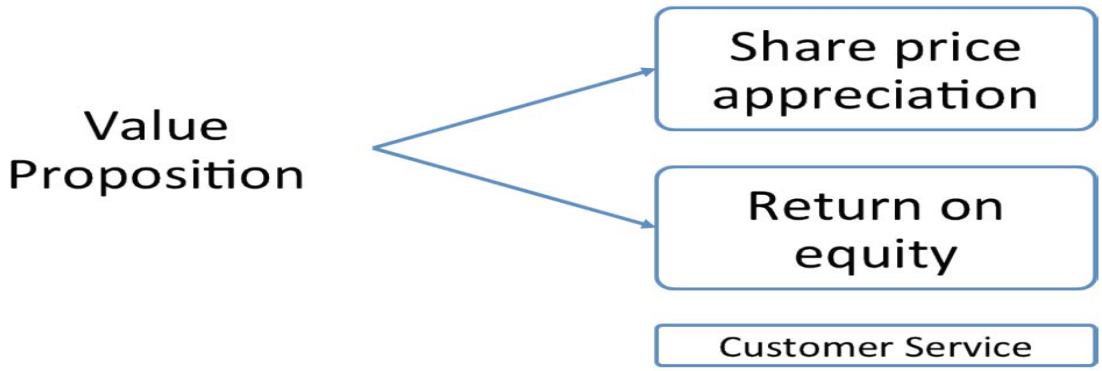
- Public ownership: the businesses have to be owned by and operated for the communities they serve.
- Local control: local and independent control of state-owned utilities is dependent on independent regulation and governance designed to best serve customers/owners and protect the long term viability of the utility.
- Low cost structure: public-owned utilities have to demonstrate that they attain certain cost advantages in the form of tax exempt financing, higher credit ratings, lower operating costs, and non-profit models.

- Non-profit operations: models of state-owned utilities should demonstrate commitment to the interests of customers and do not have an incentive to distribute profits to both shareholders and customers.
- Customer-focused: public-owned utilities have to demonstrate commitment to delivering the highest level of service and value to customers/owners for the long term.

The viability of this public power business model hinges on the ability of the public entities to deliver value to customers in a way that they achieve advantages of lower costs, higher reliability, and intangible elements of local ownership and control. The value of public ownership in the eyes of the consumers will only be viewed positively by the customers if they satisfy the above-mentioned elements according to Tarbert (2012).

Tarbert (2012) further illustrates the model and value proposition of IPPs as primarily designed to provide a return on investment for their shareholders, by selling power to consumers. The value derived by investors is through dividends paid or share price appreciation (capital gains), as depicted in Figure 3.21

Figure 3.20: The independently owned (IOU/IPP) business model



Source: Tarbert (2012: 16)

3.5 BUSINESS MODEL EVALUATION AND CRITIQUE

One of the main criticisms against business models is that they have not yet developed a common and accepted language that would allow researchers to develop constructs from empirical evidence. This is due to the fact that there are numerous business model definitions

and a varied set of approaches to the classification of business models (Baden-Fuller & Haefliger, 2013). This view is supported by Sawy and Pereira (2013) who state that the business model concept lacks underpinning theory, particularly, economic theory. There are also numerous definitions of business models, which creates difficulty in understanding the essential components of business models. The terminology of business models is also confusing with terms such as business model, strategy, business concept, revenue model and economic model are often used interchangeably. There has been reference to business models as architecture, design, pattern, plan, method, assumption and statement.

According to Sawy and Pereira (2013) business models suffer from four deficiencies. The first one is that the assumptions underlying the key premises of a firm's business plan are often flawed or untested, or they are based on implicit or explicit cause-and effect-relationships that are not well founded or logical. Business plans also suffer from limitations in the strategic choices considered. Business models address the developing the business logic only, they make untested assumptions about the other components. There are also misunderstanding about value creation and value capture. Organisations are often unable to financially take advantage of the 'value they create. This may negatively affect the revenue generation aspects of business models. Lastly, business models suffer from having flawed assumptions about the value network. There is an assumptions that the current value created through the network would continue unchanged into the future and not change dynamically.

The generic business models discussed above each focus on certain aspects of a business model, but none of them incorporates all the elements of a business model as described above. For example, the network and influence business model depicts a linear relationship between a business and its suppliers. The model is simplistic in that it does not describe how value is created through the business model. On the other hand, the integrated low-cost business model defines how value is created through a product or service. It does not describe the core competencies, revenue drivers, the pricing approach, or the source of market differentials that are necessary to support the low-cost business model.

The same criticism can be levelled against the utility business models, in that they define the key components of a business model essential to the utility business, but each model fails to bring together the key concepts discussed above. The High Performance utility model, for instance, succeeds in defining the key competencies necessary to create a high performance utility, but it neglects to define the value proposition as described in both the public utility and

the independently-owned and IPP models. Lastly, it emerged from this study that IPPs have inherent operational, institutional and market risks, and a business model should cater for the different risk elements of a business. None of the existing models sufficiently address these risks. The purpose of this study is to develop a model that incorporates the relevant elements of a generic business model with utility models, as well as addressed the gap identified from the existing utility business models.

The purpose of the table below is to put into perspective the key concepts, variables of business models. This will allow the researcher to compare and identify the gaps in these models so that the model developed from this study will be able to close those gaps by providing an alternative business model. The section provides a framework for evaluating the effectiveness of a business model. This framework will assist the researcher in evaluating the IPP business model.

Table 3.1 : Analysis of literature different business model concepts

Components of a Business Model		
Literature	**Model description**	**Key concepts**
Mason and Mouzas (2012) Shafer, Smith and Linder (2004:202) Morris, Shirokova and Shatalov (2007) (IIRC) Background paper for International Reporting (2012) (IIRC) background paper for International Reporting (2012:8) Rajala and Westerlund (2012: 35) Harvard Business School (1996)	Architecture and focus Components of a business model Scheme for company business model analysis Business Model Closure Map The position of a business model in relation to other system elements. Positioning the business model concept The balanced scorecard	• Business model is focused on customers, competitors and inter-functional coordination. A business has transactional, network and corporate ownership relationships. • A business model consists of strategic choices (for example customer, value proposition, revenue and pricing). • It consists of a value network which includes customer relationship information, suppliers, customer information, and product and service flows. • It consists of creating value through resources, assets and processes and activities. • It consists of value-capturing through cost, financial aspects and profits. • Models operate at operating, economic and strategy levels. • A model is composed of how and where value is created, core internal competencies, revenue drivers and pricing approach, volumes and margins, source of market differentiation, and growth model. • Focusses on long-term value creation.

		• A business model is a function of inputs, business activities to convert those inputs into outputs, as well as outcomes from those outputs. • The business model exists within the context of the society/organisation where financial, intellectual, human, and other resources are obtained. • These resources are converted into outputs which are made available to the environment through outputs such as natural and human resources. • A business model exists between the strategy and the processes. It informs the kinds of processes that need to be designed and implemented to realise the company objectives. • The balanced scorecard links vision and strategy with the key financial, customer, learning and growth and customer perspectives. • Guides the business on which activities should be performed to realise the vision and strategy.
Generic Business Models		
Mason and Mouzas (2012)	The network influence and the transactional business model.	• This model depicts a simple linear relationship between a business and its suppliers (upstream) on one hand and the customers (downstream) on the other. • Other models include a franchise business model, an agent business model, a sales-oriented business model and a retail business model.
Kachaner, Lindgart and Michael (2011)	An integrated low-cost business model	• This model is based on the assumption that a value proposition is provided through a product or service offering for the targeted segment of the market. • The revenue model is based on a no-frills product or service and the value chain helps to define core versus non-core activities. • The organisation is the pillar of this model because it assumes that the organisation should be designed for operational efficiency and should adopt radical human resources polices, amongst other things.
Utility Business Models		
Kolk and Buuse (2012)	Financing models positioning	• The model distinguishes between the privately-funded and the publicly-funded institutions on the one hand and the subsidised and non-subsidised institutions on the other hand.
Accenture: (2011: 3)	High	• This model focusses on the key operations

	performance utility model	necessary to have a high performance organisation. • These are the management of generation infrastructure, the management of core operations, commercial optimisation, regulatory affairs, managing the corporation, and providing management processes and support services.
Tarbert (2012: 7)	The public ownership business model	• The model lists the essential elements of a business model. • These are public ownership, local control, service convenience, reliability, and price and cost.
Tarbert (2012:16)	Independently owned/ IPP business model	• This model is based on the assumption that a value proposition should be delivered through share price accumulation, return on equity, and customer service.

Source: Author adapted

The table above provides a summary of the key components of business models, the generic business models summary as well as the utility business models summary. The key themes emanating from the above are that the key components of business models include customers, competitors, a value chain of suppliers, customer information, customer relationships, and product and service flows. They consist of value creation through resources, assets, processes and activities. It defines value capturing through costs, financial aspects and profits. A business model operates at operating, economic and strategic level. It defines how and where value is created, the core internal competencies, revenue drivers, pricing approach, volume margins, source of market differentials as well as the growth model.

There has to be a certain form of evaluation of business models. More precisely, a question should be asked as to what constitutes a good business model. To answer this question, business models must conform to specific standards. According to Casadesus-Masaness and Ricart (2011), there are four requirements of good business models. First business models must deliver consequences that are aligned to goals that move an organisation towards achieving its objectives. An organisation may possess an excellent business model, but if it does not deliver outputs that are aligned with the organisational goals, then that model is bound to fail. Such goals may include profit maximisation, a better environment or work satisfaction. Business models should reinforce the development of new ideas by providing incentives for the development of new business opportunities. This is essential because business models develop through time. Business models should encourage positive feedback mechanisms through a positive feedback loop. The feedback loop assists organisations in capturing value over time and in ensuring that growth does not erode the business'

competitive advantage. A robust business model sustains its effectiveness over time. Threats to effectiveness include sustainability, imitation, holdup, slack and substitution.

Kolk and Buuse (2012) state that to understand a business model there are six key fundamental questions that needs to be asked. Figure 3.8 indicates the six questions and the subcomponents linked to each question.

Figure 3.21: Six questions that underlie a business model

Question	*Some subcomponents*
How will the firm create value?	Peculiarities of the offering
For whom will the firm create value?	Market factors such as business-to-business or business-to-consumer, local-international, value-chain position of customer, market segments
What is the firm's internal source of competitive advantage?	Internal capability factors including production, sales, technology, finance, supply chain management, leveraging of networks and resources
How will the firm position itself in the marketplace?	Competitive strategy factors such as operational excellence, product/service quality, innovation/cost leadership, customer relationship/experience
How will the firm make money?	Economic factors such as pricing and revenue sources, operating leverage, volumes and margins
What are the entrepreneur's time, scope, and size ambitions?	Type of investment model (e.g. subsistence, income, growth, speculation)

Source: Kolk and Buuse (2012: 555)

These questions incorporate certain key components of the business models discussed above such as value creation, the firm's internal source of competitiveness, how it makes money and how it will position itself in the marketplace. A good business model is the one that meets the requirements set above and answers the questions that are listed in the figure above.

3.6 THE PROPOSED BUSINESS MODEL (TENTATIVE) COMPONENTS

From the literature review, it is possible to identify key components that are common in the business models. These key features and attributes should be incorporated into the proposed business model because they represent the academic developments and current research in this field of study.

3.6.1 Value proposition

The value proposition is an essential component of a business model. A value proposition is a promise of value to be delivered and acknowledged, and a belief from the customer that value will be delivered and experienced. A value proposition can apply to an entire organization, or parts thereof, or customer accounts, or products or services (Shafer, Smith & Linder, 2004).

Some of the value propositions identified from literature review include share price appreciation, return on equity, customer services, and local control.

3.6.2 Core operations and business activities

The High Performance Utility Model (Hpum) identifies core operations such as equipment performance, work management, supply chain, and operating the plant (Accenture, 2011).

3.6.3 Inputs /outputs

These inputs are converted into outputs in terms of products and services and result in specific outcomes such as customer satisfaction, profit/loss or shareholder return. Inputs include items such as human resources and raw materials. These are converted into outputs through business activities such as research and development, product differentiation and quality control. Lastly, outcomes such as customer satisfaction and shareholder return emerge from outputs.

3.7 SUMMARY OF KEY LITERATURE REVIEW AND KEY THEMES

Chapter 2 and 2 of the literature review highlighted the essential key themes and theories dominating the power sector domain as well as the different business models. The concepts discussed in these chapters require a synopsis and synthesis that consolidates and puts into perspective all the relevant facts. Table 3.2 highlights the dominant themes and trends emerging from the literature review.

Table 3.2: Summary of literature review and importance for the study

Section	Subject/theme	Summary	Impact on study
Chapter 2	Privatisation as part of public sector reforms	Privatisation is one of the consequences of public sector reforms that have taken place in numerous regions of the world.	The IPP industry is largely a result of public sector reforms and privatisation efforts designed to bring in private producers (IPPs).
	Power market reforms	The objectives of the power sector reforms have necessitated the introduction of IPPs to ensure the realisation of an efficient and effective electricity sector. In addition there are certain impediments and drivers	Power market reforms objectives necessitated and provided the rationale for the introduction of IPPs which could ensure the achievement of these objectives. To understand the power market reforms in South Africa, an overview of the historical global market trends and experiences is

		that impact on power market reform efforts which the literature review highlighted. Global power market reform trends, experiences and phases were outlined to put into perspective the current reforms taking place in South Africa in relation to the global trends.	necessary. This overview can be used to highlight key learning points and can be used for benchmarking purposes.
	Power market reform structures	The literature review highlighted key reform structures that exist in different power markets around the world.	Various types of power markets are in different stages of reform and reform efforts do not necessarily result in a similar structure/entity, and it is therefore imperative to provide an overview of the different types and structure of power sector business models.
Chapter 3	Global evolution of IPPs	The literature review highlighted the evolution of IPPs in Asia and Middle East, Africa, Europe and North America.	Since the IPP sector in South Africa is fairly new it is essential to understand how this industry revolved from other regions of the world.
	Market overview of IPPs	This section highlighted the global market of IPPs in terms of different parameters such as profit margin analysis, investor returns, and liquidity ratios.	The business and financial indicators can provide a framework within which new IPPs in South Africa can be evaluated.
	Overview of the South African Power sector, its reforms as well as the introduction of the IPPs in South Africa	This section provided an overview of the power sector reforms in South Africa as well as the IPPs as a natural consequence of the reforms.	The South African power sector reforms provide a framework for the introduction of IPPs and it is therefore essential to understand the rationale behind the reforms.
Chapter 4	Business models as a management tool	The major theme of this chapter is that business models capture the logic of how companies generate revenues and provide value for clients and that therefore they are an essential indicator of business performance.	Business models are essential in describing the value proposition and revenue-generating activities of businesses and therefore in comprehending the value provided by utilities' and IPPs' business models.

3.8 RESEARCH QUESTIONS EMANATING FROM THE LITERATURE REVIEW

As much as the literature review intended to elucidate certain essential aspects of the covered topics, it highlighted a number of research gaps that need further examination either through further studies or empirical research. These further research questions are listed below:

- What are the key components and characteristics of the IPP business model which exist in the electricity and renewable power industry in South Africa?
- To what extent will the IPP sector in South Africa succeed in realising the objectives of power sector reforms such as the provision of low-cost electricity, ensuring access to electricity, and ensuring the security of supply?
- What are the key dissimilarities between the existing electricity utility business models and the IPPs existing in South Africa?
- To what extent can a business model reflect business risks (for example construction risks, operational risks, and market risks) of IPPs as identified in this study?
- To what extent can experiences of current IPPs be used to generalise and be applied to other IPPs operating within a similar environment?

A research methodology and an empirical study will be utilised to answer these questions later in this study.

3.9 SUMMARY

This chapter has provided an overview of business models as a management concept that represents how a business generates revenue and value for its owners and shareholders. This chapter is essential in this study because a business model will assist the researcher in conceptualising the findings from primary data collection into a framework that represents the business of IPPs in South Africa. The study elucidated key business model concepts and the development of and evolution of this concept over decades. It also highlighted key literature that dominates the business model as a business subject. Different types and components of business models, including utility business models were described in this chapter. The chapter posited that the existing business models were insufficient in addressing the key components of a business model in that utility models did not incorporate operational, institutional and market risks elements, amongst others. In addition, certain utility models focus on internal core competencies while not addressing the value proposition for different stakeholders such as owners and customers.

The following chapter expounds on the research methodology that elucidates how the empirical study was conducted, taking into account the different dynamics of this study such as the research design, population size and sampling criteria.

CHAPTER 4

RESEARCH METHOLOGY

4.1 INTRODUCTION

The previous chapters were dedicated to the literature review that sought to elucidate key power sector dynamics and prevailing issues and trends. This included an overview of power sector reforms and the role of IPPs in the reforms. It observed different reform structures, models and theories that form part of the electricity sector. Lastly, it provided an overview of the business models and how they represent the basic tenets of how a business generates revenues and adds value for its key customers.

This chapter is dedicated to the research methodology which seeks to provide clarity on how the primary data was collected. It highlights different concepts of data collection and analysis, such as the nature of research, the research design, the objectives of the study, data collection, statistical analysis and various other research concepts, without which the validity and reliability of the study would be questionable.

4.2 REVIEW/SUMMARY OF RESEARCH QUESTIONS AND HYPOTHESIS

The research question, objectives and hypothesis of the study are reviewed in this section. It is essential for the research questions to be clearly articulated as part of the study before data is collected. Failure to do so will result in the failure of the study to meet validity and credibility criteria.

The study responded to the following questions:

The following is the list of questions that the study responded to:

1. What are the key business and managerial challenges and risks faced by IPPs?
2. To what extent can the experiences of new IPPs operating in South Africa be linked to business and sector trends and be used develop a business model?
3. What are the key activities, resources, partners, customers and channels that impact on IPPs in South Africa?
4. How can the drivers for success that form part of the business environment of IPPs be identified and what are these drivers? and

5. What will a business model for renewable IPPs to improve managerial activities and value creation represent, and how can this be used to improve the success rate of IPPs in South Africa?

Prasad, Rao and Rehani (2001) define a hypothesis as a conjectural statement that assumes the existence of a relationship between two variables. It is a tentative guess used to devise a theory or to plan experiments in experimental studies. It is a suggested statement or explanation that needs to be proved or disapproved. It serves as a guideline of what is to be investigated and should be specified before research is conducted. LeMire (2010) affirms that a hypothesis that opposes a null hypothesis is referred to as an alternative hypothesis. A null hypothesis is a statement that has been put forward and an alternative hypothesis is the opposite of a null hypothesis.

A total of 15 hypotheses were developed to be tested in this study, and these are identified below:

$H1_0$ - The pre-investment phase of planning for an IPP is essential for IPP business success.
H1a - The pre-investment phase of planning for an IPP is not essential for IPP business success.

$H2_0$ - Post-financing activities for an IPP are essential for the success of an IPP.
H2a - Post-financing activities for an IPP are not essential for the success of an IPP.

$H3_0$ - Proper management of an EPC contract is essential for the success of an IPP during project management and the operational phase.
H3a - Proper management of an EPC contract is not essential for the success of an IPP during project management and the operational phase.

$H4_0$ - Grid access management is an essential for successful plant operations.
H4a - Grid access management is not essential for successful plant operations.

$H5_0$ - The management of O&M operations is essential for successful IPP plant performance.
H5a - The management of O&M operations is not essential for successful IPP plant performance.

$H6_0$ - The management of plant operational costs is essential for successful plant business success.
H6a -The management of plant operational costs is not essential for successful plant business success.

$H7_0$ - The management of supply chain operations is essential for successful IPP plant operations.
H7a - The management of supply chain operations is not essential for successful IPP plant operations.

$H8_0$ - Management of regulatory/legal affairs is essential for IPP plant successful performance.
H8a - Management of regulatory/legal affairs is not essential for IPP plant successful performance.

$H9_0$ - Management of community affairs is essential for IPP plant success.
H9a - Management of community affairs is not essential for IPP plant success.

$H10_0$ - Unbundling of the power sector is an essential requirement to enable effective and efficient performance of the IPP sector.
H10a - Unbundling of the power sector is not an essential requirement to enable effective and efficient performance of the IPP sector.

$H11_0$ - Opening up the IPP sector for smaller players will make the IPP sector more attractive to SMMEs.
H12a - Opening up the IPP sector for smaller players will not make the IPP sector more attractive to SMMEs.

$H13_0$ - More access to funding for smaller players will encourage diversity in the IPP sector.
H13a - More access to funding for smaller players will not encourage diversity in the IPP sector.

$H14_0$ - Return on investment is an essential value proposition for the IPP business model.
H14a - Return on investment is not an essential value proposition for the IPP business model.

4.3 RESEARCH DESIGN

The following section highlights the research paradigm, research methodology and design that was utilised to conduct this study.

4.3.1 The research paradigm

This research follows a structured approach. The basic premise of this study is that ontology represents reality, and that epistemology is the relationship between the reality and the researcher, and a methodology is a tool utilised by the researcher to arrive at the truth (Perry, 2006). There are four philosophical pillars that support different paradigms of science. The figure below depicts the different philosophical paradigms that underpin the research process.

Figure 4.1 : The 4 different paradigms of science

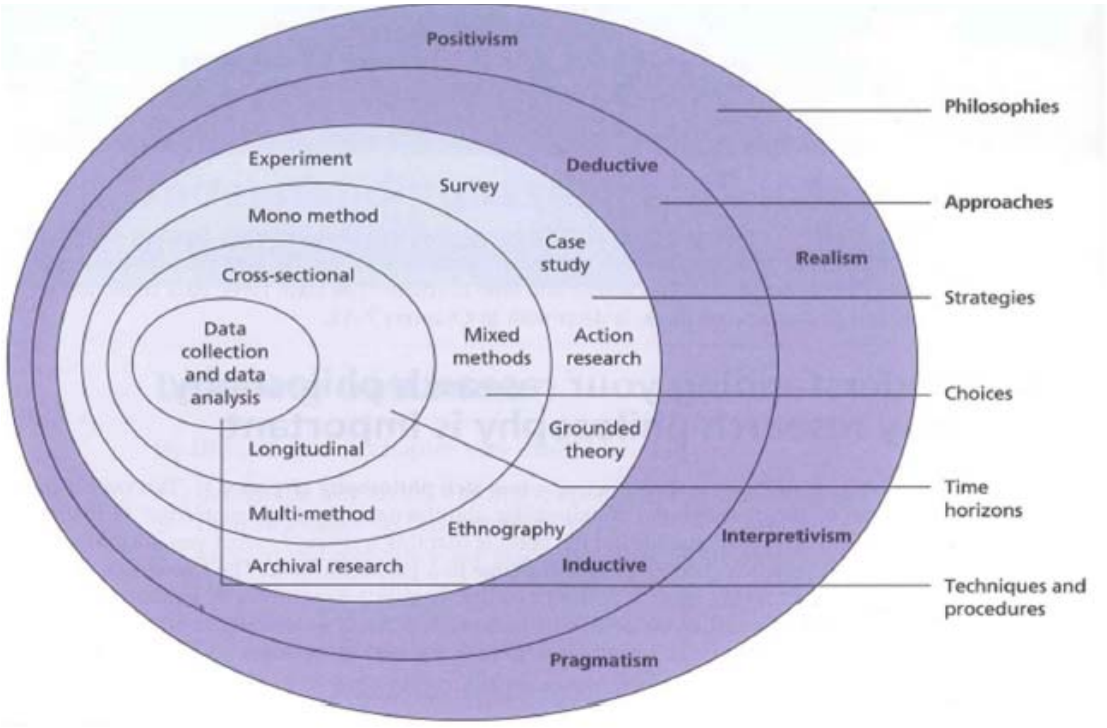
	Paradigm			
Element	Positivism	Constructivism	Critical theory	Realism
Ontology	Reality is real and apprehensible	Multiple local and specific "constructed" realities	"Virtual" reality shaped by social, economic, ethnic, political, cultural, and gender values, crystallised over time	Reality is "real" but only imperfectly and probabilistically apprehensible and so triangulation from many sources is required to try to know it
Epistemology	Findings true – researcher is objective by viewing reality through a "one-way mirror"	Created findings – researcher is a "passionate participant" within the world being investigated	Value mediated findings – researcher is a "transformative intellectual" who changes the social world within which participants live	Findings probably true – researcher is value-aware and needs to triangulate any perceptions he or she is collecting
Common methodologies	Mostly concerns with a testing of theory. Thus mainly quantitative methods such as: survey, experiments, and verification of hypotheses	In-depth unstructured interviews, participant observation, action research, and grounded theory research	Action research and participant observation	Mainly qualitative methods such as case studies and convergent interviews

Source: Perry (2006: 1195)

This study premises from a positivism point of view that assumes that a number of research questions or hypotheses can be tested to allow for explanations that are measured against accepted knowledge of the world that we live in. This point of view creates a body of knowledge that can be replicated by other researchers to generate the same results

(Kovalainene & Eriksson, 2013). In this approach, according to McLaughlin (2012) the pursuit of knowledge is attained through a process of deduction that leads to experimentation, verification, explanation and prediction. Positivists seek to apply scientific measures to generate causal laws and rely on specific assumptions about reality (Pierce, 2008). The purpose of this study is to develop and map the components a business model for IPPs that can be utilised as a framework to guide and inform businesses operating in this sector. This model will be tested against certain assumptions (hypotheses) and should provide results that can be applied to any IPP operating within similar conditions. The figure below depicts the research onion.

Figure 4.2: The research onion



Source: Saunders et al (2003: 83)

In addition, this study utilises a mixed methods approach, as it has realism elements as well, because scientific methods need to be continuously reviewed and theory needs to be revised to arrive at the reality. Realism makes it possible for different types of research methods to be utilised to arrive at the reality (Kovalainene & Eriksson, 2013). This is the case for this study where a mixed method approach was utilised to arrive at the finding.

Pierce (2008: 26) refers to inductive research as "inference from the particular to the general." It is used as a tool to build theory and can be used to find answers and then explanations for questions of "what if". An inductive research approach is useful in that it allows a study to be carried out on a subject or phenomenon from a point of view of where there is insufficient existing prior knowledge on the subject. A study is conducted through case studies (or exploratory research), for example, and once a provisional understanding is developed on a subject, this knowledge may be used to develop a number of hypotheses (Bellamy, 2012). This is the approach followed by this study. According to Pierce (2008), the deductive research process may follow the following steps:

- Select a topic
- Choose the research questions
- Collect data
- Interpret data
- Develop theoretical explanation of data
- Collect modified data to test the initial explanation
- Reiterate until conclusion can be made that best meets the test of falsifiability.

Deductive research, on the other hand, allows for a hypothesis consisting of a precise statement of what might be found in the observations derived from what we know. The aim of deductive research is to test a statement that is formulated before the creation or collection of any data (Bellamy, 2012). This approach is not suitable for this study because it requires that certain testable statements be developed upfront.

4.3.2 Stage I- Explanatory Study

Explanatory research might involve a literature search or conducting focus group interviews. The exploration of new phenomena in this way may help the researcher's need for better understanding, may test the feasibility of a more extensive study, or determine the best methods to be used in a subsequent study. For these reasons, explanatory research is broad in focus and rarely provides definite answers to specific research issues (Sachdeva, 2009).

Sometime referred to as analytical study .The main aim of explanatory research is to identify any causal links between the factors or variables that pertain to the research problem. Such research is also very structured in nature (Kothari, 2004). It is used to ask questions such as: "What are the critical success factors of a profitable company? What are the distinguishing features of a good leader? What are the reasons for the carnage on South African roads?"(Van

Wyk, 2014, 12). This approach was pertinent for this study because it assisted the researcher to understand the IPP sector in South Africa in more detail by asking such questions as "what are the critical success factors for an IPP operating South Africa, What are the business risks inherent in the IPP sector in South Africa? (See annexure A).

4.3.3 Stage II- Descriptive Research

Descriptive research concerns itself with the present phenomena in terms of conditions, practices beliefs, processes, relationships or trends. Descriptive research is devoted to the gathering of information about prevailing conditions or situations for the purpose of description and interpretation (Salaria, 2012). This type of research method is not simply amassing and tabulating facts but includes proper analyses, interpretation, comparisons, identification of trends and relationships. Williams (2007) agrees and further elaborate on this definition by stating that the descriptive research approach is a basic research method that examines the situation, as it exists in its current state. Descriptive research involves identification of attributes of a particular phenomenon based on an observational basis, or the exploration of correlation between two or more phenomena. Descriptive research refers to research studies that have as their main objective the accurate portrayal of the characteristics of persons, situations or groups (Polit & Hungler 1997). This approach is used to describe variables rather than to test a predicted relationship between variables.

This approach was deemed to be applicable for this study since it allowed the researcher to test, interpret and analyse the variable of the renewable IPP business model. Testing a relationship between different variables was not necessary for this study, because the study did not assume a relationship between each component of a business model.

4.4 RESEARCH METHOD

Carruthers (2014) asserts that the research method defines the process that one can follow to reach answers to the research questions. The research can either be based upon a qualitative or quantitative design. Quantitative research, according to Thamhain (2014), is a research process of collecting large amounts of information from which generalised inferences can be made across a large number of cases from quantitative data. The focus of quantitative research is on drawing data from a number of data points and drawing conclusions from a sample population that can be applied to bigger populations. Sukram (2009) further elaborates on this definition of quantitative research with the view that quantitative research is a numerical assessment of specific aspects of phenomena and a structured approach to measure data.

Quantitative research relies on the establishment of competing explanations based on analysing the relationship between variables. The goal is to find a set of small variables that can explain the phenomena as much as possible.

Thamhain (2014) further states that, on the other hand, qualitative researchers tend to focus on in-depth analysis of a single phenomenon in order to gain a deep understanding of this phenomenon/experience through the use of fewer participants. The purpose is to enrich understanding and build a holistic view of numerous features. Researchers use both qualitative and quantitative studies in a single study in order to discover something they might have missed had they only used either a qualitative or a quantitative approach.

Table 4.1 demonstrates the key features of qualitative and quantitative methods.

Table 4.1 : The key features of qualitative and quantitative methods

Description	Quantitative data	Qualitative data
Purpose	• More useful for conducting tests • A summary of information on various characteristics is provided for. • Useful in tracking trends	• More useful for discovery • In-depth information on a few characteristics is provided. • Discovers "hidden" motivations and values
Properties	• More structured collection technique and objective ratings. • High concern for representation • Relatively short interviews • Interviewer is passive • Large samples (over 50) • Results objective	• More structured collection technique requiring a subjective interpretation • Little concern for representativeness • Interviews are relatively long • Interviewer is interactive and should be highly skilled • Small samples (1-50) • Results subjective

Source: Hair, Rabin, Money and Samouel (2003: 76)

According to Table 5.1, the major differences between qualitative and quantitative research lie in the purpose and the properties. Quantitative research is more useful for testing a hypothesis; it provides a summary of information in numerous characteristics and is useful for tracking trends. On the other hand, qualitative research is more useful for discovery of

knowledge, for providing in-depth analysis and for discovering hidden motivations and values. Furthermore, quantitative research is a more structured technique, depending on an objective rating, whilst qualitative data relies on subjective interpretation.

According to Ospina (2004), the advantages of qualitative research include effective exploration of processes and the flexibility to follow unanticipated ideas during research, the ability to be sensitive to contextual factors and the ability to study social meaning and symbolic dimensions. The main criticism of qualitative research is the fact that it lacks the vigour of quantitative research and produces "soft" data that is based on small samples or case studies and cannot be replicated. There are issues and difficulties in meeting scientific criteria for validity, reliability and representativeness (Sumner, 2006). However, the value of qualitative research in market research and applied social science is increasingly being recognised.

On the other hand, Garwood (2006) states that the advantages of quantitative research is that it provides estimates of populations at large and allows for statistical comparison between groups. Data collected using quantitative methods can be subject to statistical analysis and can be generalised to a larger population. Qualitative research also indicates the extensiveness of attitudes held by the group and measures level of occurrence, actions and trends. It also produces facts about the world and behaviour which is considered the human knowledge sum.

Quantitative research has been criticized for not paying attention to social meanings and the social constructs that define the world we live in. Quantitative research is criticised by qualitative researchers for ignoring the subjects from which data is collected and subjecting them to unequal power relations between the subjects and the researcher (Garwood, 2006).

Amaratunga et al (2002: 23) are of the view that qualitative and quantitative methodologies are not "antithetic or divergent;" instead they focus on different dimensions of the same phenomenon. This view is expanded on by Boesch et al (2013), who state that both qualitative and quantitative research are deconstructive in nature because an episode is selected in the social world, dissected into data, and certain aspects of the phenomenon are engaged. A phenomenon is treated as a system under qualitative method. Qualitative research searches for patterns within its boundaries, and represents a coherent account of underlying processes by incorporating as many episodes as possible. The quantitative method is analytical in nature, and fragments the phenomenon into simpler models, with the consequence that there is more

precision and internal consistency in the results. This study was conducted using both qualitative and quantitative methods.

4.4.1 Two stage design

Stimson (2014) states that a two-stage design is used when the size and parameters and the size of the population is not known. A smaller, know sample is used to aggregate the population into specific characteristics such as position/ rank. Once this data is known it is used to conduct a probability sample which can be used for interviews or survey. Giraldo and Zuanna (2005) states the advantage of a two stage sample design us that allows for collecting population-based data where initially the desired sample size is not known. It helps to increase the representation of elements in the population as well as the generalisability of the study.

Aliaga and Ren (2006) state that a two-stage sampling procedure has several advantages including that it provides good coverage, is simple to implement, and allows for control of field-work quality. In order to achieve both economy and good precision, sample sizes at both stages of the survey must be determined in such way that they minimize the sampling error under a given sampling cost. This view is supported by Suri (2011) who states that that a two stage sample design can facilitate triangulation and flexibility and improve generalisations at a higher level of abstraction.

The two-stage design consists, simply, of a listing of elements of a populations such households or organisations, depending upon the availability of information regarding the address and/or location of the households/ organisations and whether that information is current. This is followed by a systematic sample of a fixed number of elements at the second stage. In the second stage, elements are selected at random and from which all the whole population was surveyed (Turner, 2003).

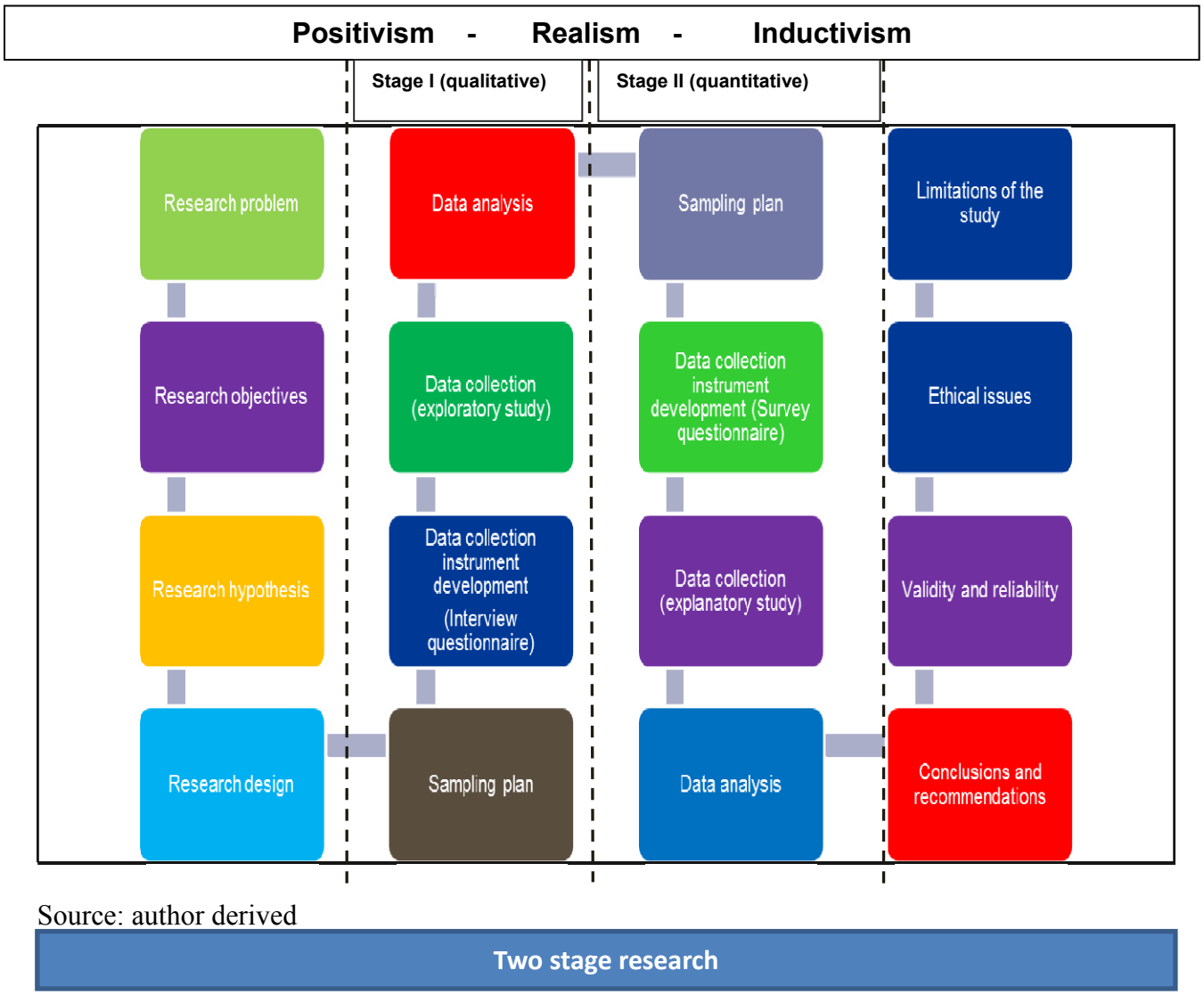
This study was conducted in two stage, each reflecting a different research methodology. Due to the fact that the IPP sector is new in South Africa and little academic research exists, it became necessary to adopt a mixed method approach, where the study was conducted in two stages:

- Stage I: this was a preliminary data collection phase to acquire qualitative data (explanatory) on the different items that relate to different components of IPPs such as key business performance indicators, drivers, risks, success factors and other related data. This was done through interviews with different stakeholders and players

within the IPP sector. This phase also assisted the researcher to determine the population parameters of respondents such as the number of management employees in an organisations, the ranking in terms of seniority, as well as their responsibilities. This was critical since when the researcher embarked on this study, only the list IPP companies was available, however organisational structures were not available.

- Stage II: this phase was quantitative and descriptive in nature, where data was collected through a survey questionnaire that was designed to provide inferential statistics on the items. This data was used to test the established business model parameters and components' validity and reliability. Each variable was ranked in order of importance in the each theme of managing an IPP. Each variable represent a component of a business model, either an input, output or value proposition of a business model.

Figure 4.3: The Research Process



Source: author derived

Figure 4.3 above demonstrates the research process for this study.

4.5 SAMPLING DESIGN

Sampling is the selection of a certain part of the total population from which an inference can be made about the total population. This definition is supported by Kothari (2004), who reiterates that sampling is a process of obtaining information about the entire population by examining only a part of it. In most research work and surveys, generalisations and inferences can be drawn from samples about the parameters of the population from the whole sample taken. Soobramoney (2008:112) explains that sampling is a process that entails drawing a representative sample from all the elements in a universe. A population or universe is an aggregate of all the elements, whilst a survey population is an "an aggregate of elements from which a sample is selected." The items selected are referred to as a sample. The selection process or technique is called sample design; and a sample survey is a survey conducted in respect of a sample.

The selection of a sample is necessary because it is not possible to study every unit in the population or to engage in an elaborate exercise to collect data from the whole population. This view is confirmed by Soobramoney (2008) who affirms that analysing data collected from the whole population would be a cumbersome process. In spite of this the most fundamental principle about sampling is that it should be representative of the whole population.

4.5.1 Stage I

Dawson (2002) lists different types of non-probability sampling methods. Non-probability samples are based on the possibility of one person being included in the sample.

- Quota sample: a sample is selected according to a quota system that is based on such factors as age, sex and social class. The researcher aims to represent the major characteristics of the population by sampling a proportional amount of each (Miller & Salkind, 2002). A limitation of this method is that the researcher might be biased towards the easily accessible cases. It is most popular with market researchers and opinion polls. This method is not recommended by statisticians because of a lack of statistical vigour (Corbetta, 2003).
- Snowball sample: it relies on referrals from initial subjects to generate additional subjects. This method is used when it is difficult for subjects to be found or when the

study population is small. This sample design is useful when studying members of a social group whose members tend to hide their identity, such as rare population groups scattered over a large area. Here, the disadvantage is that snowball sampling is biased towards subjects that are socially more active and visible (Corbetta, 2003).

- Convenience sampling: this method is utilised as haphazard and incidental sampling. It involves selecting respondents that are easy to access and inexpensive to study (Suri, 2011).
- Judgement sampling: this method allows for subjects to be chosen based on their relevance or interest to the topic. It allows for a subgroup of a population that can be judged to be representative of the population (Miller & Salkind, 2002).

Since only the company names and locations were known when stage I of this study was conducted, a snowball sampling approach was used to determine the management employees for each company. Once this number was arrived at, it was used to determine a sample frame and size for the Stage II of the study.

4.5.2 Stage II

Probability sampling allows a researcher to determine the probability that any element or member of a population will be included in a sample. This view is asserted by Welman and Kruger (2001), who state that the advantage of probability sampling is that it enables the researcher to indicate the probability to which the sample results deviate from the corresponding population values. Probability sampling allows the researcher to determine the sampling error, the statistical measure of the degree of unrepresentativeness of a sample. The different random sampling methods are listed below, as espoused by Welman and Kruger (2001):

- Random sampling: consists of both simple random sampling and stratified random sampling. In simple random sampling, each member of the population has the same chance of being selected and each sample of a particular size has the same probability of being selected. Stratified random sampling, on the other hand, is effective in allowing a researcher to stratify/subdivide the population into clear characteristics from which a representative sample can be drawn. The advantage of a stratified sample is that if a sample is drawn from a population with similar characteristics, such as sex, the probability of a sample being drawn from a single sex only is zero. A stratified random sample requires less time and money because a smaller sample is possible, where essential strata can be included in the sample, and the probability that

a sample will include more elements from different strata as the sample size increases is low (Henry, 1990).

- Systematic sampling: a systematic sampling allows for the N/th element of a population to be selected using a systematic pattern. Its level of accuracy is lower than stratified sampling.
- Cluster sample: this is suitable for large scale surveys where the population is broken down into small cluster samples from existing heterogeneous groups, called cluster, and all members of the selected clusters become the eventual sample. The advantage of this method is that in contrast to random sampling, fewer locations have to be selected, thus saving time and costs required to collect the sample. The disadvantage is that when certain clusters are homogenous in terms of the variable of interest, cluster samples may lead to bias (factors that lean towards a particular factor of a research topic) (Henry, 1990).

A stratified random sample was utilised for this phase of the study because the characteristics of each company could be determined from a list of IPPs in South Africa. These companies were stratified according to technology type and plant size. From the list, a sample of managerial employees were selected for the study. This design ensured that the sample selected represented all the different technologies and plant sizes of IPPs operating in South Africa. The sample was therefore representative of management employees of renewable IPP companies is South Africa.

4.5.3 How the sample was determined

- **The universe**

This is the first step in the sampling process and involves determining the total group that is studied (Ehlers, 2000). Once the population is determined, which is all the IPPs operating in the renewable space in South Africa, the sample frame needs to be determined (Ehlers, 2000).

- **The sample frame**

The sample frame is the record of all sample units available for selection during the stage of the sampling process. The availability of the sample frame is essential for a sample design and helps in reducing the task of sample selection.

The study focussed on the IPPs which are currently operating in South Africa. The South African Department of Energy lists all the IPPs that have been approved in terms of the

renewable energy programme of the government. The table 4.2 below lists the IPPs that were in operation in South Africa when this study was conducted. A sample frame was determined taking into account the size of the plant and the technology it utilises.

Table 4.2: Sample frame (Stage 1 and stage 2)

Technology	Size of plant	Number of plants	Population of managerial employees	Sample – Stage I	Sample –Stage II
Solar	5- 20 MW	10	9	6	8
	21-50 MW	6	3	2	3
	50 MW and above	10	5	3	2
Total Solar		26 (67% of population)	17	11	14
Wind	5-50 MW	4	4	3	3
	51- 100 MW	6	6	3	5
	100 MW and above	2	2	1	2
Total Wind		12 (30%)	12	7	10
CSP	50-100 MW	2	2	1	2
Total		40	31	19 (61%)	26 (83%)

Source: Author derived

* A manager may be responsible for more than one IPP plant, in certain instances.

The sample frame was determined in way that increases the chance of each element of each population to be selected. By segmenting the companies in terms of size, and type of generation option, the probability of each element to be selected was increased. This was particularly important for the second stage of the sample which was a survey questionnaire of data that will be provide data to be statistically analysed.

- **The sample size**

One of the essential aspects of a research study is to calculate the sample size, as it is neither feasible nor practical to study the whole population. An undersized study is a waste of

resources because it does not have the capacity to produce useful results, and an oversized one can lead to a waste of resources by using more than is necessary (Lenth, 2001).

There are two measures which affect the accurateness of the sample size. The first one is the margin of error: this is the positive or negative deviation allowable on the survey result of the sample. This is the degree of deviation between the opinions of the respondents and the opinions of the population. For instance, if a margin of error of 5% is chosen it means that if 90% of respondents said "yes", a researcher can be sure that between 85% (90%-5) and 95% (90%+5) of the entire population would have chosen "yes" (Kadam & Bhalerao, 2010).The second one is the confidence level which is an indication of how often the population lies within the boundaries of the margin of error. The standard confidence level chosen for quantitative research is 95%. This would mean that 95% of the time between 85% and 95% of the population would select "yes" (Kadam & Bhalerao, 2010).

Depending on the margin of error allowable and the confidence level you want to achieve, an ideal sample size can be attained. The response rate should be taken into account as conventionally a 20% response rate is the norm for online surveys. So if a sample size of 100 is desired, it might mean 500 surveys will have to be sent out (Van Dessel, 2013).

Additionally, the population size is dependent on whether the data is to be analysed is categorical or continuous. Statistical formulas can be used to determine the appropriate sample size (Bartlett, Kotrlik & Higgins, 2001). For this study, a table was utilised to determine the appropriate sample size. This table depicts sample sizes that will be appropriate for both categorical and continuous data.

Table 4.3: Sample size calculator

Population Size	Confidence = 95% Margin of Error				Confidence = 99% Margin of Error			
	5.0%	3.5%	2.5%	1.0%	5.0%	3.5%	2.5%	1.0%
10	10	10	10	10	10	10	10	10
20	19	20	20	20	19	20	20	20
30	28	29	29	30	29	29	30	30
50	44	47	48	50	47	48	49	50
75	63	69	72	74	67	71	73	75

Source: Bartlett, Kotrlik & Higgins (2001:1)

The first stage of the research achieved a margin of error of higher than 5% and confidence level of less than 95%.%, based on a sample size of 19. Based on a sample of 26 respondents for the second stage, a margin of error of between 5% and 3.5% and a confidence level of 95% was achieved. This compensated for a smaller sample achieved in the first stage.

4.6 DATA COLLECTION AND FIELDWORK

This section describes how data was collected for the study, for both stages of research.

4.6.1 Stage I

Interviews provide a structured way of using a single researcher to interview a number of participants (Sachdeva, 2009). The advantage of an interview is that it allows respondents to express themselves in a natural environment which allows them to share common issues, thus providing insight into the phenomenon under study. Interviews however pose several challenges that need to be addressed by the researcher. The representativeness of the sample and the generalizability of the findings is one challenge. To deal with this hurdle the researcher must select the sample utilising strict probability principles that ensures that the correct sample size is selected. This was discussed in the section above covering sample selection. Issues of confidentiality where information is shared amongst group members there is no guarantee that they will respect each other‘s confidentiality at a later stage. This requires skilful facilitation skills that allow for group members to draw the line in terms of confidentiality boundaries.

Blumberg, Cooper and Schidler (2011) agree that interviews have certain advantages as a research method. One of those advantages is that they enable the researcher to observe

interaction between him and the respondents, which helps in detecting different views on a topic. On the other hand, the disadvantages of interviews are that they require a well-trained moderator, as some individuals might dominate the interview and other respondents might be reluctant to speak up. Interviews were deemed appropriate for phase I of the study because they allowed the researcher to collect data from a number of respondents quickly and to obtain more insight into the study phenomenon.

A semi-structured interview structure was utilised for this study. A semi-structured interview consists of several questions that helps to define the areas to be explored but allows for the interviewer to pose follow up questions in order to receive a more detailed response (Gill et al, 2008). It may be a checklist of topics to be dealt with or a list of general questions that give an interviewer guideline for the interview (Corbetta, 2003). The aim of the researcher was to obtain the participants' perspectives without any interference from the researcher. This assists in increasing the study's validity (Morse et al., 2002). This interview technique gives both the interviewer and the interviewee's freedom to articulate various issues, whilst at the same time ensuring that all themes are addressed and the necessary information is collected (Corbetta, 2003). This approach enabled the researcher to obtain as much data as possible on the IPPs' key issues, themes and indicators.

4.6.2 Interview Schedule

The effectiveness of an interview relies on the questions that the researcher lists in the interview schedule and the sequence of those questions. These questions need to be aligned with the study's research questions (Remenyi, 2011). The content an interview schedule details decisions such as what questions to ask, how to phrase the questions, the depth and breadth of topics to include, and the question sequence (Mathers, Fox & Hunn, 2002).

The interview schedule is provided as one of the annexures at the end of this report.

For this study the interview schedule included the following elements:

- Opening and introduction: the researcher introduces himself and the purpose of the study. He explains what motivated the study. He explains how long the interview will take, which for this study was between 45 minutes and an hour.
- Transition: this phase entails establishing the general demographics of the interviewees, including their current positions as well as their level of experience.

- Topics and questions: the researcher introduces various themes of the study as well as the relevant questions for each theme. The interviewer needs to ensure that the sequence of interview questions allows for follow-up questions or alternative questions in case the respondents could not answer certain questions for any reason, which might include lack of experience or knowledge in that field. This is to ensure that time is not wasted on questions which respondents have no expertise or knowledge to answer (Remenyi, 2002).
- Closing: the researcher summarises the key issues and themes which emerged from the interview and thanks the interviewees for their time. He establishes if it is appropriate to call the candidates for a follow-up should there be any further questions arising out of the interview.

4.6.3 Stage II

Survey research methods involve the use of questionnaires or statistical surveys to gather data about people and their thoughts or behaviours. Rohilla (2013) states that surveys are designed to produce a quantitative description of certain aspect of the study population. They may be concerned with the relationship between variables, or with projecting findings descriptively. Surveys are described by Burton (2000:2) as ways to produce information to "describe, compare, and predict attitudes, opinions, values and behaviours" based on what people say or see. The main tool of collecting survey data is through structured and predefined questions. This information may be collected through a representative sample of the entire population. There are two broad types of survey data collection: questionnaires and interviews (which were used for the first stage).

Survey questionnaires were used to collect quantitative data addressing the research objectives and themes discussed at the beginning of this chapter. Email provides an effective platform for collecting research data using questionnaires. Smorfitt (2008) affirms that emails provide ease of access to contact a vast number of potential respondents in a short space of time. It is a very effective method for collecting data from geographically dispersed populations.

The questionnaires from the second phase of data collection were emailed to respondents once the data from the first phase has been analysed. These respondents were given two (2) weeks to respond to questions, at the end of which those who had not responded were contacted telephonically and reminded to do so.

Questionnaire design

Each questionnaire is divided into two parts:

- Section A: demographic data such as management level, gender, age, experience and the company information.
- Section B: business related questions. These are described in the next section below.

The questionnaire was divided into subsections, each covering a specific business theme. The themes were identified from data analysis from interviews where data was coded and emerging themes were identified.

The themes covered are the following:

- Pre-investment phase: covers activities that have to be performed upfront before bidding commences (questions 1-9).
- Post financing: refers to work that has to be done to reach financial close (10-13).
- Managing the engineering, procurement and construction (EPC) work: this refers to the work that needs to be done to set up an EPC contract (14-17).
- Grid access management: these are the activities carried out to manage access to the grid (18-21).
- Managing Operations and Maintenance (O&M) operations: these relate to management activities that have to be performed to manage O&M activities (22-30).
- Managing plant costs: these questions refer to work that needs to be done to manage plant costs (31-36).
- Managing human resources: these questions refer to human resources functions that have to be performed in an IPP plant (37-40).
- Supply chain operations: these questions refer to supply chain tasks that have to be performed in an IPP plant (41-44).
- Regulatory/legal and community affairs: these questions pertain to legal and regulatory affairs that have to be managed in an IPP business (45-50).
- Value proposition: these questions refer to the value proposition that has to be delivered by an IPP to different stakeholders (51-55).

An administered survey questionnaire should be designed in a way that allows for accurate data collection and effective and efficient statistical analysis (Soobramoney, 2008). The

utilisation of structured questionnaires is one effective way of doing this and these questions should ideally consist of the following mix:

- Dichotomous questions, offering a choice between only two variables,
- Multiple choice questions with multiple answers, allowing the respondent to select more than one response,
- Checklists, where a respondent is asked to place a list of items in order of importance in terms of a set criterion, and
- Ranking, where a respondent is asked to place a list of items in order of importance in terms of a set criterion.

Rating scales

Rating scales have been used by researchers in attitudinal and behavioural studies for a number of years. Roster and Album (2006) state that the Likert scale is the most popular type of scale for capturing both direction and intensity of respondents' reactions in a single measurement. This scale was utilised in the second phase of the study to capture most of the responses from the survey questionnaire.

Scale types could be classified into four categories (Ehlers, 2000):

- Ratio scales: these have an absolute zero, equal distances among all adjacent points and properties of order among scale points.
- Interval scale: consists of variables that do not have an absolute zero but have properties of order among scale points and equal distances among scale points.
- Ordinal scales: varies only the property order among scale points.
- Nominal scales: are simply names for categories and do not have the property of order among them.

The scale was compiled out of the variables and factors emerging from the preliminary interview data, in combination with the theory emanating from the literature review. The survey questionnaire utilises a standard five-point Likert scale to ensure the consistency of questions asked and to simplify completion. Respondents were asked to rank each variable in order of importance, using an ordinal scale, from 1 (strongly agree) to 5 (strongly disagree). The Likert scale is a widely used format of agreement/disagreement (Likert 1932). Researchers in all social and behavioural science disciplines use rating scales in a wide range of attitudinal and behavioural studies. Regardless of form, the rating scale is assumed to

capture both direction and intensity (or extremeness) of respondents' reactions in a single measurement of, say, corporate reputation (Roster & Albaum, 2006).

However, rating scales are not without their flaws. The use of a five point scale is prone to errors such as form-related errors and systematic errors in a respondent's use of rating scales. According to Riedl, Blohm, Leimeister, and Krcmar (2013) these include the following type of errors:

- Leniency: the tendency to rate something too high or too low (i.e. rate in an extreme way).
- Central tendency: reluctance to give extreme scores.
- Proximity: give similar responses to items that occur close to one another

Additionally, when using Likert items of only five levels, researcher cannot make assumption that respondents perceive all the adjacent levels as being in equal distant, thus regard item as an ordinal data (Album, Roster, Yu & Rogers, 2006).

The validity and reliability of the Likert scale could not be established for this study since the researcher had already established a number of variables through interviews and the scale was used to determine a rank order of each variable in terms of importance in order to determine whether the variable should be included in the proposed business model. The interval between each level was not regarded since the researcher only included variable in the model where there was an agreement amongst respondents that it is important for an IPP. The model was developed on a premise that if the management of an IPP company considers a variable important for the success of an IPP or to reduce business risks, it will be included in the business model.

4.7 TARGET POPULATION

The target population for this study was the renewable IPP companies that are operating in South Africa. When this study was conducted, there were 40 such companies operating in South Africa. The study targeted managerial employees of such companies because they are in a better position to understand the business risks, challenges and success factors of IPP companies operating in South Africa. The study identified 31 management employees from these companies. In some instances a single Managing Director was responsible for two or three IPP plants in owned by a single company.

4.8 ETHICAL CONSIDERATIONS

According to Erriksson and Kovalainen (2008), ethical principles such as that of informed consent, the avoidance of deception, harm or risk, or applying universal principles of respect, should govern all research activity, irrespective of the researcher's approach to knowledge production. Sumner (2006) states that ethics is a field of moral philosophy dealing with the standards by which behaviour should be regulated. Ethical tensions arise between the objective of searching for new knowledge and the rights and interests of individuals and groups that may be affected. Additionally, Mcauley (2003: 21) states that "the ethics of social research is about creating a mutually respectful, win-win relationship in which participants are pleased to respond candidly, valid results are obtained, and the community considers the conclusions constructive." One major element of research ethics is the treatment of human subjects, which includes their right to be informed of the potential consequences of participating in a study (informed consent), the avoidance of deception, the guarantee of anonymity or confidentiality, and not opening up participant records without their consent (Meterns & Ginsberg, 2009; Sumner, 2006). In addition, the Belmort Report Commission (set up by the National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research) spells out six norms of scientific research that should inform any scientific research efforts. These are: the use of valid research designs; the competence of the researcher to conduct the study; the identification of consequences of the research (primarily for the research participants); appropriate sample selection; the assurance of voluntary consent; and the informing of participants as to whether harm will be compensated (Meterns & Ginsberg, 2009). Mcauley (2003) furthermore states that ethical responsibility is essential in all stages of research, from designing the study, including how participants are to be treated, to explaining the consequences of their participation. Lastly, Mcauley (2003) states that researchers have an obligation not to provide falsified information, to ensure that the analysis and reporting of information is not inappropriate, and that the technical shortcomings of the study are reported and any negative or positive findings are reported. A researcher has an obligation to make sure that information is not concealed even if the results arrived at are unexpected.

There are several ethical considerations that are relevant in this study. The researcher ensured that all participants were informed of the potential implications of their participation in the study. The responding IPPs (companies) are competitors in the electricity sector, and therefore the revelation of their competitive strategies might harm their respective competitive positions. The researcher therefore committed to ensuring that such information would only

be detailed at a generic level, without specifying the relevant respondents. Thus their anonymity and confidentiality was guaranteed. Secondly, the researcher ensured that respondents were diligently handled and that harmony prevailed between respondents participating in the interview and the interviewer.

The study adhered to rigorous research methods, including ensuring that the research design was appropriate, the use of sample selection methods was appropriate and relevant, as well as the use of a competent research statistician. The researcher ensured that all information provided was authentic, that the analysis and reporting of information was appropriate, and that the shortcomings of the study are detailed (in the limitations section), and that information is not concealed, even where the findings are unexpected. Additionally the institutional requirements in terms of obtaining ethical clearance was adhered to in so far as obtaining permission to conduct the study and meeting informed consent requirements. The reporting and storage of research data was also carried out on accordance with the research code of the institution.

4.9 DATA ANALYSIS AND HYPOTHESE TESTING

This section highlights how the data was analysed for both phases of the study. It provides an overview of the tools that were utilised for the statistical analysis of the data. The data is presented in sequence of how it was collected, that is, stage I first, followed by stage II.

4.9.1 Stage I

Qualitative data is analysed through organising it in a logical way into meaningful groups. The data is interpreted through scrutiny, seeking themes, patterns, and meaning, and lastly, coming up with generalisations (Creswell & Stake, as cited in Leedy & Ormond, 2005). According to Griffee (2005), there are two ways of categorising and analysing interview data. One is through the interviewer categorising emerging themes through rigorous and continuous reading and analysis of transcripts and notes.

Coding

Qualitative data collection is done through coding, which is the process of identifying key themes through a short word or phrase (Sancheva, 2009). This strategy requires the following key steps:

- Step one: read or listen through the transcript of the interview

- Step two: read the transcript several times to familiarise oneself with contents
- Step three: coding the interview
- Step four: write a summary of the coded data.
- Step five: write an interpretation of the coded data.

Categories

The second strategy is for the interviewer to create categories before the interview by determining a hypothesis behind each question posed to the interviewees. This can only be possible if the researcher knows something about what he/she is looking for. These strategies go hand in hand and dependent on how exploratory the interview is, the more the researcher should look for grounded theory (Sancheva (2009).

Data for this study was analysed using coding as described above. This is because the qualitative data was utilised as a preliminary study to identify key themes and trends from this study. The second methodology would not have been appropriate since the researcher did not specify categories or themes. The data was categorised into a number of themes that formed the basis for developing a questionnaire to test each variable in each theme.

Once the data has been analysed, researchers can utilise a wide variety of methods to represent it. These methods include themes supported by direct quotations from interview transcripts, diagrams, and visual presentations of key concepts in matrices, charts and graphs, as well as narratives from the respondents (Roulston, 2014).

4.9.2 Stage II

The analysis of collected data is a key point of departure for this process, and for it to be successful the quality of the interview and survey data analysis should be of an acceptable level. Rohilla (2013) agrees that the interpretation of data can be only achieved once it has been statistically analysed.

Social theories make propositions about the relationship between concepts, and a major purpose of research is to confirm or reject certain propositions based on collected data (Neuman, 2011). A hypothesis is an empirical testable version of a proposition; it is a statement that can be tested again empirical evidence. Prasad, Rao and Rehani (2001) define a hypothesis as a conjectural statement that assumes the existence of a relationship between two variables. It is a tentative guess used to devise a theory or to plan experiments in experimental

studies. It is a suggested statement or explanation that needs to be proved or disapproved. It serves as a guideline of what is to be investigated and should be specified before research is conducted. Numerous hypotheses were proposed in various chapters of this. A total of 15 hypotheses were developed to be tested in this study

Summary statistics such as means, standard deviation and correlations can be done on a simple spreadsheet programme and are usually straightforward. Analyses aimed at inference causes are usually more complex, requiring specialised knowledge. These techniques are described below.

Descriptive techniques

According to Rohilla (2013), these techniques are designed to collect and measure descriptive data such as the following:

- Graphic description: use graphs to summarise data. Examples are histograms, scatter grams, bar charts and pie charts.
- Tubular description: this is used to summarise data. Examples are frequency distribution schedule, and cross tabs.
- Parametric description: estimates the values of certain parameters which summarise data and includes measurements such as location or central tendency (for example, arithmetic mean, median and mode) and measurement of statistical dispersion (for example, standard deviation, variance and range). It measures the shape of the distribution (for example skewness or kurtosis.)

Goddard and Melville (2007) confirm that most quantitative data are either measures of central tendency of measures of dispersion. These techniques were useful in understanding the relationship between certain business variables and their impact on IPPs' business performance.

The analysis of the data was done utilising descriptive statistics including means and standard deviations, where applicable. Frequencies are presented in tables and graphs.

Inferential techniques

Inferential statistics involves generalising from a sample to the whole population. It involves the testing of a hypothesis. The objective of inferential statistics is to confirm whether or not two treatment conditions occurred by chance or whether there is a true difference.

Soobramoney (2008) cites a number of tools to analyse inferential data, which include correlations, factor analysis, ANOVA, and t-tests.

- Factor analysis: factor analysis is a useful tool for interpreting data where the variables being analysed are interrelated, certain of them dependent and others independent. Giorgi (2002) posits that factor analysis is one of the essential techniques in multivariate analysis where numerous variables are involved. This tool is essential in developing a business model, since there are numerous factors that can be identified that have an impact on a business model, such as management experience, plant technology type and government regulations. Therefore, a factor analysis will assist in analysing the relationship between different variables. An attempt was made to see if single construct measures for each section are possible to get an idea of relative importance of the constructs, but this was not possible numerically. Factor analysis cannot be applied to so small a sample to identify factors (or for validation of the instrument).
- The Cronbach Alpha test: produced as a result of factor analysis, it measures the reliability of the scored items to test if the scores are of a reliable magnitude in relation to the study's goals, sample composition, the number of cases, and the specific conditions under which the results were obtained (Bedeian, 2014).

One sample t-test was applied to test for a significant difference from a neutral score of 3, implying significant agreement or disagreement. All these tests were checked using the non-parametric Wilcoxon signed ranks test. The check was done because the data is not normally distributed and because of the small sample size. In every case, there was no difference in the results.

Graphs and bar charts

Graphs and bar charts are diagrams which can be used to represent a relationship between variables (Cramer & Howitt, 2004). Graphs and bar charts were used extensively in the study to depict the relationships between a number of variables.

4.9.3 Validity and reliability

The usefulness of data and analysis depends on the how valid and reliable the data is. These are the two most essential requirements of any study that purports to make generalisations about any phenomenon.

Validity

The quality of research is one of the most essential aspects of the research discipline, and is a key requirement for all the phases and processes of research. Ali and Yusof (2011) assert that quality needs to permeate all research processes, including the quality of the research question and data collection, the analysis and the presentation of data. This can only be assessed in terms of reliability, internal and external validity and objectivity.

Giorgi (2002: 189) defines validity as the extent to which a test measures what the researcher wants it to measure. Different types of validity exist. Face validity: "that quality of an item or indicator judged to be a reasonable measure of a particular variable." This can be improved through the use of expert panellists who are knowledgeable on the subject. Face validity was achieved in the study through the use of mixed methods, both exploratory and explanatory. The use of exploratory research allowed the researcher to collect qualitative data on various themes within the IPP sector from different managers employed in this sector. The explanatory research allowed a further synthesis and analysis of data through a survey study on the managers employed in the IPP sector in South Africa.

Content validity refers to how much a measure covers the range of meanings included within the concept, as espoused by Babbie and Mouton (2010). To achieve content validity, for instance, the researcher needs to ensure that during the formulation of research questions, the questions must be formulated in such a way that their meaning is clear. Different terminology should be used to explain concepts that have the potential for creating confusion. The researcher ensured that content validity was achieved by testing questions with a few respondents to check if the meaning attached to them was similar across respondents and was interpreted in the same way.

Internal validity requires that all alternative explanations for causality are ruled out, and may be a laborious task since ruling out any variables requires explicit identification of each variable (Wolverton, 2011). Through the statistical tools such as the inferential and descriptive techniques identified above, the study managed to meet the requirements of internal validity. Criterion validity "refers to degree to which a measurement relates to certain external criteria" (Giorgi, 2002: 192). Construct validity refers to the logical relationship between variables (Mpofu, 2010). Boesch et al. (2011) expand on this definition by positing

that construct validity refers to the extent to which an instrument or method measures the theoretical entity that it was designed to measure.

Wolverton (2009) describes logical validity as the flow of each step of the research process to the subsequent steps. The author states that steps such as the problem statement, the research hypothesis, the selection, definitions, findings and conclusions should flow into one other. The logical validity of this study was achieved through the use of the theoretical framework that underlay the collection of qualitative data through interviews, and the testing of this data through a survey questionnaire.

Reliability

Babbie and Mouton (2010) posit that reliability refers to the consistency of the results, in that the test applied should check whether the results would be the same should the research be repeated by another researcher in a different context or environment.

Mpofu (2010) and Boesch et al. (2013) provide tools and methods that can be used to improve validity and reliability, as depicted below.

Table 4.4: Testing for quality in empirical social research

Tests	Research tactic	Phases of research in which tactic occurs	Questions to assess the method
Construct validity	• Use multiple sources of evidence • Establish a chain of evidence • Have key informants	• Data collection	• Can hypotheses be built from theories that may be proven incorrect or timidly confirmed through the test results? • How do the theoretically relevant measures correlate with empirically collated measures?
Internal validity	• Do pattern-matching • Do explanation-building • Address rival explanations • Use logic models	• Data analysis	• Do the results clearly confirm or reject the hypothesis? • Are alternative explanations implausible? • Are samples truly randomized selections?
External validity	• Use replication of logic in multiple case	• Research design	• Is the right thing measured by the

	studies		operation? • Is it a representative sample taking into account the ground population? • Is the participant's behavior normal?
Reliability	• Ensure clear research questions. • Ensure that results are independent of sample selection.	• Data collection	• Can the results be potentially influenced by the sample selection process? • Is it possible to draw the same results from the sub-sample, if the sample is?

Source: Adapted from Mpofu (2010: 116) and Boesch et al (2013: 222-223)

Ali and Yusof (2011) advise the different methods above to achieve validity and reliability of the research process. The authors provide additional methods to improve reliability. These include providing the rationale for the research methodology, utilising more than one method to study a problem, detailing how the interviews were conducted, as well as certain procedures for data analysis.

Taking into account the factors listed above, several avenues were identified to improve on the reliability of the study. A mixed method approach was conducted utilising qualitative and quantitative methods. This method ensured that the study was rigorous. The advantages and disadvantages of this method are discussed under the research design section above. The sample selection techniques ensured that a representative sample was attained (construct validity). The researcher ensured that the study objectives were aligned with the purposes of the study and that the research methods were aligned with the research objectives. The procedures for data collection and analysis were detailed in the study and the strengths and weaknesses of each technique were discussed.

One of the essential elements of this research phase was the analysis of the questionnaire. The face validity and reliability of questionnaires needs to be tested. The questionnaire needs to be assessed to test the quality in the context of applicability in achieving the research goals of the study. The questionnaire needs to achieve consistent results even when applied a number of different times (Smorfitt, 2008). Statistical experts were employed to test the

questionnaire to assess whether it complied with the above mentioned criteria. All the unclear elements in the questionnaire were then addressed.

4.10 SUMMARY

The research methodology is an essential part of a study, and without a properly constituted research method, the study's validity and reliability was threatened. This chapter has demonstrated how the primary data was collected and analysed, taking into account all the relevant concepts that impact on the study's findings, and explaining how and why each method was selected. It has been demonstrated that a mixed methods approach was the most appropriate approach for this study, as it allowed the researcher to collect qualitative data and quantitative data at the same time. This method ensured that the rigour of the study was improved and that the research questions were fully answered. This chapter has demonstrated the philosophical dimensions that underpin the study as well their relevance towards achieving the study objectives. The chapter highlighted how the research design will assist to ensure that the study achieves its objectives. It has described the sample selection, data collection and analysis, as well as the hypothesis-development components of the study. The chapter addressed the validity and reliability dimensions of the study and the measures that were implemented to ensure that these dimensions were not compromised. Lastly, ethical issues pertinent to this study were discussed.

The following chapter presents the research findings of the study from both the qualitative and quantitative data. It provides an overview of the different variables and themes that emerged from the different responses received from respondents.

CHAPTER 5

EXPLANATION OF THE FINDINGS

5.1 INTRODUCTION

The previous chapter provided a detailed description of the research methodology that was utilised for this study. It detailed how this study utilises a mixed methods approach, where both qualitative and quantitative methods were utilised to collect data. It further detailed which instruments were utilised to collect both types of data, namely the interview questionnaire and the survey questionnaire. Lastly, it provided an overview of how the data will be presented and analysed using various tools such as bar charts and various statistical tools.

This chapter is dedicated to the presentation and analysis of the data from both stages of the study. The chapter is divided into two sections. The first section presents the data from the interviews (qualitative). The second section provides a presentation and analysis of the data from the questionnaires (quantitative).

5.2 STAGE I: PRESENTATION AND ANALYSIS OF INTERVIEW DATA

The analysis of collected data from interviews requires that emerging themes be identified from respondents' answers, and that these responses be summarised and their meanings deduced. It means establishing patterns behind the collected data, and how they link to the research questions and to one another. This was done to ensure that a holistic view of the collected data is presented. This data is presented to align it with the research objectives as set out in the previous chapter of this study.

Research objective 1: To identify the key business and managerial challenges drivers for success, and risks faced by IPPs.

Pre-investment phase

Respondents stated that the IPP key operations begin before a project becomes a preferred bidder during the open tender Request for Proposal (RFP) process. This is when the Department of Energy requests potential IPPs to submit their bids to develop plants in terms of different technologies such as solar, wind or concentrated solar power. There are a number of activities that need to be performed at this phase which can determine whether the bidding is successful or not. These activities require human and financial resources commitments. They involve the following:

- Obtaining government permits and licences (for example water licences, cost estimate letters).
- Conducting natural resource level studies (for example wind and wind studies), for at least a year.
- Determining the required return on investment required by investors.
- Determining the Engineering, Procurement and Construction (EPC) costs.
- Determining the interest payments due to lenders.
- Making provisions for hedging forex.

The majority of the respondents agreed that the project development costs can require up to R20 million in capital investment; irrespective of whether a project bids successfully or not, these costs have to be expended (sunk costs).

Respondents summarised the pre-investment phase in the following way:

- Phase one involves doing pre-feasibility work which includes site identification, analysing site conditions for solar radiation, analysis of proximity to water, and road access.
- Phase two entails obtaining environmental approvals and the conceptual high-level designs. These costs can be in the region of about R 10-20 million.
- Phase 3 is the bid phase, where developers have to demonstrate that environmental authorizations, the water application, cost estimate letters, and resources studies have been done.
- Phase 4 is about reaching financial close, which involves negotiation with EPC contractors and lenders.

Respondent 5 agreed that "by this time the project costs would have reached R 60-80 million."

The importance of ensuring that all the activities in these phases are carried out effectively and efficiently cannot be underestimated, because such vast capital is invested in the project during this phase.

Post-investment phase

Respondents stated that there are a number of activities that have to be carried out by an IPP which has reached preferred bidder status but which still needs to reach financial close. Financial close is reached when an IPP has met all funding requirements in terms of securing funding to cover the capital costs of constructing a power plant. These activities are essential to ensure the success of an IPP during the project management phase. They are summarised below:

- The negotiation of contract terms with EPC contractor.
- Negotiating lending terms with potential lenders.
- Determining the debt coverage ratio for the business, taking into account potential revenues.
- Adhering to all technical and legal requirements for reaching financial close.

Respondent 14 agreed that this phase consumes numerous resources, and by the time the project reaches commercial operation, it would have changed hands a couple of times. He further affirms that "numerous projects are developed by one or more parties, who then sell the project onto another set of parties, either before or at project close. Construction management then takes over. Once construction is over the operations management takes over. That was certainly the case for our three projects,"

Managing the EPC contract

Managing the EPC contract emerged as one of the key management issues and challenges that the IPP must deal with in order to manage their business operations successfully. An EPC contractor is required to plan and construct an IPP plant to the required specifications, as detailed by the contractor. EPC cost is the biggest cost component of an IPP and can run into billions of Rands. Respondents concurred that if the EPC contract is not properly managed, it can lead to problems such as construction delays, cost overruns and poor performance of the plant.

Respondent number 6 further explained that "drawing up of the various contracts including the EPC contract is an exercise that relies more on experienced consultants with extensive knowledge and experience in the field."

A number of activities were detailed by a majority of the respondents as necessary to ensure that the EPC contract is properly managed:

- Proper engineering design work should be done upfront.
- Proper due diligence has to be performed by the EPC contractor that has been identified to establish whether it has the necessary capability and expertise to handle the work.
- The technical aspects of the EPC contract must be properly managed.
- It must be ensured that the liability and claims handling processes are properly provided for in the contract.

The activities performed during this phase are essential from a project development point of view and are essential in militating against project delays and cost overrun risks.

Grid access management

Due the fact that the transmission grid is owned and managed by Eskom (the state-owned entity), respondents stated that it was essential for IPPs to meet requirements to be connected to the transmission grid. If this is not properly managed, it can lead to problems such as project cost overruns and schedule delays. Additionally, it might lead to challenges during operations, where it becomes difficult for the IPP to dispatch power to the grid. Respondents agreed that a there is a need to ensure the alignment of requirements between IPP and grid owners, as this is essential for successful project management and operations success.

This was affirmed by respondent number 12 who stated that "grid connection costs need to be properly managed. Grid connection costs can run into R200 million."

This was supported by respondent number 9 who stated that "savings might be achieved by concentrating projects together where possible. For instance in round 4, one company had three projects connecting in one sub-station, the costs can be shared between the three projects, making the bid price more competitive."

The grid connection phase and its activities are essential for the project management phase and therefore the effective and efficient performance of these activities will determine project success.

Managing Operations and Maintenance (O&M) operations

O&M operations are essential for an IPP, and to be able to deliver on its required performance targets, an IPP needs to properly manage its O&M operations, according to the majority of the respondents. Certain IPPs outsource this service to an external service provider. Even when these services are provided externally, an IPP manager still has the responsibility of ensuring that these activities are properly performed. These activities were identified as essential in managing O&M operations:

- Determining a robust O&M plan for a successful O&M contractor selection process.
- Determining an appropriate O&M service level agreement.
- Assigning performance guarantees to ensure that contractors meet their obligations in terms of ensuring optimum plant performance.
- Managing the implementation of an asset management programme.
- Managing the implementation of a spares management programme.
- Managing the costs of spares and components.
- Implementing and managing the plant performance system.

Lastly, respondents stated that it is essential to reduce plant downtime or out-of-commission times to ensure that the plant performs optimally, and that monitoring the performance of the plant in real time is also essential.

Remote monitoring (SCADA) is equally necessary in a renewable pant. The biggest challenge in the Northern Cape, where most solar projects are located, is the heat, and so the transformers' cooling systems need to be managed. SCADA sends an alarm when there are issues in the plant, pinpointing exactly where the problem might be. It gives you an indication of the environmental conditions such as wind speed and cloud cover.

As respondent number 13 attested, "you will get a clear indication of expected output and revenue at a given time."

Respondent number 22 agreed that "it is essential to implement a Reliability Centred Maintenance system to ensure that maintenance is done effectively and efficiently."

Management of plant operational costs

The proper management of plant operational costs was identified by respondents as one of the essential success factors for IPPs operating in the renewables sector in South Africa. This is to ensure that the plant generates enough revenue to satisfy the required returns of its investors and to repay its creditors and meet other financial obligations.

One of the potential areas of cost movement is the loss of revenue through delays in doing remedial work or corrective maintenance. To militate against this, companies allocate an inventory of spares. One way of doing this is to take a plant apart and look at all components and have an inventory of spares on site. There is a need to have trained technicians to do maintenance. As one of the respondents (23) noted, "that way you can reduce the outage time and maintain high plant availability and minimise revenue loss."

There are a number of activities that were identified by respondents as necessary to ensure this:

- Managing overheads such as rent and electricity to ensure that there are no operational cost overruns.
- Insuring for power outages is essential to mitigate the cost of downtime/out-of-commissions.
- Insuring for damages to the plant and equipment to limit the costs of unforeseen plant damages.
- Adjusting tariffs for inflation to ensure that the plant revenue generates the required return on investment.
- Hedging against foreign currency fluctuations to ensure that the price paid for parts that need to be imported is not inflated by movements of the value of the domestic currency.

The management of plant costs contribute towards ensuring that an IPP fulfils its obligation towards its shareholders by generating the expected returns on their investment. The activities required to manage the O&M operations are essential key success factors for an IPP.

Managing human resources

A majority of the respondents agreed that there are a number of essential human resources functions in an IPP plant. This was confirmed by respondent number 24 who stated that:

"There are a number of skills required in building a PV plant. There is a civil aspect, steel structure assembly activities, module installation, installation of cables, drilling of holes, concreting and wiring of inverters. On-job training and skills development was instrumental during the REIPP. Our company was able to develop skills to a large extent. We took a black female-owned engineering firm and trained her to install components in a plant thereby ensuring skills transfer. She has been able to utilise her skills in further REIPPP projects."

The acquisition and retention of scarce skills was identified by respondents as one of the essential management tasks that IPP managers have to grapple with. This is largely due to fact that engineering skills are scarce in South Africa; additionally, the renewables sector is largely a new commercial industry and skills and expertise in this sector is still not readily available. Most respondents also identified other management activities falling within the human resources function, such as the management of industrial relations, the development of multi-skills and the management of employee diversity.

Supply chain operations

There are a number of supply chain operations that were identified by respondents as essential for managing an IPP and that are essential success factors for its success. The first one is the implementation of a supply chain management programme. Supply chain operations are essential for both the project management phase and the operations phase of an IPP. A supply chain management programme details essential elements such as the supply chain strategy of a business, the key supply chain outcomes to be achieved, and the allocation of resources to achieve those outcomes. Other supply chain management operations include the management of lead times for ordering parts and components, as well the management and hedging for foreign currency fluctuations to limit the costs of importing parts and components.

As respondent number 1 noted, CSP projects "are large infrastructure projects that require a long term procurement framework which allow the county to achieve 80% local content like the Spanish."

This means that the supply chain programme must take into account the need to ensure that procurement processes allow for the implementation of the local content requirements and preferred supplier procurement framework.

The management of regulatory/ legal and community affairs

There are a number of regulations and legal matters that are essential for the management of an IPP. Most IPPs are set up as special purpose vehicles, which mean that they are administered on a limited-recourse basis. This means that a creditor is only entitled to repayments from the profits that are made by the power plant, and not the assets that a project owner might have. This is known as off-balance sheet financing, which means that the asset (power plant) does not reflect on the assets of a project owner (Das & Kim, 2015). This is an effective way of raising finance for the development of a power plant, because the construction costs of a power station can amount to several billion Rand. Other regulatory and legal affairs that need to be managed are the following:

- Setting up a proper governance structure for an IPP through a proper management board.
- Adhering to operating licences and permits.
- Managing the relationship with the buyer.
- Managing relationships with the government.

As respondent number 23 noted in support of the importance of regulatory and legal affairs,

"IPPs are subjected to various regulatory and legal requirements as detailed in their various contracts with the various stakeholders and as detailed in various acts like Occupational and Safety Act, Environmental management requirements etc."

The management of relationships with the local communities is essential to ensure that the IPP not only meets its obligations to the communities but maintains a healthy and symbiotic relationship. The community is a source of inputs such as labour for the local businesses. The government requires successful IPPs to set up a community trust which is used to benefit local economic development from a portion of the revenues of the IPP (World Wide Fund, 2015).

Research objective 2: to identify key activities, resources, partners, customers and channels that impact on IPPs in South Africa.

Value proposition

A value proposition is a promise of value to be delivered and acknowledged, and a belief from the customer that value will be delivered and experienced. A value proposition can apply to an entire organization, or parts thereof, or customer accounts, or products or services (Shafer, Smith & Linder, 2004). The majority of the respondents stated that the main component of the value proposition is towards the customer, to ensure that the customer receives electricity, at the required quality. IPPs have an obligation to contribute towards social and economic development within the local communities they operate in. They have an obligation to deliver the required level of investment to shareholders and make the required interest payments to creditors. Respondent 14 agreed that an IPP delivers value to customers in terms of a competitive price, as well as, according to respondent 3, "IPPs assist Eskom to minimise the impact of blackouts and to help to stabilise the power lines."

Key enablers

Enablers are essential in ensuring that the industry functions more effectively and efficiently and that the industry is conducive for existing and future players (Wells et al, 2013). Most respondents acknowledged that unbundling the power market (into separate transmission, distribution and generation companies) will make the environment more conducive for IPPs operating in South Africa's energy sector. This is because of the fact that Eskom is a buyer and at the same time is responsible for managing the transmission network that IPPs need to access to be able to sell to Eskom.

As respondent number 5 explained it, The SA REIPPP programme in its entirety has been an enabler regarding the success of the IPPs in the country. The SA electricity sector within the REIPPP is still conducive, the economic challenges and Eskom's financial status to an extent has led to overhead lines rollout delays, but this does not imply that the sector is not conducive for the IPPs".

Respondents feel that Eskom does not have a sufficient incentive to invest in the grid to expand connections as it is not an asset generation asset, per se. The majority of the respondents stated that it is necessary to open up the renewable programme to smaller players, to ensure that the sector is attractive to Small Medium and Micro Enterprises (SMMEs) in South Africa. This will require that access to funding is available to smaller players to encourage diversity in the sector. These key enablers are essential to ensure the sustainability of the renewables IPP sector in South Africa.

Research objective 3: To ascertain the drivers for success that form part of the business environment of IPPs. The themes that emerged from the interview questions already provide a tentative indication of what the drivers for success for IPPs. The themes are listed below:

- Pre-investment activities
- Post-investment activities
- EPC management
- Grid management
- O&M operations
- Management of plant operational costs
- Managing human resources
- Supply chain operations
- The management of regulatory/legal issues and community affairs
- Value proposition
- Key enablers

Research objective 4: To propose a business model for renewable IPPs to improve managerial activities and value creation to improve their success rate.

5.3 THE PROPOSED BUSINESS MODEL

From the discussion above, a number of components were identified for the proposed business model based on the key themes identified above. A business model is a structure of how a business creates profitable and sustainable revenue streams for one or several segments of customers. A business model is a representation of how a business generates revenue and value for its shareholders. It is also defined as a choice of the appropriate **inputs, outputs, business activities and outcomes** that a business uses to deliver value (Wells, 2013).

Inputs/business activities

A number of inputs necessary to ensure that an IPP creates profitable and sustainable revenue streams for its customers. Data collected from preliminary interviews identified a number of such inputs. Respondents identified a number of business activities that have to be performed from the IPP management point of view to ensure that a business delivers value.

Pre-investment activities:

- Budgeting for upfront costs in preparation for the bidding.
- Determining the bidding requirements.
- Obtaining government permits and licences (for example water licences, cost estimate letters) is an essential requirement for bidding.
- Conducting resource level studies (for example DNI and wind studies) is essential in meeting bid requirements.
- Determining the required return on investment to determine the appropriate bid price.
- Determining the EPC (Engineering, Procurement and Construction) to determine the bid price.
- Determining the interest payments.
- Making provisions for hedging forex is to determine the bidding price.
- Determining the value of upfront work for success of bid planning.

Post-investment activities:

- Negotiating EPC contracts to reach financial close
- Negotiating the EPC contract terms.
- Reaching financial close.
- Signing the PPA.

EPC management:

- Conducting due diligence EPC contractors before awarding the EPC contract.
- Planning the technical aspects (such as engineering designs and project plans) of the EPC contract.
- EPC contracts must provide for clear liability and claim handling processes.
- Proper front-end planning for successful EPC project management.

Grid management:

- Planning for grid access for project success.
- Alignment of requirements between IPP and grid owners for successful project management.
- Meeting grid code requirements for successful project management.
- Meeting grid code requirements for successful for plant operations.

O&M operations:

- Determining a robust O&M plan.
- Determining an appropriate O&M service level agreement.
- Assigning performance guarantees on the O&M contract
- Managing the implementation of an asset management programme.
- Managing the implementation of a spares management programme.
- Managing the costs of spares and components.
- Implementing and managing the plant performance system (SCADA).
- Reducing plant down time/out of commission time.
- Implementation of a Reliability Centred Maintenance system.

Management of plant operational costs:

- Insuring for outages is essential to mitigate the cost of downtime/out-of-commissions
- Employee costs are an essential component of plant operation costs.
- Adjusting tariffs for inflation is essential in ensuring that the plant revenue generates the required return on investment.
- Foreign currency fluctuations impact on the return on investment that can be repatriated by international investors.
- Managing overheads such as rent and electricity is essential in ensuring that the there are no operational cost overruns.

Managing human resources:

- Managing scarce skills.
- Managing industrial relations.
- Developing multi-skilling abilities for employees.
- Managing team diversity.

Supply chain operations:

- Implementing a supply chain management programme for IPP project management.
- Implementing a supply chain management programme is for IPP operations.
- Planning for lead times for parts.
- Managing currency fluctuations to import components and parts.

The management of regulatory/legal issues and community affairs:

- A special purpose vehicle as an instrument for delivering IPP projects.

- Adhering to operating licences and permits to meet legal obligations.
- Managing the relationship with the buyer (off taker).
- Managing relationships with the local communities.
- Managing relationships with the government.

Value proposition/outcomes

A value proposition is a promise of value to be delivered and acknowledged, and a belief from the customer that value will be delivered and experienced. A value proposition can apply to an entire organization, or parts thereof, or customer accounts, or products or services (Shafer, Smith and Linder, 2004). The key elements of the value proposition of the proposed business model are;

1. An IPP has an ethical obligation towards local communities to contribute towards local economic development and sustainable economies.
2. IPPs have an obligation to deliver the required return on investment to shareholders.

- **Enablers**

This is an element that is not part of existing business model components. It emerged as one of the themes from the interview as respondents were of the view that to create a sustainable environment for IPPs, the must enablers such as government policy, political stability and sound macro-economic variables in the macro environment. This is in line with the literature review findings that market and political risks such as currency fluctuations, regulatory risks, government provisions and legal constraints are some of the risks IPPs are exposed to (Ogutuga, 2006). Institutional challenges such as the reliance on a single customer, the challenges arising from systems planning, and the unilateral change of contract terms and conditions are also experienced by IPPs globally (Siddiqui, 1998).

The key components of enablers are;

- Unbundling the power market (into separate transmission, distribution and generation companies) will make the environment more conducive/friendly for IPPs operating in South Africa's energy sector.
- Opening up the programme to smaller players will make the IPP sector more attractive for SMMEs (Small Medium and Micro Enterprises).

- More access to funding for smaller players will encourage diversity in the IPP sector.

Key output

- Sustainable/ clean energy

A number of hypothesis were proposed to test the components of the business model. The findings of such tests are deliberated in the next section.

5.4 PHASE II: PRESENTATION AND ANALYSIS OF SURVEY QUESTIONNAIRE DATA

In order to improve the validity and reliability of the study, a secondary study was conducted where quantitative data was collected through a survey questionnaire. The questionnaire was designed to test the data that was collected through interviews. A sample was drawn from the management of 40 IPPs that were operating in South Africa at the time this study was conducted. An interview questionnaire was sent to 26 senior managers after the managerial employees were determined. Questions were divided into sections, each representing a specific theme identified from the interview responses. They are described below.

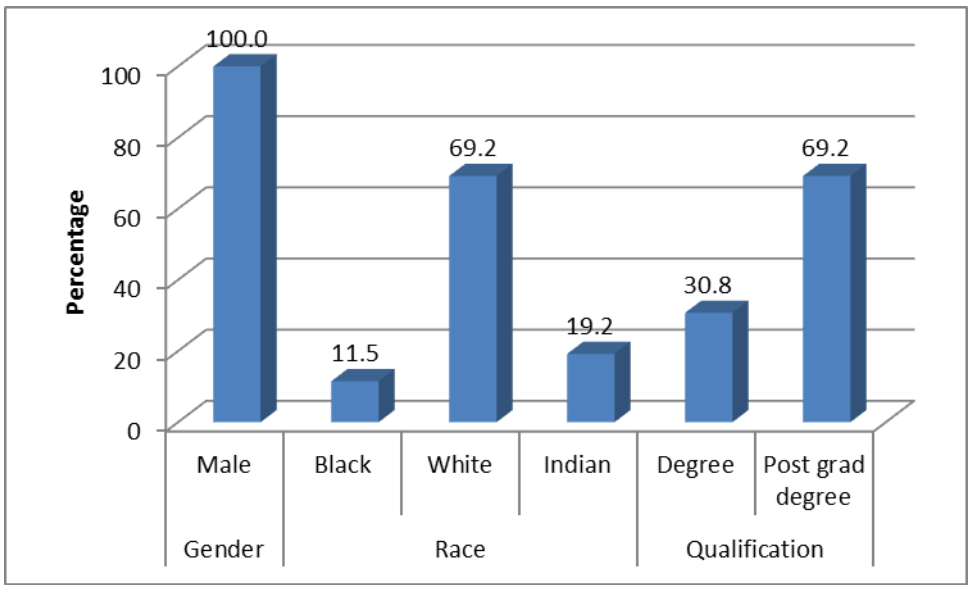
5.4.1 Demographic data

Demographic data was collected for statistical purposes and to demonstrate the breakdown of respondents in terms of age, race, and education, level of employment, position and experience.

Personal variables

All respondents in this study were male. The majority of the respondents were white (69%) followed by Indian (19.2%) and black (11.5%). A majority of the respondents had postgraduate degrees (69.2%), and 30.8% had an undergraduate degree (figure 5.1). The fact that most respondents had postgraduate qualifications might be indicative of the fact that the IPP industry is highly technical and therefore requires advanced skills and knowledge. This would make the respondents more qualified in their views of the issues being investigated.

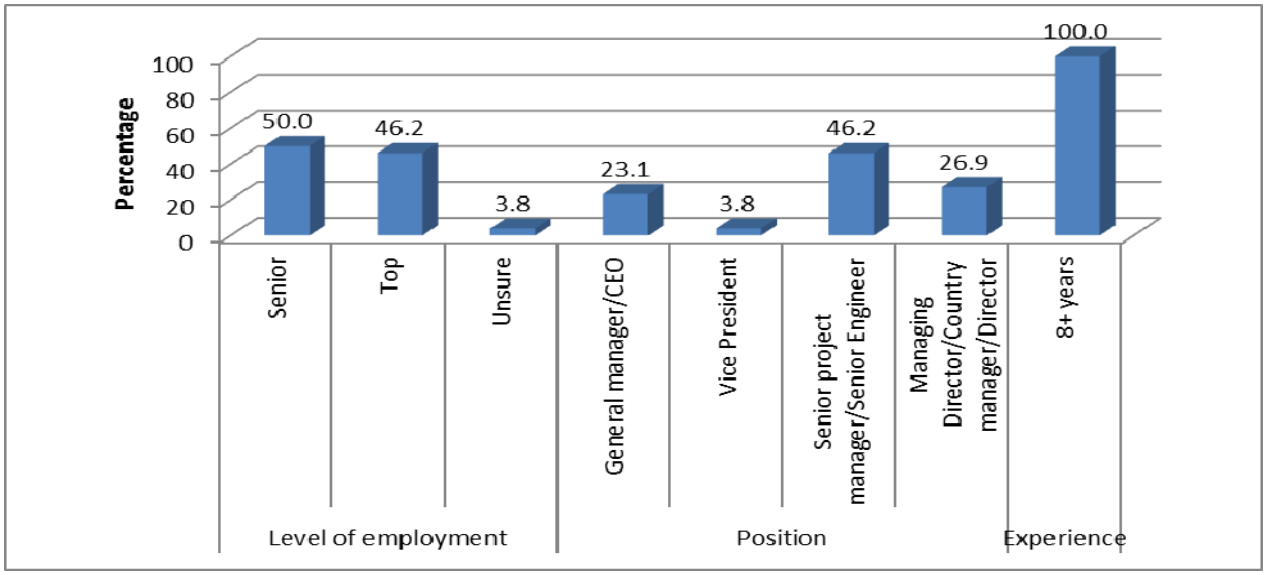
Figure 5.1: personal information of respondents



Work related variables

Fifty percent (50%) of the respondents classified their level of employment at senior level, whilst 46.2% classified themselves as top management. Only one delegate classified himself as "unsure". Senior Project Managers or Project Engineers comprised the highest category of respondents at 46.2%, followed by Managing Director/Country Manager at 26.9%, General Manager/CEO at 23.1% and Vice President at 3.8%. All respondents had 8 years and above work experience. The level of seniority of each respondent is essential because the employees in senior positions are assumed to have higher knowledge of the industry. The length of experience is an indication of more knowledge of the industry and therefore a more informed view of the issues being studied (Figure 5.2).

Figure 5.2 : Work information of respondents



5.4.2 Data analysis by hypothesis

Hypothesis were tested to analyse the significance of agreement on the importance of each variable in the management of an IPP or the importance of an item to be included in the IPP model based on the hypotheses that were proposed in different sections of this study.

A summary of results from a one sample t-test is presented below in which the significance of the agreement on the importance of each question/theme is presented. This applies to all the themes identified in this study.

- **Pre investment activities**

A one-sample t-test was conducted to test the null hypotheses against the alternate hypotheses for several items pertaining to pre-investment activities.

$H1_0$ - The pre-investment phase of planning for an IPP is essential for IPP business success
H1a - The pre-investment phase of planning for an IPP is not essential for IPP business success.

The results below (Table 5.1) show that for all the items there is significant agreement as to their importance.

Table 5.1 : One Sample t-test: pre-investment activities.

Activity	Mean	T	df	P
1 Budgeting for upfront costs in preparation for the bidding is essential.	4.35	9.955	25	.000
2 Determining the bidding requirements is essential for bid preparation.	4.58	11.442	25	.000
3 Obtaining government permits and licences (for example water licences, cost estimate letters) is an essential requirement for bidding.	4.50	10.043	25	.000
4 Doing resource level studies (for example DNI and wind studies) is essential in meeting bid requirements.	4.77	20.996	25	.000
5 Determining the required return on investment is an essential component of determining the appropriate bid price.	4.42	11.28	25	.000
6 Determining the EPC (Engineering, Procurement and Construction) costs is essential to determine the bid price.	4.50	13.117	25	.000
7 Determining the interest payment is essential to determine the bid price.	4.35	10.916	25	.000
8 Making provisions for hedging forex is an essential requirement for managing bidding price.	3.65	3.563	25	.002
9 The value of upfront work is essential for success of bid planning.	4.50	11.802	25	.000

An analysis of each question in this section is provided below.

Question 1: Budgeting for upfront costs in preparation for the bidding.

There was significant agreement (M=4.35, SD = .689) that budgeting for upfront costs in preparation for bidding is essential (t (25) =9.955, p<.0005).

Question 2: Determining the bidding requirements is essential for bid preparation

There was significant agreement (M=4.58, SD=.703) (t (25) =11.442, p<.0005) that determining the bidding requirements is essential.

Question 3: Obtaining government permits and licences (for example water licences, cost estimate letters) is an essential requirement for bidding

There was significant agreement (M=4.50, SD = .762) (t (25) =9.955, p<.0005) that obtaining government permits and licences is essential.

Question 4: Undertaking natural resource level studies (for example DNI and wind studies) is essential in meeting bid requirements.

There was significant agreement (M=4.77, SD = .430) (t (25) =20.996, p<.0005) that undertaking natural resource level studies is essential.

Question 5: Determining the required return on investment is an essential component of determining the appropriate bid price.

There was significant agreement (M=4.42, SD = .643) (t (25) =11.280, p<.0005) that determining the required return on investment is an essential component of determining the appropriate bid price.

Question 6: Determining the EPC costs is essential to determine the bid price.

There was a significant agreement (M=4.50, SD = .583) t (25) =13.117, p<.0005) that determining the EPC costs is essential to determine the bid price.

Question 7: Determining the interest payment is essential to determine the bid price.

There was a significant agreement (M=4.35, SD = .629) (t (25) = 10.916, p<.0005) that determining the interest payments is essential to determine the bid price.

Question 8: Making provisions for hedging forex is an essential requirement for managing bidding price

There was still a significant agreement (M=3.65, SD = .936) (t (25) =3.563, p<.0005) that making provisions for hedging forex is an essential requirement for managing bidding price

Question 9: The value of upfront work is essential for success of bid planning.

There was a significant agreement (M=4.50, SD = .648) (t (25) =11.802, p<.0005) that the value of upfront work is essential for success of bid planning.

Relative importance of pre-investment phase items

The mean scores of responses are then ordered from highest to lowest. This gives an indication of the relative importance of each item within a theme. These will serve in assisting management of IPPs in prioritising the allocation of tasks and resources on important items. The results are presented in table 5.2 below.

Table 5.2: Ranking of mean scores: pre-investment activities

4 Conducting natural resource level studies (for example DNI and wind studies) is essential in meeting bid requirements.	4.77
2 Determining the bidding requirements is essential for bid preparation.	4.58
3 Obtaining government permits and licences (for example water licences, cost estimate letters) is an essential requirement for bidding.	4.50
6 Determining the EPC (Engineering, Procurement and Construction) costs is essential to determine the bid price.	4.50
9 The value of upfront work is essential for the success of bid planning.	4.50
5 Determining the required return on investment is an essential component of determining the appropriate bid price.	4.42
1 Budgeting for upfront costs in preparation for the bidding is essential.	4.35
7 Determining the interest payment is essential to determine the bid price.	4.35
8 Making provisions for hedging forex is an essential requirement for managing bidding price.	3.65

The table above demonstrates that performing resource-level studies received the highest ranking of importance from respondents. This indicates that of all the pre-investment activities, respondents consider this activity the most essential. This finding has an impact on the layout of the model, which should reflect the importance of this finding because it suggests that of the value creation activities under pre-investment activities, doing resource studies in considered essential.

- **Post-investment activities**

A one-sample t-test was conducted to test the null hypotheses against the alternate hypotheses for several items pertaining to post-investment activities.

The hypothesis $H2_0$ - Post financing activities for an IPP are essential for a success of an IPP
H2a - Post-financing activities for an IPP are not essential for the success of an IPP.

The results below (Table 5.3) show that for all the items there is significant agreement as to their importance

Table 5.3: One Sample t-test: Post-investment activities activities

Activity	Mean	T	Df	P values
10 Negotiating EPC contracts is essential to reach financial close	4.46	9.184	25	.000
11 Negotiating the EPC contract terms is essential for this phase	4.23	8.835	25	.000
12 Reaching financial close is essential for this phase	4.19	9.594	25	.000
13 Signing the PPA is essential for this stage.	4.46	11.520	25	.000

An analysis of each question is presented below.

Question 10: Negotiating EPC contract terms is essential to reach financial close

There was a significant agreement that negotiating EPC contract terms is essential to reach financial close (M=4.46, SD = .811) (t (25) =9.184, p<.0005).

Question 11: Negotiating the lending terms is essential for the post-investment phase.

There was significant agreement that negotiating the lending terms is essential for the post-investment phase (M=4.23, SD = .710) (t (25) =8.835, p<.0005.

Question 12: Reaching financial close is essential for this phase

There was a significant agreement that reaching financial close is essential for this phase (M=4.19, SD = .634) (t (25) =9.594, p<.0005).

Question 13: Signing the PPA is essential for post-investment phase.

There was a significant agreement that signing the PPA is essential for this stage (M=4.46, SD = .647) (t (25) =11.520, p<.0005.

Relative importance of pre-investment phase items

The mean scores of responses are then ordered from highest to lowest. This gives an indication of the relative importance of each item within a theme. The ranking of items shows that negotiating EPC contracts scored the highest mean score in terms of level of importance. This means that from the respondents' point of view, managing EPC contract negotiations is the most essential activity during the post-investment phase of IPP project (table 5.4).

Table 5.4: Ranking mean scores for post-investment activities

10 Negotiating EPC contracts is essential to reach financial close	4.46
13 Signing the PPA is essential for this stage.	4.46
11 Negotiating lending terms is essential for this phase	4.23
12 Reaching financial close is essential for this phase	4.19

- **Managing the EPC contract**

A one-sample t-test was conducted to test the null hypotheses against the alternate hypotheses for several items pertaining to managing the EPC contract.

The hypothesis $H3_0$ - Proper management of an EPC contract is essential for the success of an IPP during project management and operational phase

H3a- Proper management of an EPC contract is not essential for the success of an IPP during project management and operational phase.

The results below (Table 5.5) show that for all the items there is significant agreement as to their importance.

Table 5.5: One Sample t-test: Managing the EPC contract

Activity	Mean	T	df	P values
14 Conducting due diligence EPC contractors is essential for the IPP before awarding the EPC contract.	4.35	9.955	25	.000
15 Planning the technical aspects (such as engineering designs and project plans) of the EPC contract is essential to ensure successful selection of an appropriate EP contractor.	4.00	5.204	25	.000
16 EPC contracts must provide for clear liability and claim handling processes.	4.65	17.382	25	.000
17 Proper front-end planning is essential for successful EPC project management.	4.58	13.916	25	.000

An analysis of each question is presented below

Question 14: Conducting due diligence EPC contractors is essential for the IPP before awarding EPC contract.

There was significant agreement that conducting due diligence of EPC contractors is essential for the IPP before awarding EPC contract (M=4.35, SD = .689) (t (25) =9.955, p<.0005).

Question 15: Planning the technical aspects (such as engineering designs and project plans) of EPC contract is essential to ensure successful selection of an appropriate EP contractor.

There was significant agreement that planning the technical aspects of an EPC contract is essential to ensure successful selection of an appropriate EPC contractor (M=4.00, SD = .980) (t (25) =5.204, p<.0005).

Question 16: EPC contracts have to provide for clear liability and claim handling processes.

There was significant agreement (M=4.65, SD = .485) (t (25) =17.382, p<.0005) that EPC contracts must provide for clear liability and claim handling processes.

Question 17: Proper front-end planning (FEP) is essential for successful EPC project management.

There was significant agreement (M=4.58, SD = .578) (t (25) =13.916, p<.0005) that proper front-end planning is essential for successful EPC project management.

Relative importance of pre-investment phase items

The mean scores of responses are then ordered from highest to lowest (table 5.6). This gives an indication of the relative importance of each item within a theme. The importance of EPC contracts providing for a clear liability and claims handling process scored the highest mean. This means that the IPP managers surveyed regarded this theme as the most important, because it ensures that if costs overrun and project delays occur, managers can have recourse in the contract provision as means of relief.

Table 5.6 : Ranking of means scores: managing the EPC contract

16 EPC contracts must provide for clear liability and claim handling processes.	4.65
17 Proper front-end planning is essential for successful EPC project management.	4.58
14 Conducting due diligence on EPC contractors is essential for the IPP before awarding the EPC contract.	4.35
15 Planning the technical aspects (such as engineering designs and project plans) of EPC contract is essential to ensure successful selection of an appropriate EPC contractor.	4.00

- **Grid access management**

A one-sample t-test was conducted to test the null hypotheses against the alternate hypotheses for several items pertaining to grid access management.

The hypothesis $H4_0$ - Grid access management is an essential for successful plant operations H4a - Grid access management is not essential for successful plant operations.

The results below (Table 5.7) show that for all the items there is significant agreement as to their importance.

Table 5.7: One Sample t-test: Grid access management

Activity	Mean	T	df	P values
18 Planning for grid access is essential for project success.	4.42	12.559	25	.000
19 Alignment of requirements between IPP and grid owners is essential for successful project management	4.65	17.382	25	.000
20 Meeting grid code requirements is essential for successful project management	4.12	8.712	25	.000
21 Meeting grid code requirements is essential for successful for plant operations	4.42	14.402	25	.000

An analysis for each question is provided below.

Question 18: Planning for grid access is essential for project success

There was significant agreement that planning for grid access is essential for project success (M=4.42, SD = .578) (25) =12.559, p<.0005) (t (25) =12.559, p<.0005).

Question 19: Alignment of requirements between IPP and grid owner is essential for successful project management

There was significant agreement that this is essential (M=4.65, SD = .485) (t (25) =17.382, p<.0005).

Question 20: Meeting grid code requirements is essential for successful project management

There was significant agreement that this is essential (M=4.12, SD = .653) (t (25) =8.712, p<.0005).

Question 21: Meeting grid code requirements is essential for successful for plant operations

There was significant agreement that meeting grid code requirements is essential for successful plant operations (M=4.42, SD = .504) (t (25) =14.402, p<.0005).

Relative importance of pre-investment phase items

The mean scores of responses are then ordered from highest to lowest. This gives an indication of the relative importance of each item within a theme. This could be interpreted as meaning that aligning the grid code requirements is considered the most essential activity/capability by managers. The proposed business model should encompass the capabilities and activities in line with this finding. Additionally the highest ranking activities may be considered as core activities for the purpose of the proposed business model. Table 5.8 below presents the results for these items.

Table 5.8: Ranking of mean scores for grid access management

19 Alignment of requirements between IPP and grid owners is essential for successful project management	4.65
18 Planning for grid access is essential for project success.	4.42
21 Meeting grid code requirements is essential for successful for plant operations	4.42
20 Meeting grid code requirements is essential for successful project management	4.12

- **Managing operations and maintenance**

A one-sample t-test was conducted to test the null hypotheses against the alternate hypotheses for several items pertaining to managing operations and maintenance

The hypothesis $H5_0$ - The management of O&M operations is essential for successful IPP plant performance

H5a - The management of O&M operations is not essential for successful IPP plant performance.

The results below (Table 5.9) show that for all the items there is significant agreement as to their importance.

Table 5.9: One Sample t-test: Managing operations and maintenance

Activity	Mean	T	df	P values
22 Determining a robust O&M plan is essential for successful O&E contractor selection	3.92	5.571	25	.000
23 Determining an appropriate O&M service level agreement is an essential element of an O&M contract.	4.15	8.041	25	.000
24 Assigning performance guarantees is an essential element of an O&M contract	4.35	9.955	25	.000
25 Managing the implementation of an asset management programme is essential for successful plant operations.	4.23	6.325	25	.000
26 Managing the implementation of a spares management programme is essential for successful plant operations.	4.12	9.667	25	.000
27 Managing the costs of spares and components is essential for successful plant operations.	4.00	5.000	25	.000
28 Implementing and managing the plant performance system (SCADA) is essential for plant successful plant operations.	4.42	14.402	25	.000
29 Reducing plant down time/out of commission time is essential for optimum plant production/performance.	4.54	13.484	25	.000
30 Implementation of a Reliability Centred Maintenance system is essential for O&M operations.	4.00	5.204	25	.000

An analysis of each question is presented below.

Question 22: Determining a robust O&M plan is essential for successful O&E contractor selection

There was significant agreement that determining a robust O&M plan is essential for successful O&E contractor selection (M=3.92, SD = .845) (t (25) =5.571, p<.0005).

- **Managing plant costs**

Question 23: Determining an appropriate O&M service level agreement is an essential element of an O&M contract.

There was significant agreement that determining an appropriate O&M service level agreement is an essential element of an O&M contract (M=4.15, SD = .732) (t (25) =8.041, p<.0005).

Question 24: Assigning performance guarantees is an essential element of an O&M contract

There was significant agreement that assigning performance guarantees is an essential element of an O&M contract (M=4.35, SD = .689) (t (25) =9.955, p<.0005).

Question 25: Managing the implementation of an asset management programme is essential for successful plant operations.

There was significant agreement that assigning performance guarantees is an essential element of an O&M contract (M=4.23, SD = .992) (t (25) =6.325, p<.0005).

Question 26: Managing the implementation of a spares management programme is essential for successful plant operations.

There was significant agreement that assigning performance guarantees is an essential element of an O&M contract (M=4.12, SD = .588) (t (25) =6.325, p<.0005).

Question 27: Managing the costs of spares and components is essential for successful plant operations.

There was significant agreement that managing the costs of spares and components is essential for successful plant operations (M=4.00, SD = 1.020) (t (25) =5.000, p<.0005).

Question 28: Implementing and managing the plant performance system (SCADA) is essential for plant successful plant operations.

There was significant agreement that implementing and managing the plant performance system (SCADA) is essential for plant successful plant operations (M=4.42, SD = .582) (t (25) =14.402, p<.0005).

Question 29: Implementing and managing the plant performance system (SCADA) is essential for plant successful plant operations.

There was significant agreement that implementing and managing the plant performance system (SCADA) is essential for plant successful plant operations (M=4.54, SD = .582) (t (25) =14.402, p<.0005).

Question 30: Implementation of a Reliability Centred Maintenance system is essential for O&M operations.

There was significant agreement that the implementation of a Reliability Centred Maintenance system is essential for O&M operations (M=4.12, SD = .653) (t (25) =5.204, p<.0005).

Relative importance of pre-investment phase items

The mean scores of responses are then ordered from highest to lowest. This gives an indication of the relative importance of each item within a theme. The result (Table 5.10) shows that reducing plant downtime and out-of-commission time in order to ensure that the plant performs optimally was ranked the highest. This is in line with the fact that O&M operations are designed specifically to ensure that the plant output and performance is at the highest level at all times.

Table 5.10: ranking of mean scores for operations and management activities

29 Reducing plant down time/out-of-commission time is essential for optimum plant production/performance.	4.54
28 Implementing and managing the plant performance system (SCADA) is essential for successful plant operations.	4.42
24 Assigning performance guarantees is an essential element of an O&M contract	4.35
25 Managing the implementation of an asset management programme is essential for successful plant operations.	4.23
23 Determining an appropriate O&M service level agreement is an essential element of an O&M contract.	4.15
26 Managing the implementation of a spares management programme is essential for successful plant operations.	4.12
27 Managing the costs of spares and components is essential for successful plant operations.	4.00
30 Implementation of a Reliability Centred Maintenance system is essential for O&M operations.	4.00
22 Determining a robust O&M plan is essential for successful O&E contractor selection	3.92

- **Managing plant costs**

A one-sample t-test was conducted to test the null hypotheses against the alternate hypotheses for several items pertaining to managing plant costs.

The results below (Table 5.11) show that for all the items there is significant agreement as to their importance.

Table 5.11: One Sample t-test: Managing plant costs

Activity	Mean	T	df	P values
31 Insuring for outages is important to mitigate the cost of downtime/out-of-commissions.	3.69	5.196	25	.000
32 Insuring for damages to plant and equipment is an important requirement to limit the costs of unforeseen plant damages.	4.38	9.383	25	.000
33 Employee costs are an important component of plant operation costs.	3.96	7.404	25	.000
34 Adjusting tariffs for inflation is important in ensuring that the plant revenue generates the required returns on investment.	3.92	5.035	25	.000
35 Foreign currency fluctuations impact on the return on investment that can be repatriated by international investors.	3.81	3.889	25	.001
36 Managing overheads such as rent and electricity is important in ensuring that the there are no operational cost overruns.	3.96	8.158	25	.000

The following section presents an analysis of each question.

Question 31: Insuring for outages is essential to mitigate the cost of downtime/out-of-commissions.

There was significant agreement that insuring for outages is essential to mitigate the cost of downtime/out-of-commissions (M=3.69, SD = .679) (t (25) =5.196, p<.0005).

Question 32: Employee costs are an essential component of plant operation costs.

There was a significant agreement that employee costs are an essential component of plant operation costs (M=4.38, SD = .752) (t (25) =7.404, p<.0005).

Question 33: Employee costs are an essential component of plant operation costs.

There was significant agreement that employee costs are an essential component of plant operation costs (M=3.96, SD = .662) (t (25) =7.404, p<.0005).

Question 34: Adjusting tariffs for inflation is essential in ensuring that the plant revenue generates the required return on investment.

There was significant agreement that adjusting tariffs for inflation is essential in ensuring that the plant revenue generates the required return on investment (M=3.92, SD = .935) (t (25) =5.038, p<.0005).

Question 35: Foreign currency fluctuations impact on the return on investment that can be repatriated by international investors.

There was significant agreement that foreign currency fluctuations impact on the return on investment that can be repatriated by international investors (M=3.81, SD = 1.059) (t (25) =3.889, p<.0005).

Question 36: Managing overheads such as rent and electricity is essential in ensuring that the there are no operational cost overruns.

There was significant agreement that managing overheads such as rent and electricity is essential in ensuring that the there are no operational cost overruns (M=3.96, SD = .562) (t (25) =8.158, p<.0005).

Relative importance of pre-investment phase items

The mean scores of responses are then ordered from highest to lowest. It revealed that employee costs are the most essential costs to be managed (Table 5.12). This makes it imperative that managers of IPP plants ensure that human resources are utilised optimally and that these costs are managed properly to ensure that the value-capturing component of a business model is realised.

Table 5.12 : Ranking of mean scores for managing plant costs

33 Employee costs are an essential component of plant operation costs.	3.96
36 Managing overheads such as rent and electricity is essential in ensuring that there are no operational cost overruns.	3.96
34 Adjusting tariffs for inflation is essential in ensuring that the plant revenue generates the required return on investment.	3.92
35 Foreign currency fluctuations impact on the return on investment that can be repatriated by international investors.	3.81
31 Insuring for outages is essential to mitigate the cost of downtime/out-of-commissions.	3.69

- **Managing human resources**

A one-sample t-test was conducted to test the null hypotheses against the alternate hypotheses for several items pertaining to managing human resources.

The hypothesis $H8_0$ - The management of human resources is essential for successful IPP plant operations

H8a - The management of human resources is essential for successful IPP plant operations is not essential for successful IPP plant operations.

The results below (Table 5.13) show that for all the items there is significant agreement as to their importance.

Table 5.13: One Sample t-test :Human resources activities

Activity	Mean	T	df	P values
37 Managing scarce skills is an essential HR task within an IPP.	3.88	5.222	25	.000
38 Managing industrial relations is an essential HR management activity for an IPP.	4.38	14.23	25	.000
39 Developing multi-skilling abilities for employees is an essential human resources task for the IPP.	3.73	4.503	25	.000
40 Managing team diversity is an essential requirement for managing human resources.	4.15	10.825	25	.000

An analysis of each question is presented below.

Question 37: Managing scarce skills is an essential HR task within an IPP

There was significant agreement that managing scarce skills is an essential HR task within an IPP (M=3.88, SD = .864) (t (25) =5.222, p<.0005).

Question 38: Managing industrial relations is an essential HR management activity for an IPP.

There was significant agreement that managing industrial relations is an essential HR management activity for an IPP (M=4.38, SD = .496) (t (25) =14.230, p<.0005).

Question 39: Developing multi-skilling abilities for employees is an essential human resources task for the IPP.

There was significant agreement that developing multi-skilling abilities for employees is an essential human resources task for the IPP (M=3.73, SD = .827) (t (25) =4.503, p<.0005).

Question 40: Managing team diversity is an essential requirement for managing human resources.

There was significant agreement that managing team diversity is an essential requirement for managing human resources (M=4.15, SD = .543) (t (25) =10.825, p<.0005).

Relative importance of managing human resources items

The mean scores of responses are then ordered from highest to lowest. Managing industrial relations scored the highest followed by managing team dynamics. This ranking is an indication that managing industrial relations is considered by managers the most essential HR activity or theme within an IPP plant (Table 5.14). This suggests that IPP managers need to allocate priority and attention to the management of industrial relations in an IPP.

Table 5.14: Ranking of mean score for human resources

38 Managing industrial relations is an essential HR management activity for an IPP.	4.38
40 Managing team diversity is an essential requirement for managing human resources.	4.15
37 Managing scarce skills is an essential HR task within an IPP.	3.88
39 Developing multi-skilling abilities for employees is an essential human resources task for the IPP.	3.73

- **Supply chain operations**

A one-sample t-test was conducted to test the null hypotheses against the alternate hypotheses for several items pertaining to managing supply chain operations.

The hypothesis $H7_0$ - The management of supply chain operations is essential for successful IPP plant operations

H7a - The management of supply chain operations is not essential for successful IPP plant operations.

The results below (Table 5.15) show that for all the items there is significant agreement as to their importance.

Table 5.15: One Sample t-test: supply chain operations

Activity	Mean	T	df	P values
41 Implementing a supply chain management programme is an essential function for IPP project management.	3.50	3.934	25	.001
42 Implementing a supply chain management programme is an essential function for IPP operations.	3.48	3.674	24	.001
43 Planning for lead times for parts is essential for supply chain operations in an IPP plant	3.81	5.935	25	.000
44 Managing currency fluctuations to import components and parts is essential for an IPP plant.	3.62	4.5	25	.000

An analysis of each question is presented below.

Question 41: Implementing a supply chain management programme is an essential function for IPP project management.

There is significant agreement that implementing a supply chain management programme is an essential function for IPP project management (M=3.50, SD = .648) (t (25) =3.934, p<.0005).

Question 42: Implementing a supply chain management programme is an essential function for IPP operations.

There is significant agreement that implementing a supply chain management programme is an essential function for IPP operations (M=3.48, SD = .653) (t (25) =3.674, p<.0005).

Question 43: Planning for lead times for parts is essential for supply chain operations in an IPP plant

There was significant agreement that planning for lead times for parts is essential for supply chain operations in an IPP plant (M=3.81, SD = .694) (t (25) =5.935, p<.0005).

Question 44: Managing currency fluctuations to import components and parts is essential for an IPP plant.

There was significant agreement that managing currency fluctuations to import components and parts is essential for an IPP plant (M=3.62, SD = .615) (t (25) =4.500, p<.0005).

Relative importance of pre-investment phase items

The mean scores of responses are then ordered from highest to lowest. The planning for lead times for parts ranked the highest. This gives an indication that respondents need to dedicate sufficient time and resources to the management of this variable. According to table 5.16 respondents considered the planning for lead times the most essential activity, which is an indication that the costs arising out of improperly managing this are high, and therefore this activity requires serious business attention and numerous resources.

Table 5.16: Ranking of items by mean scores for supply chain operations

43 Planning for lead times for parts is essential for supply chain operations in an IPP plant	3.81
44 Managing currency fluctuations to import components and parts is essential for an IPP plant.	3.62
41 Implementing a supply chain management programme is an essential function for IPP project management.	3.5
42 Implementing a supply chain management programme is an essential function for IPP operations.	3.48

- **Regulatory and legal affairs**

A one-sample t-test was conducted to test the null hypothesis against the alternate hypothesis for items relating to regulatory/ legal and community affairs.

The hypothesis $H9_0$ - Management of regulatory/ legal affairs is essential for IPP plant successful performance

Hypothesis H9a - Management of regulatory/ legal affairs is not essential for IPP plant successful performance.

The results below (Table 5.17) show that for all the items there is significant agreement as to their importance.

Table 5.17: One Sample t-test :Regulatory/legal and community affairs

Activity	Mean	T	df	P values
45 A special purpose vehicle is the most appropriate instrument for delivering IPP projects.	3.88	5.527	25	.000
46 A properly set up board of directors is essential to ensure that IPPs adhere to corporate governance prescriptions.	3.92	6.325	25	.000
47 Adhering to operating licences and permits is	4.40	9.165	24	.000

essential to ensure that an IPP meets its legal obligations.				
48 Managing the relationship with the buyer is essential for managing the regulatory affairs of an IPP.	4.35	10.916	25	.000
49 Managing relationships with the local communities is essential for the management of corporate affairs of an IPP.	4.38	11.078	25	.000
50 Managing relationships with the government is an essential aspect of managing the regulator affairs of an IPP.	4.19	9.594	25	.000

The following section presents an analysis of each question.

Question 45: A special purpose vehicle is the most appropriate instrument for delivering IPP projects.

There was significant agreement that a special purpose vehicle is the most appropriate instrument for delivering IPP projects (M=3.88, SD = .816) (t (25) =5.527, p<.0005).

Question 46: A properly set up board of directors is essential to ensure that IPPs adhere to corporate governance prescriptions.

There was significant agreement that a properly set up board of directors is essential to ensure that IPPs adhere to corporate governance prescriptions (M=3.92, SD = .744) (t (25) =6.325, p<.0005).

Question 47: Adhering to operating licences and permits is essential to ensure that an IPP meets its legal obligations.

There was significant agreement that adhering to operating licences and permits is essential to ensure that an IPP meets its legal obligations (M=4.40, SD = .764) (t (25) =9.165, p<.0005).

Question 48: Managing the relationship with the buyer (off taker) is essential for managing the regulatory affairs of an IPP.

There was significant agreement that managing the relationship with the buyer is essential for managing the regulatory affairs of an IPP (M=4.35, SD = .629) (t (25) =10.916, p<.0005).

Question 49: Managing relationships with the local communities is essential for the management of corporate affairs of an IPP.

There was significant agreement that managing relationships with local communities is essential for the management of the corporate affairs of an IPP (M=4.38, SD = .673) (t (25) =11.078, p<.0005).

Question 50: Managing relationships with the government is an essential aspect of managing the regulator affairs of an IPP.

There was significant agreement that managing relationships with the government is an essential aspect of managing the regulator affairs of an IPP (M=4.19, SD = .634) (t (25) =9.594, p<.0005).

Relative importance of pre-investment phase items

The mean scores of responses are then ordered from highest to lowest. Adherence to operational licences and permits was seen as essential in order to ensure that IPPs meet their legal obligations (Table 5.18). The management of the relationship with local communities was considered as the second most essential variable. The importance of licences for IPPs is an indication that the IPPs consider this an essential activity, as the ability of IPPs to start operations depends on having licences and permits in place.

Table 5.18: Ranking of items by mean score: Regulatory/legal and community affairs

47 Adhering to operating licences and permits is essential to ensure that an IPP meets its legal obligations.	4.4
49 Managing relationships with the local communities is essential for the management of corporate affairs of an IPP.	4.38
48 Managing the relationship with the buyer is essential for managing regulatory affairs of an IPP.	4.35
50 Managing relationships with the government is an essential aspect of managing the regulator affairs of an IPP.	4.19
46 A properly set up board of directors is essential to ensure that IPPs adhere to corporate governance prescriptions.	3.92
45 A special purpose vehicle is the most appropriate instrument for delivering IPP projects.	3.88

- **Value proposition**

A one-sample t-test was conducted to test the null hypothesis against the alternate hypothesis for items relating to value proposition.

$H10_0$ - Management of community affairs is essential for IPP plant success.

H10a - Management of community affairs is not essential for IPP plant success.

$H14_0$ - Return on investment is an essential value proposition for the IPP business model.

H14a - Return on investment is not an essential value proposition for the IPP business model.

The results below (Table 5.19) show that for all the items there is significant agreement as to their importance.

Table 5.19: One Sample t-test : Value proposition items

Activity	Mean	T	df	P values
51 An IPP has an ethical obligation towards local communities to contribute towards local economic development and sustainable economies.	4.08	7.379	25	.000
52 IPPs have an obligation to deliver the required return on investment to shareholders.	4.46	12.810	25	.000

Question 51: An IPP has an ethical obligation towards local communities to contribute towards local economic development.

There was significant agreement that an IPP has an ethical obligation towards local communities to contribute towards local economic development (M=4.08, SD = .744) (t (25) =7.379, p<.0005).

Question 52: IPPs have an obligation to deliver the required return on investment to shareholders.

There was significant agreement (M=4.46, SD = .582) (t (25) =12.810, p<.0005) (that IPPs have an obligation to deliver the required return on investment to shareholders.

Relative importance of pre-investment phase items

The mean scores of responses are then ordered from highest to lowest (table 5.20). IPPs have a legal obligation towards economic development of local communities ranked the highest.

Table 5.20: The ranking of mean scores for value proposition items

52 IPPs have an obligation to deliver the required return on investment to shareholders.	4.46
51 An IPP has an ethical obligation towards local communities to contribute towards local economic development and sustainable economies.	4.08

- **Enabling environment**

A one-sample t-test was conducted to test the null hypothesis against the alternate hypothesis for items relating to enabling environment.

$H11_0$ - Unbundling of the power sector is an essential requirement to enable effective and efficient performance of the IPP sector.
H11a - Unbundling of the power sector is not an essential requirement to enable effective and efficient performance of the IPP sector.

$H12_0$ - Opening up the IPP sector for smaller players will make the IPP sector more attractive to SMMEs.
H12a - Opening up the IPP sector for smaller players will not make the IPP sector more attractive to SMMEs.

$H13_0$ - More access to funding for smaller players will encourage diversity in the IPP sector.
H13a - More access to funding for smaller players will not encourage diversity in the IPP sector.

The results below (Table 5.21) show that for all the items there is significant agreement as to their importance.

Table 5.21: One Sample t-test : Unbundling of the power sector

Activity	Mean	T	df	P values
53 Unbundling the power market (into a separate transmission, distribution and generation companies) will make the environment more conducive/ friendly for IPPs operating in South Africa's energy sector.	3.85	4.665	25	.000
54 Opening up the programme to smaller players will make the IPP sector more attractive for SMME's (Small medium and micro enterprises).	3.88	6.340	25	.000
55 More access to funding for smaller players will encourage diversity in the IPP sector.	3.85	5.500	25	.000

Question 53: Unbundling the power market (into a separate transmission, distribution and generation companies) will make the environment more conducive/ friendly for IPPs operating in South Africa's energy sector

There was significant agreement that unbundling the power market (into a separate transmission, distribution and generation companies) will make the environment more conducive/ friendly for IPPs operating in South Africa's energy sector IPP (M=3.85, SD = .925) (t (25) =4.665, p<.0005).

Question 54: Opening up the programme to smaller players will make the IPP sector more attractive for SMMEs

There was significant agreement that opening up the programme to smaller players will make the IPP sector more attractive for SMMEs (M=3.88, SD = .711) (t (25) =6.340, p<.0005).

Question 55: More access to funding for smaller players will encourage diversity in the IPP sector.

There were a higher number of neutral respondents at 38.5%. There was significant agreement that more access to funding for smaller players will encourage diversity in the IPP sector (t (M=3.85, SD = .784) (25) =5.500, p<.0005).

Relative importance of enabling environment related items

The mean scores of responses are then ordered from highest to lowest. Adherence to operational licences and permits was seen as essential in order to ensure that IPPs meet their legal obligations (Table 5.18). The management of the relationship with local communities was considered as the second most essential variable. The importance of licences for IPPs is an indication that the IPPs consider this an essential activity, as the ability of IPPs to start operations depends on having licences and permits in place.

Table 5.22: The ranking of mean scores for enabling environment items

54 Opening up the programme to smaller players will make the IPP sector more attractive for SMMEs.	3.88
53 Unbundling the power market (into separate transmission, distribution and generation companies) will make the environment more conducive/friendly for IPPs operating in South Africa's energy sector.	3.85
55 More access to funding for smaller players will encourage diversity in the IPP sector.	3.85

Relative importance of all items by mean scores

Lastly, the mean scores of responses are then ordered from highest to lowest. The items with the highest score is that of undertaking the level resource studies to meet bid requirements, followed by the need to ensure that EPC contracts provide for a clear liability and claims handling process. This suggests that respondents regard these items as the most essential in ensuring that the IPP performs effectively and efficiently. The resource studies are essential

for the success of an IPP because they determine the commercial viability of the plant and whether it can generate sufficient revenues and return on investment. EPC costs are the biggest component in establishing an IPP, plant and IPP managers feel that it is essential that an EPC contract should allow for recourse if there are issues during the implementation of the EPC contract (Table 5.23).

Table 5.23: Ranking of all items

4 Performing natural resource level studies (for example DNI and wind studies) is essential in meeting bid requirements.	4.77
16 EPC contracts must provide for clear liability and claim handling processes.	4.65
19The alignment of requirements between IPP and grid owners is essential for successful project management	4.65
2 Determining the bidding requirements is essential for bid preparation.	4.58
17 Proper front end planning is essential for successful EPC project management.	4.58
29 Reducing plant down time/out-of-commission time is essential for optimum plant production/performance.	4.54
3 Obtaining government permits and licences (for example water licences, cost estimate letters) is an essential requirement for bidding.	4.5
6 Determining the EPC (Engineering, Procurement and Construction) costs is essential to determine the bid price.	4.5
9 The value of upfront work is essential for success of bid planning.	4.5
10 Negotiating EPC contracts is essential to reach financial close.	4.46
13 Signing the PPA is essential for this stage.	4.46
5 Determining the required return on investment is an essential component of determining the appropriate bid price.	4.42
18 Planning for grid access is essential for project success.	4.42
21 Meeting grid code requirements is essential for successful for plant operations	4.42
28 Implementing and managing the plant performance system (SCADA) is essential for successful plant operations.	4.42
47 Adhering to operating licences and permits is essential to ensure that an IPP meets its legal obligations.	4.4
32 Insuring for damages to the plant and equipment is an essential requirement to limit the costs of unforeseen plant damages.	4.38
38 Managing industrial relations is an essential HR management activity for an IPP.	4.38
49 Managing relationships with the local communities is essential for the management of corporate affairs of an IPP.	4.38
1 Budgeting for upfront costs in preparation for the bidding is essential.	4.35
7 Determining the interest payment is essential to determine the bid price.	4.35
14 Conducting due diligence on EPC contractors is essential for the IPP before awarding an EPC contract.	4.35
24 Assigning performance guarantees is an essential element of an O&M contract	4.35
48 Managing the relationship with the buyer is essential for managing the regulatory affairs of an IPP.	4.35
11 Negotiating the EPC contract terms is essential for this phase.	4.23
25 Managing the implementation of an asset management programme is essential for successful plant operations.	4.23
12 Reaching financial close is essential for this phase.	4.19
50 Managing relationships with the government is an essential aspect of managing the regulator affairs of an IPP.	4.19
23 Determining an appropriate O&M service level agreement is an essential element of an O&M contract.	4.15
40 Managing team diversity is an essential requirement for managing human resources.	4.15
20 Meeting grid code requirements is essential for successful project management	4.12
26 Managing the implementation of a spares management programme is essential for successful plant operations.	4.12
15 Planning the technical aspects (such as engineering designs and project plans) of an EPC contract is essential to	4

ensure the successful selection of an appropriate EP contractor.	
27 Managing the costs of spares and components is essential for successful plant operations.	4
30 Implementation of a Reliability Centred Maintenance system is essential for O&M operations.	4
33 Employee costs are an essential component of plant operation costs.	3.96
36 Managing overheads such as rent and electricity is essential in ensuring that the there are no operational cost overruns.	3.96
22 Determining a robust O&M plan is essential for successful O&E contractor selection.	3.92
34 Adjusting tariffs for inflation is essential in ensuring that the plant revenue generates the required return on investment.	3.92
46 A properly set up board of directors is essential to ensure that IPPs adhere to corporate governance prescriptions.	3.92
37 Managing scarce skills is an essential HR task within an IPP.	3.88
45 A special purpose vehicle is the most appropriate instrument for delivering IPP projects.	3.88
35 Foreign currency fluctuations impact on the return on investment that can be repatriated by international investors.	3.81
43 Planning for lead times for parts is essential for supply chain operations in an IPP plant	3.81
39 Developing multi-skilling abilities for employees is an essential human resources task for the IPP.	3.73
31 Insuring for outages is essential to mitigate the cost of downtime/out-of-commissions.	3.69
8 Making provisions for hedging forex is an essential requirement for managing bidding price.	3.65
44 Managing currency fluctuations to import components and parts is essential for an IPP plant.	3.62
41 Implementing a supply chain management programme is an essential function for IPP project management.	3.5
42 Implementing a supply chain management programme is an essential function for IPP operations.	3.48

5.5 SUMMARY

This chapter has presented the findings of this study, both from the interviews and the survey questionnaire. The trends that emerged from the interview questions were listed and explained after they were coded into specific themes that represent activities, capabilities, business risk, and success factors. The main findings are that there are a number of managerial challenges and risks faced by IPPs in South Africa. These were characterised as a number of themes including pre-investment activities, post-investment activities, the management of an EPC contract, grid access management, the management of operations and maintenance, the management of key plant costs, the management of human resources, the management of supply chain operations, the management of regulatory/legal and community affairs, value proposition and the enabling environment.

The survey questionnaire data was presented. Through descriptive statistics such as means and standard deviations, quantitative data from the survey questionnaires was presented. A sample t-test was used to test the significant difference from a neutral score of 3. The frequencies were presented graphically and in tables. The data confirmed the agreement on the importance of each variable in the management of an IPP.

The following chapter will discuss the findings of the study with respect to the extent to which the research objectives of the study were addressed and to which the research questions were answered. The chapter will present the findings in relation to the literature review in terms of the relationship of the findings to the concepts and theories from the literature review.

CHAPTER 6

EXPLANATION OF THE FINDINGS

6.1 INTRODUCTION

This chapter presents an analysis of the findings from the previous chapter in relation to the objectives of the study, the research questions, as well as the research hypotheses formulated for this study. A discussion of the findings in relation to the theories and concepts presented during the literature review will be presented. These theories encompass various themes relating to IPPs' business environment in respect of its challenges, risks and success factors. The presentation encompasses the function of a business model as a representation of how a business creates value and generates the required return for its shareholders.

The purpose of the chapter is to verify the extent to which the study has been successful in its objectives, and to determine the extent to which the research questions have been answered by looking at how the literature review links to the empirical findings. The issue of whether the quantitative study has been able to confirm or reject the proposed hypotheses will be deliberated. The chapter is arranged in terms of each of the themes identified during the literature review as well as the items within each theme.

6.2 REVIEW OF RESEARCH QUESTIONS

This section expounds on how the specific interview and survey questions were able to assist in answering the research questions. It explains the extent to which the responses and emerging themes from empirical data assisted in answering those questions.

Research question 1: What are the key business and managerial challenges and risks faced by IPPs?

The interviews assisted in answering this question because respondents were asked to identify the key managerial and business risks and challenges from the management of an IPP plant during project management and operations. The researcher was able to identify from responses key themes pertinent to these questions. For example, respondents identified pre-investment and post-investment activities as the most essential challenging aspect of

managing an IPP and which are necessary to reduce the risk of project delays and cost overruns.

Research question 2: To what extent can the experiences of new IPPs operating in South Africa be linked to business and sector trends and be used develop a business model?
A number of questions were posed to respondents to ascertain their views on the essential key success factors for IPPs operating in the renewable energy sector in South Africa. There were several themes that emerged with respect to the key drivers for IPPs. Certain key drivers are the proper management of the EPC contract, grid access management, the management of operations and maintenance, the management of plant costs, human resources management, and the management of supply chain operations. The survey questionnaire confirmed that the drivers and items under each theme were essential, based on the level of agreement on their significance.

Research question 3: What are the key activities, resources, partners, customers and channels that impact on IPPs in South Africa?
The empirical study succeeded in identifying the components of an IPP business model. The proposed business model is presented towards the end of this chapter, as part of the recommendations.

Research question 4: How can the drivers for success that form part of the business environment of IPPs be identified and what are these drivers?
This question was answered during the literature review phase of this study in that the model was regarded as representing the architecture of how a business converts inputs into outputs and generates value for the business's stakeholders and shareholders (Wells, 2013). This requires a business to have certain capabilities and to perform certain activities to be able to do this. The literature review identified different types of business models, including utility and IPP business models, and how the existing business models are insufficient in representing all the attributes of an IPP (Osterwalder & Pigneur 2005).

Research question 5: What will a business model for renewable IPPs to improve managerial activities and value creation look like and how can this be used to improve the success rate of IPPs in South Africa? The business model of a renewable IPP should contain the different components that reflect the key activities, capabilities, partners, resources and channels that enable the business to convert inputs into outputs that deliver

value for shareholders and stakeholders. Management in an IPP business should take cognisance of these activities and capabilities that have to be performed to ensure that IPP renewable businesses are successful.

6.3 REVIEW OF THE RESEARCH OBJECTIVES

This section reviews the research objectives of the study and the extent to which these objectives were achieved through both empirical research and the literature review. The objectives of the study were:

Research objective 1: To explore the key business and managerial challenges and risks faced by IPPs.

Respondents stated that the biggest challenges of establishing an IPP in South Africa are encountered during the establishment of an IPP business through a competitive bidding process. There are a number of upfront activities that need to be performed by an IPP in order to be successful during the bidding process. These require multiple commitments in financial and human resources. The costs incurred during this phase can run into millions of Rands and if an IPP is not successful, this capital cannot be recovered. Because of this, the project developers who initially kick-start the project might end up selling to other parties, because they cannot afford the project development costs. There was significant agreement from respondents that the activities identified by respondents are essential during this phase. The most essential activity during this phase is carrying out natural resources studies. The mean score of this variable was the highest, with 100% respondents in agreement that this is an essential activity. Other essential activities are the determination of bid requirements, the obtaining of government licences and permits, determining the EPC costs, determining the value of upfront work and budgeting for upfront costs. Respondents agreed that determining the interest costs and hedging requirements is essential for this phase.

Respondents identified a number of activities that need to be performed for a project to be successful in reaching financial close (post-financing), as one of the most essential challenges from a post-investment point of view. The importance of these activities cannot be underestimated because they determine whether a project will be successful or not. The respondents were in agreement on the importance of these activities. Negotiating EPC contracts was ranked as having the highest importance in terms of its mean score of post-investment activities, with 80.8% of respondents agreeing with this statement. Signing of the

PPA, negotiating the lending terms and reaching financial close are the most essential activities about whose importance respondents were in significant agreement during this phase.

The respondents identified pre-investment and post-investment activities as fraught with challenges, as there is no guarantee at this point that the project will be a preferred bidder in spite of the extensive financial investments required. These activities have an impact on the success of the IPP plant during project development and operations.

Other essential trends that emerged from interviews and were tested through the surveys, include the following:

- Regulatory, legal and community affairs: respondents agreed that these issues were essential in ensuring that an IPP creates and maintains a sound relationship with the policy stakeholders, regulators and local communities. The survey questionnaire confirmed that these issues were essential, because there was significant agreement of their importance. Adhering to licences and operating permits was considered by respondents as the most essential activity under this theme, with 84% respondents agreeing with this variable ranking the highest in terms of mean score. Other activities that emerged include the importance of establishing a special purpose vehicle as the means to deliver large infrastructure projects. As described in the literature review of this study, an SPV is the best vehicle for delivering large infrastructure projects, as the repayment of debt is limited to revenue generated by the project, and if it fails to be viable, the creditors do not have recourse to the sponsors' own funds. Sponsors are not expected to use extra money outside the project to cover revenue shortfalls (HSBC, 2013). A total of 61.5% of respondents agreed that this was the ideal way to do this, but it is not necessarily the only way to finance projects, as they can be financed through the company's balance sheet (corporate finance). Another issue that an IPP must take into account as part of this theme is the setting up of a proper board in order to adhere to corporate governance prescriptions (61.5% agreement), the management of the relationship with the buyer (92.3% agreement), the management of the relationship with local communities (84.4% agreement) and the management of relationship with government (88.5% agreement).
- Enabling environment: the literature review identified the need to create an enabling environment for an IPP as one of the essential requirements for the success of electricity sector reforms and the introduction of IPPs. One of the necessary reforms is

the restructuring of the electricity sector, by unbundling and opening the market to various generators and distributors to compete in the electricity sector and attract investment, especially in the transmission network (Brenzinger & Finger, 2013). The respondents did not consider unbundling the electricity sector the most essential variable under the investment theme, as only 65% of the respondents agreed with this statement. Opening up the market for smaller players was ranked highest by respondents (69.2%) followed by the need to unbundle the sector and more access for funding for smaller players (61.6%).

- The value proposition: one of the most essential components of a business model as described by Tarbert (2012) is the value proposition. A value proposition is the perceived or actual value that is delivered by a product or service through lower rates, a higher price, reliability, excellent service or unique elements of local ownership and control. The public utility and IPP utility models discussed in this study listed local control, local ownership, reliability, share price appreciation, and shareholder return as important IPP/utility value propositions. The respondents in this study stated that the main value proposition of an IPP is to deliver the required return on investment for its shareholders, with 92.2% respondents in agreement with this statement. This was followed by the ethical obligation that IPPs have towards local communities to contribute towards local economic development (76.2% agreement).

Research objective 2: To collect and contextualise the experiences of new IPPs operating in South Africa and link these to business and sector trends.

This objective was achieved because the literature review conducted demonstrated that business models are the relevant tool for corporate management (Shafer, Smith & Linder, 2004). In addition, the literature sources describe a business model as "a chosen system of inputs, business activities, outputs and outcomes that aims to create value in the short, medium and long term" (Wells, 2013: 23). A business model proposes the rationale/architecture of how a business creates, delivers and captures value (Osterwalder & Pigneur, 2005). A business model is therefore an appropriate tool to categorise and contextualise the experiences and business trends of IPPs into a framework that can be used for business management and improvement. The findings of this study in terms of activities, capabilities and outputs will be incorporated into an IPP business model framework that will be presented later in this chapter.

In addition, from the findings it emerged that there are a number of challenges and experiences in the IPP sector which are common in the business environment, locally and globally. The key themes that emerged from the empirical study fall within the broader discipline of management. Project management is carried out through pre-investment and post-investment activities. The management of capital assets and procurement is addressed through the EPC contract. Project cost overruns are not only common in the energy sector, but in other sectors as well. The management of grid access, O&M and operational costs falls within the ambit of business operations and cost management. The findings dealt with human resources, supply chain management and legal and community affairs issues as well. This is an indication that the IPP sector is not isolated from other business sectors in terms of key challenges and responsibilities.

A business model is a useful tool for strategic planning and for managing an IPP business. A business model can assist a business make strategic choices about customers and competitors, as well as the value proposition of the firm (Shafer, Smith & Linder, 2004). A business model assists a business in making decisions about its competitive strategy (Ghezzi, 2014). With traditional electricity models under constant threat from disruptive forces (Valocchi, Juliano & Shurr, 2010), a business model helps a business to determine whether the formula for generating value is still relevant. The proposed business model will provide relevant input into how a company can remain sustainable through the performance of certain activities. This is in support of the literature review findings that IPPs fail because they lack strategic focus, amongst other reasons, and are not able to adjust to the changing environment.

Research objective 3: To ascertain the drivers for success that form part of the business environment of IPPs. The findings of the study revealed that there are certain key drivers for success, risk and management activities that form part of the IPP business model. The management of the EPC contract was identified in this study as one of the essential drivers for the success of an IPP. The EPC contract is the biggest component of establishing an IPP, and if not properly managed, can lead to problems such as construction delays, cost overruns and poor plant performance. Managing access to the grid also emerged as one of the success factors in managing an IPP. There was significant agreement (100%) amongst respondents that the EPC contract must provide for clear liability and claims handling processes. Other activities that need to be performed in order to manage the EPC contract include performing proper front end planning (96.1% agreed), conducting due diligence of the EPC contractors (88.5%) and the planning of technical aspects (69.2% agreed).

Grid access management emerged as another key driver for the success of IPP businesses, both from project point of view and during operations. Alignment of grid access requirements between an IPP and the grid owner was ranked as the most essential factor in terms of mean scores, with 100% of respondents agreeing that this was essential. Other activities which respondents identified as essential include the planning of grid access (96.2% agreement), meeting grid code requirements (100%) during operations, and project management (84.6%).

The management of O&M operations was considered by respondents as one the most essential key drivers for success in managing an IPP. As mentioned in the previous chapter, O&M operations are essential for an IPP to be able to deliver on its required performance targets (such as revenue and return on investment). An IPP needs to properly manage its O&M operations. There was significant agreement that the activities necessary to manage O&M operations are essential. Respondents agreed (96.2 %) that reducing plant downtime/out-of-commission time was the most essential activity in managing O&M operations (ranking items by mean scores). This is a reflection of the fact that there are cost implications attached to the plant being out of commission. For example, the fixed costs component of the plant remains constant whether or not a plant produces electricity. Other essential activities include the implementation of a plant performance management system (100% agreement), the assignment of performance guarantees (88.5% agreement), the implementation of an asset management programme (76.9%), and the determination of a spares management programme (88.5%).

The management of the plant's operational costs determines the return on investment that an IPP plant can generate (Victor, 2014). In the analysis of business performance indicators of IPP businesses, it was identified that the return on investment of the plants in developing countries was lower than those in developed countries, for reasons including the fact that the operating costs are high. There was significant agreement amongst respondents that managing the plant's operational costs is essential. The insuring of the plant against damages was ranked as the most essential (in terms of mean scores), with 84.6% of the respondents agreeing that this is essential. Respondents also ranked the management of employee costs (76.9% agreement), the management of overheads (82.6% agreed) as well as the adjusting of tariffs for inflation, as essential (61.6% agreement). Tariff adjustment is contracted into a PPA and annual tariff adjustments are provided for in the contract. If there were no tariff adjustments in relation to inflation, the IPP would not be in a position to generate sensible revenues to cover

operational costs. This variable did not score highly with respondents because they probably assume that this is provided for and therefore an obvious requirement. The literature review revealed that in certain countries such as the Philippines, Thailand and Malaysia, tariffs were readjusted down because of prevailing economic conditions, and in certain cases PPA contracts had to be renegotiated (Woodhouse, 2005).

The management of human resources was identified by respondents as one of the key drivers for success for an IPP. The management of industrial relations was considered by respondents as an activity that is most essential in the management of human resources (based on mean scores, with all respondents agreeing on the importance of this activity. The management of team diversity was considered as an essential activity (92.3%) followed by managing scarce resources (73.1%) and the development of multi-skilling abilities (65.4%).

The management of supply chain operations was identified by respondents as another key driver for the success of IPPs. Respondents (with 88% agreement) stated that planning for lead time is one of the essential activities for the management of supply chain operations which ranked the highest when these items were ranked by mean score. Other activities that are essential for the management of supply chain operations are the management of currency fluctuations to allow for importation of parts (88.4% agreement amongst respondents), the implementation of a supply chain management programme for both operations (92.3%) and project management (92.3% agreement).

Research objective 4: To identify key activities, key resources, partners, customers and channels that impact on IPPs in South Africa.

The empirical findings of the study revealed that there are a number of activities that need to be performed by an IPP to ensure that it delivers value to the shareholders. These are represented by the key themes, such as managing O&M operations and managing the EPC contract, that were identified from this study. Key resources essential for an IPP to perform its duties include financial resources, human resources, and physical (primarily energy) resources. The IPPs key partners include government, state utility and local communities. The key customers and channels are the offtaker that receives electricity as defined through the PPA.

This is evidenced from the literature review where Chatterjee (2013) delineates business models into four categories which include Efficiency based business models that rely on

human or capital resources to produce commodities. Examples of these resources are airlines, law firms, utilities, mining and hospitals. The Technical Task Force of the International Integrated Reporting Council (IIRC) background paper for International Reporting (2012:1) defines a business model as "the chosen system of inputs, business activities, outputs, and outcomes that aims to create value in the short, medium and long term." Wells (2013: 23) supports the definition and describes a business model as "nothing else than the architecture of a firm and its network of partners for creating, marketing and delivering value and relationship capital to one or several segments of customers in order to generate profitable and sustainable revenue streams."

Research objective 5: To propose a business model for renewable IPPs to improve managerial activities and value creation to improve their success rate.

The study enabled the researcher to identify the key components of the proposed business model. The key components of the proposed model are the activities in the area of managing the pre-investment and post-investment phase of an IPP, EPC management, grid management, the management of costs, the management of core operations, the management of human resources, supply chain management and the management of legal and community affairs. There are inputs from the environment that an IPP needs to access in order to fulfil its obligation towards its shareholders. These inputs include financial and human resources, as well as natural resources. An IPP relies on partners such as government, the EPC contractor, financial institutions and local communities to be able to deliver value.

According to Amit and Zott (2010), a business model is a definition of the manner by which the enterprise delivers value to customers, entices customers to pay for value, and generates returns from those payments. It thus reflects management's premise about what customers want, how they want it, and how the enterprise can organize to best meet those needs.

6.4 EXPOSITION OF FINDINGS FROM QUALITATIVE AND QUANTITATIVE DATA

This discusses the findings from both qualitative and quantitative data as well as the findings in respect of the proposed hypotheses.

Pre-investment activities

All businesses including IPPs are exposed to business risks, including construction risks, cost overrun risks, and contractor underperformance risks. The effective and efficient performance of the activities under this theme has the ability to reduce the exposure of IPPs to these risks. The activities identified will form an integral part of the business model as the adopted definition of business models is that they are "the chosen system of inputs, business activities, outputs, and outcomes that aims to create value of the short, medium and long term." Wells (2013: 23). The significance of these activities was established by the sample t-test results presented in the previous chapter.

Based on these findings, the hypothesis $H1_0$ - "The pre-investment phase of planning for an IPP is essential for IPP business success" - was accepted, because there was significant agreement from the majority of the respondents that all the items that are incorporated in this theme are essential. Thus the hypothesis H1a – "The pre-investment phase of planning for an IPP is not essential for IPP business success" - was rejected.

One of the items identified for this theme is the need to budget for upfront costs in preparation for bidding. This is an indication that IPPs need to develop capabilities to perform the activities that are required to ensure that the upfront costs that will be incurred during the bidding process are fully budgeted and accounted for. This responds to the fact that business models assist businesses to reduce costs through the continuous improvement of processes (Wells, 2013).

IPPs need to determine the bidding requirements upfront in order to bid successfully. The determination of bid requirements upfront ensures that IPPs are prepared to bid for projects because the bid requirements require substantial financial, human, time resource. For example, there is a requirement that successful bidders should have done at least a year of resources studies (wind availability, solar radiation) before they qualify to bid (DOE REIPPP Window 4 Announcement, 2015). Additionally, as a majority of the respondents noted during interviews, resources studies are linked to how much revenue can be generated by an IPP plant, because if wind or solar energy is limited, the plant cannot generate sufficient revenue to meet its financial obligations. This is in in line with the fact that a business model must strive for continuous improvement which drives up revenue (Morris, Shirokova & Shatalov, 2007).

Respondents identified the fact that it is essential to obtain government permits and licences as one of the bidding requirements. This activity is essential for an IPP business model as the DOE requires potential bidders to demonstrate that they have obtained all the necessary permits and licences from the different departments and agencies (DOE REIPPP Window 4 Announcement, 2015). In addition, the High Performance Utility Model (HPUM) by Accenture makes provision for the management of documents and assets as part of generation infrastructure capability (Accenture, 2011:3). This is an indication that there are common features between the IPP business model and the utility business model (HPUM) in so far as assets management and document management are concerned. Therefore, the inclusion of this activity in the proposed business model becomes justifiable.

Determining the required return on investment is an essential component of determining the appropriate bid price. One of the essential pillars of a business model is the value proposition, and according to Tarbert (2012), the IPP business model's value proposition includes three elements: the share price appreciation, return on equity, and customer services. This finding confirms the idea that determining the appropriate return on investment required by shareholders is an essential activity for an IPP, and that for the IPP to deliver this value proposition, it must satisfy the return-on-equity requirement.

One of the business risks that IPPs are exposed to is construction risks, and one mitigation strategy is to use EPC contracts, because they allow for a complete facility to be delivered to the project owner at a fixed price. The EPC contractor assumes the full risk of the project (Otuga, 2006). For an IPP business model, one of the essential value-capturing initiatives is the managing of the cost components of a business (Shafer, Smith & Linder, 2004). Therefore an IPP business model should include cost curtailment capability and activities.

Another component of a business model is the management of the financial aspects of a business in order to capture value for the firm (Shafer, Smith & Linder, 2004). In addition, the literature review revealed that IPPs in the Middle East and Africa were exposed to high interest payments during the period between 2008 and 2011, to such an extent that this affected their profit margins negatively (Frost & Sullivan, 2011). The determining of interest payments due is one of the activities that are essential for a proposed renewable energy IPP business model.

The capability to manage currency fluctuations is related to the need to manage currency volatility as one of the risks of IPPs. Ogutuga (2006) mentions currency volatility as one of the risks that IPPs are exposed to. Doucet (2004) mentions a sound economic and financial framework as one of the pre-conditions for electricity sector reforms. One of these financial framework parameters is currency convertibility. Lastly, Kergman (2002) mentions the sharp devaluation of the local currency as one of the challenges that threatens the commercial and economic viability of IPPs. This makes this activity one of the essential components of the proposed business model, in that it will help address these risks.

The value of upfront work means that when project developers initially develop projects for bidding, they can quantify their work to enable them to determine the bid price to reflect the initial development costs. A majority of the respondents acknowledged that there is numerous upfront work that needs to be performed whether the project bids successfully or not. If the project becomes successful, the bid price should reflect these costs and be able to recoup them through a tariff. In addition, as respondent number 14 acknowledged during the interviews, the project can be developed by one party who then sells it to other parties. The value of this work should be correctly quantified to reflect a fair value to enable an arm's-length transaction between a buyer and a seller. The business model to be proposed should capture the significance of this activity, because it assists in ensuring that the fair value of project development is reflected in the IPP business.

Post-investment activities

Based on the findings of a sample t-test, the hypothesis $H2_0$, that post-financing activities for an IPP are essential for a success of an IPP, was accepted, because there was a significant agreement from a majority of the respondents that all the items that are incorporated in this this theme are essential. Thus hypothesis H2a, that post-financing activities for an IPP are not essential for the success of an IPP, was rejected.

The EPC component is the biggest component of the bid price, which affects the final price of how much electricity can be sold as well as the return that becomes available for investors (Pieters, Lots & Brent, 2014). The proposed business model should reflect the need to ensure that the contract terms that an IPP commits to allow for the capturing of value through the management of value creation activities (Shafer, Smith & Linder, 2004), one of which is the negotiation of EPC contract terms. In addition, the economic model should provide the pricing approach as one of the pillars of that determine a firm's performance (Morris,

Shirokova & Shatalov, 2007). The bid price and tariff is a representation of a firm's efforts to address the pricing approach as envisaged in a business model.

As mentioned under pre-investment activities, lending terms are essential in determining potential returns from a project. This variable cannot be excluded from a proposed business model. Reaching financial close is essential for a proposed business model because the ability to reach financial close will determine the outlook of the funding model as one of the business model's inputs, as espoused by the IIRC Background Paper for International Reporting (2012).

The signing of a PPA is an essential milestone for an IPP because it guarantees revenue for the term of the contract. The PPA is an essential document because it signals to the different stakeholders, such as lenders and investors, that the IPP will be in a good financial position to settle its obligations when they become due (National Renewable Energy Laboratory, 2009). The PPA signing reflects an essential component to be incorporated into a business model, which is the revenue model (Kachaner, Lindgart & Michael, 2011), because a PPA details the guaranteed revenue for a specified period (the term of the PPA). The findings above reflect that the proposed business model's core capabilities for capturing value (Kachaner, Lindgart & Michael, 2011), through negotiating EPC contracts and to perform related activities, are essential.

Managing the EPC contract

The management of an EPC contract is one of the essential ways through which an IPP can reduce the risk of project cost overruns and contractor underperformance, as an EPC allows for a fixed price clause to prevent project cost variations (Otuga, 2006). The fact that respondents agreed that all the items under this theme are essential suggests that these items are essential for a business model that seeks to ensure that a business creates value for the shareholders.

Based on these findings, $H3_0$, that the proper management of an EPC contract is essential for the success of an IPP during project management and operational phase, was accepted because there was a significant agreement from the majority of the respondents that all the ietms that are incorporated in this theme are essential. Consequently hypothesis H3a, that the

proper management of an EPC contract is not essential for the success of an IPP during project management and operational phase, was rejected.

Conducting due diligence on the EPC contractor is an essential variable for a proposed model because it links back to the business model's role of maximising profitability and delivering value (Morris, Shirokova & Shatalov, 2007). This applies to all the items under the theme of managing the EPC contract.

Rajala and Westerlund (2012) define a business model as part of the business planning and execution process, which assists in the description of various aspects of the business such as markets, customers, product development and risks. Planning the technical aspects (such as engineering designs and project plans) of the EPC contract is essential to ensure the successful selection of an appropriate EP contractor. This variable is essential in the planning process as part of the business model's purposes.

There is a need to make provision for liability and claims handling processes in the EPC contract. This is to ensure that the IPP owner is protected against defects and delays during the construction and operation of the plant, and that the plant is delivered at the right time, quality and price (Long & Carter, 2015). Having a clear liability and claims handling process ensures that the IPP can handle cost overruns by reverting to the EPC contract terms to determine who is liable for certain cost movements.

Front end planning (FEP) is a process that helps identify risks early in the capital project planning phases. With effective FEP, risks can potentially be mitigated through the development of detailed scope definition and subsequent efficient project resource use (George, Bell, Back, 2008; Bosfield, 2012). This variable is essential for a proposed business model that seeks to reduce business risks and generate profits for its owners.

Grid access management

The importance of grid access management as a capability in the proposed business model is aligned with the business model requirement that it captures value through a network of suppliers, partners, and external stakeholders (Ghezzi, 2014). The transmission grid is essential for IPPs to be able to sell power to Eskom, and a relationship is essential to facilitate this process (Economies of Regions Learning Network, 2015). A proposed business model needs to capture all the activities required to ensure that an IPP can access the grid and be able to dispatch generated electricity timeously and efficiently.

Based on these findings, hypothesis $H4_0$, that grid access management is essential for successful plant operations, was accepted, because there was significant agreement from the majority of the respondents that all the items that are incorporated in this this theme are essential. Consequently, H4a, that grid access management is not essential for successful plant operations, was rejected.

The findings above indicate that this variable (grid management) is essential for a business model. This is in common with Accenture's HPUM (High Performance Utility Model) which includes the management of infrastructure as one of its items. The investment into the transmission grid can run into hundreds of millions, as certain respondents mentioned above in this study.

The alignment of grid requirements is considered essential by respondents because if there is no alignment the project may be delayed and the operations may be interrupted. Meeting grid code requirements is not only essential during project management and construction, but during the operation of the plant as well. This variable is an essential component of a business model since grid codes ensure access to the transmission grid for the purpose of dispatching power, and without the grid code alignment, electricity cannot be dispatched to the grid.

Managing operations and maintenance

The activities that need to be performed to manage O&M operations are the core of the company's business operations, and an essential component of a business model because they represent the internal processes and infrastructure design that allow the business to create value (Morris, Shirokova & Shatalov, 2007).

In addition, the literature review revealed that the challenges and risks faced by IPPs relate to operational cost overruns as well as maintenance challenges (Siddiqui, 1998). Certain IPPs were unable to recover operational costs for a number of reasons, including the fact that they lacked business experience and strategic focus. The proposed business model seeks to address these challenges by putting forward activities that should be performed by firms to improve operational performance.

Based on the findings of the sample t-test on the significance of the management of the O&M operations theme and its related items, hypothesis $H5_0$, that the management of O&M

operations is essential for successful IPP plant performance, was accepted. Therefore hypothesis H5a, that the management of O&M operations is not essential for successful IPP plant performance, was rejected.

One business model activity involves operational improvement management (Background Paper for International Reporting, 2012), and O&M will assist an IPP to ensure that the operational performance of a plant is optimal. The proposed business model will be enhanced by including features that address operational planning.

The determination of an appropriate SLA will assist the IPP in ensuring that the terms of the contract are clear between the plant owners and the O&M contractor, and that the services are provided within specific time frames and at the appropriate specifications. This activity forms part of the proposed business model because it improves operational efficiency. Performance guarantees are tied to the SLA agreement in that a plant is expected to perform at a certain productive level within the defined specifications. Performance guarantees assignment is an essential component of the proposed business model as it ensures that plant performance is at the expected level.

The asset management programme controls the decision-making, planning and control over the acquisition, use, safeguarding and disposal of assets to maximise their performance and to minimise their risks (The South Africa Department of Local Government, 2006). A business model is a result of strategic choices about assets and governance and their associated consequences (Ghezzi, 2014).

The management of spares is also considered essential by the respondents. The replacement of spares constitutes part of the operational costs and their proper management. The management of the cost of spares and parts is aligned with the implementation of a spares management programme, and is in line with the management of costs as part of a proposed business model component that seeks to capture value for its shareholders (Shafer, Smith & Linder, 2004).

The implementation and management of a plant performance system is essential for a proposed business model not only as a means to monitor plant performance, but also to ensure that the value is realised by an IPP, as deviations from the expected performance can be identified and addressed as they arise. Reducing plant out-of-commissions is an essential

activity for the proposed business model to ensure that the plant operates optimally through the performance of core operations of the plant. The HPUM (Accenture, 2011) proposed plant operations management as part of core operations. The implementation of a Reliability Centred Management system, "a logical discipline for the development of scheduled maintenance programmes" (Overman, 2012:9), is linked to other O&M operations and is one of the activities of the proposed business model.

Managing plant costs

This section expands on the theme and items that are necessary to ensure that plant operational costs are kept to a minimum. These are the costs other than the O&M costs linked to the core operations of the business.

In certain instances, insurance for production guarantees is a requirement from lenders, and IPPs need to take this insurance to protect revenue from equipment and plant failure and the subsequent loss in revenue (Electric Power Research Institute, 2015). This finding is an indication that respondents consider insuring for outages essential, and that it therefore should be part of the proposed business model in terms of the low cost structure component (Tarbert, 2012).

Human resources form part of the essential inputs to a business model (The IIRC Background Paper for International Reporting, 2012), and the management of such inputs forms part of the value creation component of business models (Shafer, Smith & Linder, 2004). The proposed business model needs to encompass the ability to manage employee costs.

Although respondents admitted during interviews that the PPA provides for a mechanism for adjusting tariffs in line with inflation, this provision is essential for a proposed business model in order to ensure that returns are aligned to investor expectations. Currency depreciation risk was identified during the literature review as one of the business risks that affect the performance of IPPs in developing countries (Otuguta, 2006). Providing a hedge against currency depreciation is aligned to the value capturing component of a business.

The hypothesis $H6_0$, that the management of plant operational costs is essential for successful plant business success, was accepted based on the findings from the sample t-test. On the other hand, the alternative hypothesis H6a, that the management of plant operational costs is not essential for successful plant business success, was rejected.

The agreement with the significance of these costs is linked to the key component of creating value, because the management of these costs ensures that cost escalations are kept to a minimum to the benefit of shareholders. The business model addresses the interrelatedness of different items necessary to ensure that a business attains a competitive advantage (Morris, Shirokova & Shatalov, 2007). For instance, the integration of EPC, O&M and cost management operations is essential to ensure that overall business value can be attained. The management of costs other than O&M costs is essential for an IPP as cost overruns were identified as one of the pertinent issues for IPPs.

Managing human resources

This section explains the management of human resources as one of the management functions or themes from the point of view of the respondents. Human resources form part of the essential inputs to a business model (IIRC, Background Paper for International Reporting, 2012). Human resources contribute towards the value creation component of a business model along with financial resources, assets, processes and activities (Shafer, Smith & Linder, 2004).

The finding that there was a significant agreement on the importance of human resources management and its related items means that hypothesis $H7_0$, that the management of human resources is essential for the effective and efficient management of an IPP plant, is accepted. Therefore hypothesis H7a, that the management of human resources is not essential for the effective and efficient management of an IPP plant, is rejected.

The management of scarce skills is an essential activity for the proposed business model because IPPs operate in the engineering sector which contains a number of essential and scarce skills. The capability to manage these human resources activities is essential for a proposed business model. The finding that the respondents are in agreement on the importance of managing industrial relations is an indication that industrial relations form an essential part of the management of IPPs in South Africa.

The respondents agreed that managing an IPP plant requires the employment of personnel who can operate across a number of skill sets, who are thus able to perform a number of activities. This makes this variable an essential one as part of managing human resources. The

respondents agreed that the management of diverse teams is another capability that is required for the management of human resources in an IPP plant.

Supply chain operations

The management of the supply chain is an essential activity, especially for businesses that rely on the supply of raw materials and equipment for the value chain (Mason & Mouzas, 2012), and therefore the management of supply chain activities is an essential component of the proposed business model. Kachaner, Lindgart and Michael (2011) propose that as part of an analysis of a company's value chain, decisions such as determining what activities to insource and which to outsource should form part of evaluating the supply chain.

The hypothesis $H8_0$, that the management of supply chain operations is essential for successful IPP plant operations, is accepted based on the sample t-test findings. On the other hand, hypothesis H8a, that the management of supply chain operations is not essential for successful IPP plant operations, is rejected.

The respondents agreed that a supply chain management programme is essential for both the operations and project management phases of managing an IPP plant. This contributes towards reducing project delays and cost overruns, which were identified during the literature review as one of the risks experienced by IPPs. As identified earlier in this chapter, currency fluctuation on the project is one of the major risks faced by IPPs. This risk might affect the cost of importing parts and equipment from overseas markets. One of the functions of a business model is to identify and manage risks and opportunities, and therefore the inclusion of this variable in the proposed business model will assist in managing project- and operational-related risks from the point of view of currency risks (Vives & Svejenova, 2011).

Regulatory/legal and community affairs

The external business environment impacts on a business through regulations imposed on it (Tarbert, 2013). In addition, businesses source inputs such as labour and raw materials, and they need to conduct their business in a responsible and ethical manner (Accenture, 2011). There was agreement by the respondents on the importance of this theme and the items related to it, as evidenced by the sample t-test.

The hypothesis $H9_0$, that the management of regulatory/legal affairs and related items such as the establishment of an SPV, the establishment of governance structures and the management

of relationships with regulator institutions, are essential for IPP plant successful performance, is accepted. Consequently, hypothesis H89a, that the management of regulatory/legal affairs is not essential for IPP plant successful performance, is rejected.

As described above in this study, an SPV is a legal entity that can be used to deliver huge infrastructure projects on a non-recourse basis. Respondents consider the setting up of an SPV an essential component of managing an IPP. Corporate governance is one of the components of a business model, and therefore any proposed business model should incorporate the establishment of governance structures as a key activity. Obtaining the necessary permits and licensing and adhering to the conditions are part of ensuring compliance with regulator prescriptions.

The value proposition of a public utility and IPP business model should be to deliver customer service and a reliable product at a reasonable price and cost (Tarbert, 2012). The importance of this relationship with Eskom as a buyer makes this variable essential for a proposed business model. As mentioned before in this study, communities are a source of inputs for the business, and they are the recipients of goods and services produced by an enterprise. The management of this relationship was considered essential by the respondents, and therefore should be an integral part of the proposed business model.

Based on this finding the hypothesis $H10_0$, that the management of community affairs is essential for IPP plant success, is accepted. On the other hand, hypothesis H10a, that the management of community affairs is not essential for IPP plant success, is rejected.

The risks experienced by IPPs operating in developing countries emanate from regulatory uncertainty, reforms, and changes in government. Government action against IPPs has demonstrated that governments have the power to unilaterally change the terms of IPPs (Woodhouse, 2005). Therefore IPPs need to manage their relationship with government to ensure that they are aware of any potential government actions that might hamper the IPPs' ability to deliver value to shareholders.

Value proposition

Value proposition forms part of the strategic choices that businesses have to make about the customers they plan to target, the competitors of the firm, as well as the strategy for competing in a specific market (Shafer, Smith & Linder, 2004). In addition, the public and

utility business models deliver different value propositions to different markets, such as service.

Based on the findings above, hypothesis $H15_0$, that IPPs have a socio-economic responsibility towards local communities, is accepted. On the other hand, hypothesis H15a, that IPPs do not have a socio-economic responsibility towards local communities, is rejected.

The respondents agreed that IPPs have a role to play towards contributing to the upliftment of local communities through local economic development initiatives. This agreement makes this variable one of the pillars of the IPP business model value proposition.

The findings indicate that hypothesis $H14_0$, that return on investment is an essential value proposition for the IPP business model, is accepted. On the hand, hypothesis H14a, that return on investment is not an essential value proposition for the IPP business model, is rejected. The responsibility towards delivering the required return on investment is an essential pillar for any business and therefore an essential element of the proposed business model.

Enabling environment

An enabling business environment can only be created when all players are aware of the business risks and are able to take action to militate against those risks. The unbundling of the power sector was identified as one of the key elements of electricity sector reforms necessary to open up the sector towards more competition (Euroelectric, 2013). The agreement with the importance of this variable by respondents suggest that this is considered an essential business model variable as part of the external environment of a business that influences the business model (Sillin, 2004). The respondents agreed that opening up the market for smaller players is part of creating an enabling environment and opening up the sector for competition. The proposed business model will incorporate this variable as part of the market environment of a business.

Based on the findings above, the hypothesis $H12_0$, that opening up the IPP sector for smaller players will make the IPP sector more attractive to SMMEs, is accepted, whilst the hypothesis H12a, that opening up the IPP sector for smaller players will not make the IPP sector more attractive to SMMEs, is rejected

Access to funding for smaller players will ensure that opening up the market will be successful and will not be hindered by lack of funding. The hypothesis $H13_0$, that more access to funding for smaller players will encourage diversity in the IPP sector, is accepted. On the other hand, hypothesis H13a, that more access to funding for smaller players will not encourage diversity in the IPP sector, is rejected.

The hypothesis H110, that the unbundling of the power sector is an essential requirement to enable effective and efficient performance of the IPP sector, is accepted. Consequently hypothesis H11a, that the unbundling of the power sector is not an essential requirement to enable effective and efficient performance of the IPP sector, is rejected.

6.5 SUMMARY

This chapter has provided an exposition of the findings of this study, both from the qualitative and quantitative viewpoints, in relation to the literature review theories and themes. The chapter has established that there are several links between the literature review and the empirical findings of the study, in that there were a number of common themes between the findings of the study and the literature review theories and concepts. For example, there are a number of risks that emerged from the project development point of view of an IPP, which is characterised by the pre-investment and post-investment themes. The literature reviews a number of risks during this phase, such as project cost overruns and construction risks. On the other hand, the literature review on business models depicts a business model as a representation of how a business creates value through the performance of certain activities that create value. The activities under each theme should be performed by a business that wants to meet this value creation requirement.

The study has highlighted the fact that all the activities and capabilities identified under each theme are linked to certain aspects of a business model, either as revenue capturing, continuous improvement, value proposition, enabling, business planning and execution, risk mitigation or operational improvement component. The study has confirmed that the hypotheses that were formulated were accepted based on the quantitative findings of the study.

The following chapter presents the recommendations and conclusions of the study. The limitations of this study, suggestions for further studies and the study's contribution to knowledge are addressed in this final chapter.

CHAPTER 7

RECOMMENDATIONS AND CONCLUDING REMARKS

7.1 INTRODUCTION

The aim of this study was to identify the key business challenges, issues and trends of renewable energy IPPs that operate in South Africa, in order to provide guidelines for business management, improvement and sustainability. This was done by identifying the business risks, drivers for success, management activities and capabilities that form part of the business environment of IPPs. The purpose of the study was to categorise these experiences, business trends and activities into a business model that can be used to manage an IPP business in South Africa. These relate to the management of an IPP during project management and during operations as well. There are key capabilities that an IPP needs to have and there are key activities that need to be performed in order to ensure that an IPP delivers value to its shareholders and stakeholders. The previous chapter presented the findings of the study in terms of interviews and survey questionnaire data.

This chapter establishes whether there is an alignment between the objectives of the study, the research questions of the study, and the empirical findings of the study. It reviews the contribution that this study makes to the field of management and energy studies. The limitations of the study, as well as the recommendations in terms of the proposed business model, will be presented. The chapter will be concluded by highlighting recommendations and suggestions for possible future research in this field of knowledge

7.2 CONTRIBUTIONS OF THE STUDY TO INDUSTRY AND ACADEMIC KNOWLEDGE

This study makes a contribution towards the existing body of knowledge in the field of management as well as that of energy studies. The business model that was developed from this study provides an elucidation of the components of a renewable energy IPP business model in South Africa. The proposed business model is an original contribution to the field of knowledge in the management of IPPs in that it identifies key business activities (for example O&M activities), key resources (for example human resources and financial), key partners (for example government and local community) that are necessary for an IPP to deliver value. Additionally, the study elucidates a number of issues that were covered during the literature review. These are explained below. The business model is an original contribution because it

is based on empirical data collected to identify the key elements of the IPP business model by interviewing managers who have experience in this sector in South Africa.

The study revealed that there are a number of business risks that IPPs globally are exposed to. These include construction risks (cost overruns and underperformance of contractors), operational risks (cost overruns and underperformance) and market and political risks (the existence of a single buyer) (Ogutuga, 2006). Through empirical research, this study managed to identify a number of business activities and capabilities that ensure that a business can militate against these business risks. For example, the proper management of the EPC contract through activities such as engineering and design work, proper due diligence of an EPC contractor, and providing for liability and claim handling processes are designed to limit construction risk.

The study established that O&M operations can be utilised to manage operational cost overrun risks through performing certain activities such as determining an O&M plan, assigning performance guarantees to contracts and implementing a spares management programme. The study identified a number of activities that can be performed to limit plant cost overruns. Such costs can be managed, for example, through insuring for damages and outages and managing the costs of foreign currency for importing parts and equipment. Market risks did not emerge as an issue in South Africa, but respondents stated that there was a need to unbundle the electricity market into generation, distribution and transmission sectors to allow more competition and investment in the sector.

There is a need to ensure that the sector is open to small players, because currently the capital costs of entering the sector are prohibitive for start-up businesses to invest in. Certain market risks, such as the risk of commercial and economic stability that other businesses are exposed to, are applicable to IPPs in South Africa. For instance Kergman (2002) identifies a sharp decline in the economic conditions of a country as one the risks of IPPs in emerging markets. For example, the devaluation of the local currency or a significant contraction in demand and supply has been one of the factors in the collapse of the IPP model in developing countries.

Authors such as Wells (2013) and Casadesus-Masanell and Ricart (2011), argue that the academic community has offered little insight on business models and little is understood about what constitutes a superior business model, or what a business model really is. This study contributes academic field of business models as a business management tool by

investigating and examining the different components of an IPP business model in respect of inputs, business processes and activities that are designed to deliver outputs to the market and value to the business owners. The model developed from this study is an attempt to close some of the gaps that have been identified in the background of this study by developing a renewable IPP business model. This model will provide a framework or guideline that will assist in ensuring that IPPs are delivering value to their shareholders through effective and efficient management of resources.

Lastly, the study has contributed to the field of management by proposing a business model that details how an IPP can create value by performing certain management activities and acquiring certain capabilities. The model demonstrates how the IPP acquires resources from the community, and converts them into outputs that benefit shareholders and local communities. This model is unique in that the researcher was able to establish a model that demonstrates and details all the key business activities and competencies in such detail. Previous models were not detailed enough in that they focussed on value proposition but did not provide details on how to derive the value proposition. Others detailed certain competencies, but were not detailed enough on how these activities could be performed or why they were essential. This model brings together dimensions from a technical perspective and a managerial perspective into a coherent business model.

7.3 LIMITATIONS AND GENERALISABILITY OF THE STUDY

This study has focussed on the first 40 companies that were the first renewable IPPs to operate in the history of South Africa. A sample of 26 respondents is small for a national study, therefore it is a limitations of the study. This limitation is however mitigated by the fact that the fact the respondents are senior managers and have 8 years or more experience. The DOE has further selected more companies which will become operational in the next few years. Even though the researcher attempted to draw a representative sample from existing companies, once more companies become operational, this sample might become smaller. It is not foreseeable that this might have a significant impact on the findings, since the companies selected sufficiently represent different technologies such as wind, solar and CSP.

The generalisability of the study is limited to renewable IPP businesses in South Africa. As the renewable IPP programme expands, continuous improvement can be realised through learning. As managers become more experienced and the businesses adapt to their

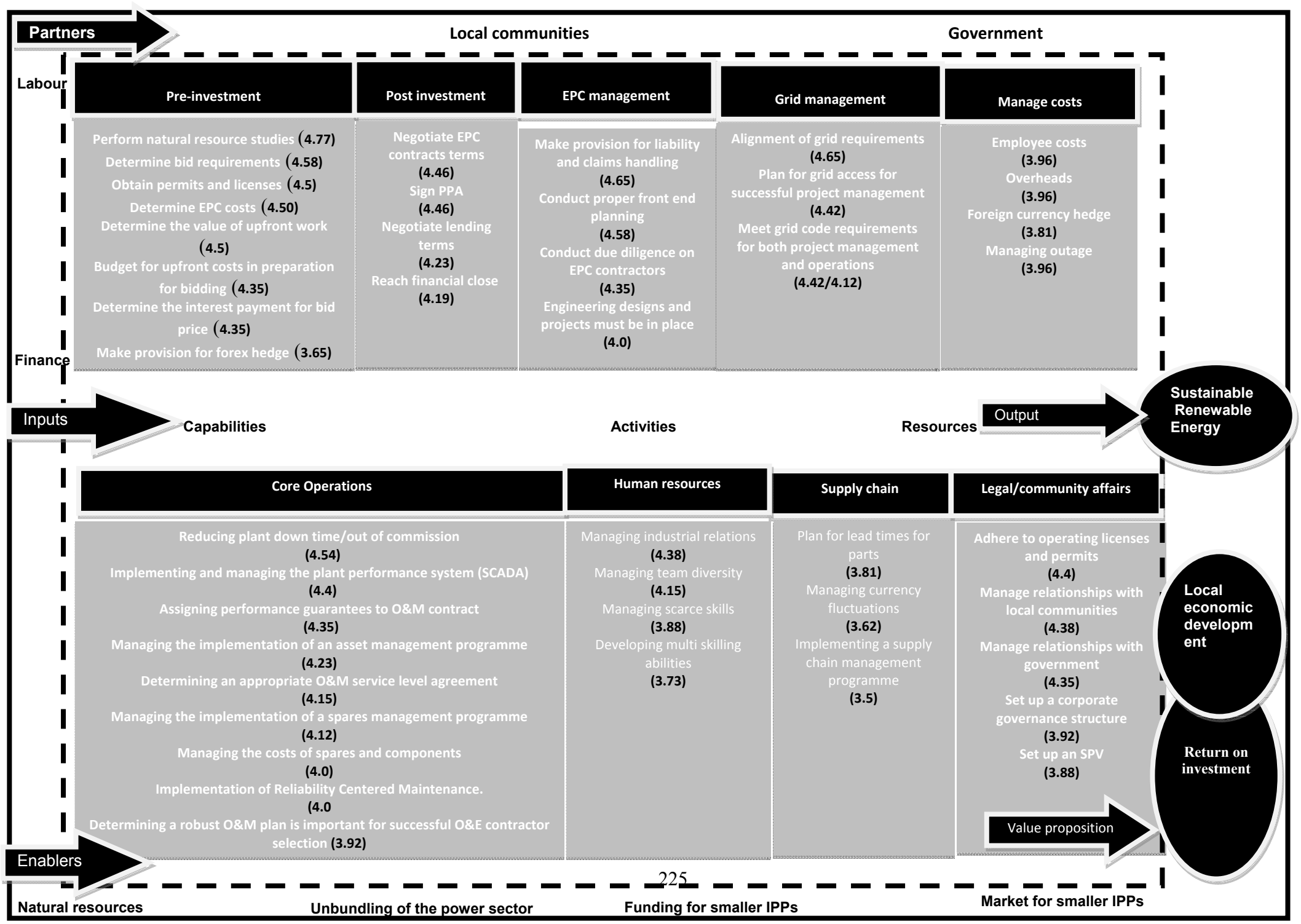
environment, the business risks and challenges might change. Future research opportunities exists to compare the experiences of the earlier projects as opposed to later projects (Windows III and IV).

7.4 CONCLUSIONS

7.4.1 Conclusion 1 (The renewable IPP business model).

Figure 8.1 below depicts the business model that was drawn from the findings of this study. The model is drawn mainly from the findings of the empirical review process of this study as well as the literature review. There are items that were incorporated from existing business models. For example, the value proposition includes a competitive price and reliable supply of power (Tarbert, 2012). These value propositions were identified from the literature review and are still relevant for this study. The renewable energy IPP programme was conducted through a competitive bidding process to ensure that the ultimate price that consumers pay is competitive (Eberhard, 2014). The literature review identified that the purpose of introducing IPPs is to assist the state utility to provide a reliable power supply to communities, which is the case for South Africa (Ireland, 2005).

The mean scores from each variable are included and ranked from high to low, it terms of agreement with the importance of each variable in the management of an IPP business. The key components of the model include core activities such as pre investment and post-investment activities, Key partners such as local communities and the government, enablers, such as unbundling and allowing access for smaller players, the value proposition (local economic development, return on investment) and output in terms of sustainable clean energy.


Partners
Local communities
Government
Labour
Pre-investment
Post investment
EPC management
Grid management
Manage costs
Perform natural resource studies (4.77)
Determine bid requirements (4.58)
Obtain permits and licenses (4.5)
Determine EPC costs (4.50)
Determine the value of upfront work (4.5)
Budget for upfront costs in preparation for bidding (4.35)
Determine the interest payment for bid price (4.35)
Make provision for forex hedge (3.65)
Negotiate EPC contracts terms (4.46)
Sign PPA (4.46)
Negotiate lending terms (4.23)
Reach financial close (4.19)
Make provision for liability and claims handling (4.65)
Conduct proper front end planning (4.58)
Conduct due diligence on EPC contractors (4.35)
Engineering designs and projects must be in place (4.0)
Alignment of grid requirements (4.65)
Plan for grid access for successful project management (4.42)
Meet grid code requirements for both project management and operations (4.42/4.12)
Employee costs (3.96)
Overheads (3.96)
Foreign currency hedge (3.81)
Managing outage (3.96)
Finance
Inputs
Capabilities
Activities
Resources
Output
Sustainable Renewable Energy
Core Operations
Human resources
Supply chain
Legal/community affairs
Reducing plant down time/out of commission (4.54)
Implementing and managing the plant performance system (SCADA) (4.4)
Assigning performance guarantees to O&M contract (4.35)
Managing the implementation of an asset management programme (4.23)
Determining an appropriate O&M service level agreement (4.15)
Managing the implementation of a spares management programme (4.12)
Managing the costs of spares and components (4.0)
Implementation of Reliability Centered Maintenance. (4.0
Determining a robust O&M plan is important for successful O&E contractor selection (3.92)
Managing industrial relations (4.38)
Managing team diversity (4.15)
Managing scarce skills (3.88)
Developing multi skilling abilities (3.73)
Plan for lead times for parts (3.81)
Managing currency fluctuations (3.62)
Implementing a supply chain management programme (3.5)
Adhere to operating licenses and permits (4.4)
Manage relationships with local communities (4.38)
Manage relationships with government (4.35)
Set up a corporate governance structure (3.92)
Set up an SPV (3.88)
Local economic development
Return on investment
Value proposition
Enablers
Natural resources
Unbundling of the power sector
Funding for smaller IPPs
Market for smaller IPPs

7.4.2 Conclusion 2

The study established that there are key business and managerial challenges in managing IPPs in South Africa from the point of view of project management and operations. Through the qualitative and quantitative data collected from the managers of IPP plants, this study has established the key managerial challenges and risks that exist in the IPP sector in South Africa. This finding is in line with the international trend established from the literature review of the exposure of IPPs to certain business risks such as operational risks and cost overruns. These risks have the potential to prevent an IPP from delivering on its financial performance and delivering value to shareholders.

7.4.3 Conclusion 3

The study established that a business model is an appropriate tool to contextualise the trends of new IPPs and link these to the business sector and trends. This is because a business model is an architecture of a system of inputs, business activities, outputs and outcomes that aim to create value over the short, medium and long terms. The model proposed for this study is a representation of the IPP business sector trends.

7.4.4 Conclusion 4

The study established that there are drivers for business success in the IPP sector, and that an IPP needs to acquire certain capabilities in the management of certain aspects of a business, such as the management of an EPC contract and the management of O&M operations.

7.4.5 Conclusion 5

An IPP business does not operate in isolation from its environment. There are key activities, resources, partners, customers and channels in the IPP sector, and IPP managers need to be aware of their importance in ensuring that an IPP delivers value to shareholders.

7.4.6 Conclusion 6

The business model proposed suggests the performance of certain managerial activities and the possession of certain capabilities in order to improve the success rate of IPPs. The business model only focusses on key activities. A business may be performing other activities such as accounting and marketing, but this business model focusses on activities that are essential to an IPP for managerial success.

7.5 RECOMMENDATIONS

7.5.1 Recommendation 1

The managerial challenges and business risks identified in the study can be addressed and mitigated through acquiring managerial competence in the different operational capacities. Core competencies in areas such as performance of natural resources studies, negotiating EPC terms and conditions or acquiring permits and licences, can be acquired by IPP managers through training and development dedicated towards acquiring these skills. Other competencies in fields such as regulatory compliance and navigating the various corporate governance prescriptions require setting up a dedicated legal unit that has specialist skills in dealing with IPP-specific issues. Alternatively, this function can be outsourced to a dedicated legal firm with expertise in dealing with IPP legal matters.

7.5.2 Recommendation 2

Although the IPP sector requires generic business capabilities, there are specific capabilities that require specific technical engineering knowledge, for example, the management of the EPC contract. Most of the business challenges and experiences relate to generic business disciplines such as project management, cost management, operations management and strategic management. It is recommended that new entrants in the IPP sector familiarise themselves with the technical side of the business, because certain essential success factors require technical competence.

7.5.3 Recommendation 3

The findings from the interviews identified a number of essential success factors, such as the management of plant costs. The recommendation of this study is that IPP management must develop competencies to ensure that the firm possesses the key success factors in areas such as cost management, the management of human resources, the management of supply chain operations, and the management of regulators and the legal environment. IPP firms must always be aware of the value proposition of delivering sustainable energy, delivering the required return on investment and supporting local economic development. They must always perform activities dedicated towards the realisation of the required return on investment

7.5.4 Recommendation 4

A business model is the ideal tool for IPPs to identify the activities, resources, key partners, customers and channels that impact on IPPs in South Africa. The findings of this study identified partners such as the government and local communities, and customers such as the

off-taker Eskom. The resources the IPP depends on include natural resources (wind and solar) as well as financial and human resources.

7.6 SUGGESTIONS FOR FUTURE RESEARCH

There might be a need for a comparative study to investigate whether companies that become part of the IPP programme in the future face similar challenges and issues to the companies sampled for this study. As the market becomes mature and the learning curve becomes less steep, the challenges, issues and business risks might change (Dowling et al, 2012). A comparative study might reveal new knowledge in terms of how the sector has changed since the inception of the IPP programme in South Africa. Furthermore, this study only focussed on renewable IPPs. The DOE plans to introduce gas and coal IPPs in the future (Department of Energy Request for Information Document, 2015). A comparison of renewable energy IPPs with fossil energy IPPs such as gas and coal will enhance the business model developed during this study.

7.7 CONCLUSION

This chapter is the final chapter of this study. It has provided an overview of the study in terms of the extent to which it succeeded in realising the research objectives. It has examined how far the study succeeded in answering the specific research questions it was seeking to answer. The chapter has presented the contributions that it has made towards knowledge in the field of study, both in the management and the energy sectors. The chapter has focussed on the recommendations in terms of the proposed business model. The limitations of the study as well as suggestions for further research were presented as a conclusion to the study.

In conclusion, this study makes a contribution towards the existing body of knowledge in the fields of management as well as energy studies. The business model that is presented from the study provides elucidation of the components of a renewable energy IPP business model in South Africa. The proposed business model is presented as an original contribution to the field of existing knowledge in the management of IPPs in that it identifies key business activities, key resources, and key partners in the renewable IPP sector. These are necessary for an IPP to deliver value. The proposed business model is an original contribution because it is based on empirical data collected to identify the key elements of the IPP business.

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Annexure A: Research questionnaire

This questionnaire is part of the research that is currently being conducted for a PhD (Management Studies) degree with the University of Kwazulu Natal by Bongani Khonjelwayo. The South African Renewable Energy Independent Power Producer Programme (REIPPP) was very successful in introducing renewable energy in the electricity industry in South Africa. This study seeks to map inputs and outputs to the renewable energy model in South Africa. A business model is defined as a "the chosen system of inputs, business activities, outputs, and outcomes that aims to create value in the short, medium and long term" (Wells, 2013). A number of interviews were conducted with the IPP managers from the REIPPP by the researcher from which a number of potential inputs were identified. This questionnaire is intended to test the inputs to determine their scale of intensity or level of importance.

<u>Section A:</u> The following information is needed to enable meaningful data analysis. We appreciate your help in providing this essential information.

1	Gender:	1. Male			2. Female	
2	Please state your age					
3	Race:	1. Black	2. White	3.Coloured	4. Indian	5. Other
4	Level of Employment:	1. Junior	2.Middle	3. Senior	4. Top	5. Unsure
5	Highest Qualification:	1. Matric	3. Diploma	4. Degree	5.Postgraduate	5.Other
6	Occupation:	……				
7	Years of work experience	less than 2 years	From 2 to less than 8 years	8 years and over		

<u>Section B:</u> Indicate the degree to which you agree with each statement <u>that it is essential to IPP business success</u>.

1 Strongly Disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree

Pre-investment phase

		Strongly	Disagree	Neutral	Agree	Strongly agree
1	Budgeting for upfront costs in preparation for the bidding is essential.	1	2	3	4	5
2	Determining the bidding requirements is essential for bid preparation.	1	2	3	4	5
3	Obtaining government permits and licences (for example water licences, cost estimate letters) is an essential requirement for bidding.	1	2	3	4	5
4	Conducting resource-level studies (for example DNI and wind studies) is essential in meeting bid requirements.	1	2	3	4	5
5	Determining the required return on investment is an essential component of determining the appropriate bid price.	*1*	*2*	*3*	*4*	*5*
6	Determining the EPC (Engineering, Procurement and Construction) costs is essential to determine the bid price.	*1*	*2*	*3*	*4*	*5*
7	Determining the interest payment is essential to determine the bid price.	*1*	*2*	*3*	*4*	*5*
8	Making provisions for hedging forex is an essential requirement for managing bidding price.	*1*	*2*	*3*	*4*	*5*
9	The value of upfront work is essential for success of bid planning.	*1*	*2*	*3*	*4*	*5*

Please add any other elements that you think are essential for this phase and add level of agreement of importance from 1-5

Post-financing *(before financial close)*

		Strongly	Disagree	Neutral	Agree	Strongly
10	Negotiating EPC contracts is essential to reach financial close	*1*	*2*	*3*	*4*	*5*
11	Negotiating the EPC contract terms is essential for this phase	*1*	*2*	*3*	*4*	*5*
12	Reaching financial close is essential for this phase	*1*	*2*	*3*	*4*	*5*
13	Signing the PPA is essential for this stage.	*1*	*2*	*3*	*4*	*5*

Please add any other elements that you think are essential for this phase and add level of agreement of importance from 1-5

Managing the EPC contract

		Strongly	Disagree	Neutral	Agree	Strongly agree
14	Conducting due diligence on EPC contractors is essential for the IPP before awarding the EPC contract.	*1*	*2*	*3*	*4*	*5*
15	Planning the technical aspects (such as engineering designs and project plans) of the EPC contract is essential to ensure successful selection of an appropriate EPC contractor.	*1*	*2*	*3*	*4*	*5*
16	EPC contracts must provide for clear liability and claim handling processes.	*1*	*2*	*3*	*4*	*5*
17	Proper front end planning is essential for successful EPC project management.	*1*	*2*	*3*	*4*	*5*

Please add any other elements that you think are essential for this phase and add level of agreement of importance from 1-5

Grid access management

		Strongly	Disagree	Neutral	Agree	Strongly agree
18	Planning for grid access is essential for project success.	*1*	*2*	*3*	*4*	*5*
19	Alignment of requirements between IPP and grid owners is essential for successful project management	*1*	*2*	*3*	*4*	*5*
20	Meeting grid code requirements is essential for successful project management	*1*	*2*	*3*	*4*	*5*
21	Meeting grid code requirements is essential for successful for plant operations	*1*	*2*	*3*	*4*	*5*

Please add any other elements that you think are essential for this phase and add level of agreement of importance from 1-5

Managing Operations and Maintenance (O&M) operations						
		Strongly	Disagree	Neutral	Agree	Strongly agree
22	Determining a robust O&M plan is essential for successful O&E contractor selection	*1*	*2*	*3*	*4*	*5*
23	Determining an appropriate O&M service level agreement is an essential element of an O&M contract.	*1*	*2*	*3*	*4*	*5*
24	Assigning performance guarantees is an essential element of an O&M contract	*1*	*2*	*3*	*4*	*5*
25	Managing the implementation of an asset management programme is essential for successful plant operations.	*1*	*2*	*3*	*4*	*5*
26	Managing the implementation of a spares management programme is essential for successful plant operations.	*1*	*2*	*3*	*4*	*5*
27	Managing the costs of spares and components is essential for successful plant operations.	*1*	*2*	*3*	*4*	*5*
28	Implementing and managing the plant performance system (SCADA) is essential for successful plant operations.	*1*	*2*	*3*	*4*	*5*
29	Reducing plant down time/out-of-commission time is essential for optimum plant production/performance.	*1*	*2*	*3*	*4*	*5*
30	Implementation of a Reliability Centered Maintenance system is essential for O&M operations.	*1*	*2*	*3*	*4*	*5*
Please add any other elements that you think are essential for this phase and add level of agreement of importance from 1-5						
Managing plant costs						
		Strongly	Disagree	Neutral	Agree	Strongly agree
31	Insuring for outages is essential to mitigate the cost of downtime/out-of-commissions.	*1*	*2*	*3*	*4*	*5*
32	Insuring for damages to plant and equipment is an essential requirement to limit the costs of unforeseen plant damages.	*1*	*2*	*3*	*4*	*5*
33	Employee costs are an essential component of plant operation costs.	*1*	*2*	*3*	*4*	*5*

34	Adjusting tariffs for inflation is essential in ensuring that the plant revenue generates the required return on investment.	*1*	*2*	*3*	*4*	*5*
35	Foreign currency fluctuations impact on the return on investment that can be repatriated by international investors.	*1*	*2*	*3*	*4*	*5*
36	Managing overheads such as rent and electricity is essential in ensuring that the there are no operational cost overruns.	*1*	*2*	*3*	*4*	*5*
Please add any other elements that you think are essential for this phase and add level of agreement of importance from 1-5						
Managing Human resources						
		Strongly	Disagree	Neutral	Agree	Strongly agree
37	Managing scarce skills is an essential HR task within an IPP.	*1*	*2*	*3*	*4*	*5*
38	Managing industrial relations is an essential HR management activity for an IPP.	*1*	*2*	*3*	*4*	*5*
39	Developing multi-skilling abilities for employees is an essential human resources task for the IPP.	*1*	*2*	*3*	*4*	*5*
40	Managing team diversity is an essential requirement for managing human resources.	*1*	*2*	*3*	*4*	*5*
Please add any other elements that you think are essential for this phase and add level of agreement of importance from 1-5						
Supply chain operations						
		Strongly	Disagree	Neutral	Agree	Strongly agree
41	Implementing a supply chain management programme is an essential function for IPP project management.	*1*	*2*	*3*	*4*	*5*
42	Implementing a supply chain management programme is an essential function for IPP operations.	*1*	*2*	*3*	*4*	*5*
43	Planning for lead times for parts is essential for supply chain operations in an IPP plant	*1*	*2*	*3*	*4*	*5*
44	Managing currency fluctuations to import components and parts is	*1*	*2*	*3*	*4*	*5*

	essential for an IPP plant.					

Please add any other elements that you think are essential for this phase and add level of agreement of importance from 1-5

Regulatory/legal and community affairs

		Strongly	Disagree	Neutral	Agree	Strongly agree
45	A special purpose vehicle is the most appropriate instrument for delivering IPP projects.	*1*	*2*	*3*	*4*	*5*
46	A properly set up board of directors is essential to ensure that IPPs adhere to corporate governance prescriptions.	*1*	*2*	*3*	*4*	*5*
47	Adhering to operating licences and permits is essential to ensure that an IPP meets its legal obligations.	*1*	*2*	*3*	*4*	*5*
48	Managing the relationship with the buyer is essential for managing regulatory affairs of an IPP.	*1*	*2*	*3*	*4*	*5*
49	Managing relationships with the local communities is essential for the management of corporate affairs of an IPP.	*1*	*2*	*3*	*4*	*5*
50	Managing relationships with the government is an essential aspect of managing the regulator affairs of an IPP.	*1*	*2*	*3*	*4*	*5*

Please add any other elements that you think are essential for this phase and add level of agreement of importance from 1-5

Value proposition

A value proposition is a promise of value to be delivered and acknowledged and a belief from the customer that value will be delivered and experienced. A value proposition can apply to an entire organization, or parts thereof, or customer accounts, or products or services.

		Strongly	Disagree	Neutral	Agree	Strongly agree
51	An IPP has an ethical obligation towards local communities to contribute towards local economic development and sustainable economies.	*1*	*2*	*3*	*4*	*5*

52	IPPs have an obligation to deliver the required return on investment to shareholders.	*1*	*2*	*3*	*4*	*5*
Key enablers *(for example policies, support systems and institutions to enable a conducive renewable IPP industry)*						
		Strongly	Disagree	Neutral	Agree	Strongly agree
53	Unbundling the power market (into a separate transmission, distribution and generation companies) will make the environment more conducive/friendly for IPPs operating in South Africa's energy sector.	*1*	*2*	*3*	*4*	*5*
54	Opening up the programme to smaller players will make the IPP sector more attractive for SMMEs (Small, medium and micro enterprises).	*1*	*2*	*3*	*4*	*5*
55	More access to funding for smaller players will encourage diversity in the IPP sector.	*1*	*2*	*3*	*4*	*5*
Please add any other elements that you think are essential for this phase and add level of agreement of importance from 1-5						

Thank you for your participation, it is highly esteemed.

Annexure B: Interview schedule

School of Management, IT and Governance,
College of Law and Management,
University of KwaZulu-Natal,
Westville Campus, Durban,
South Africa

Dear Respondents,

I am a PhD student of the above named institution conducting research on "The changing nature of the power sector in South Africa: the Independent Power Producer Model." Your organization has been chosen to be included in this study. The study is an attempt to comprehend issues, trends and challenges of independent power producers (that are contracted to supply Eskom with power) that can be utilized to develop a framework/business model to support and ensure sustainable business performance of IPPs. This study is divided into two parts. The first part (this part) is designed to get an overall grasp of the state of IPPs in South Africa. From the findings of this study a further questionnaire will be developed which will be used to determine the different parameters and dimensions of the business model.

The insight from this study is essential in that it will provide a framework through which such a model can be tested and developed. By consolidating business key issues, trends and challenges into a business framework, the researcher hopes to develop and test a business model/framework that seeks to encompass all the business facets/dimensions for a sustainable business model/framework. Please assist in answering the questions provided because your opinion counts and will have a bearing on the data needed. It may assist decision-makers by providing a reference point through which the documented IPP experiences can be understood and where areas of improvement/development can be identified.

The information required from all respondents will be treated with the utmost anonymity/confidentiality, as this study is purely for academic research.

Thanking you in anticipation for your co-operation.

Yours faithfully

Bongani Khonjelwayo (Mr.)
0738428827, 011 800 3168
Bongani.khonjelwayo@gmail.com
khonjeb@eskom.co.za

INTERVIEW SCHEDULE
INSTRUCTIONS

Opening

Establish rapport: Greetings. My name is Bongani Khonjelwayo. I am doing a study on IPPs in South Africa as part of My PhD studies at the UKZN. IPPs are playing a huge role in alleviating the energy challenges faced by Eskom and I thought it would be appropriate to do a study of this nature since this is a fairly new sector in South Africa and not much academic work has been done around it.

The purpose of this interview is to obtain information on the trends, challenges and experiences of managers in the planning and execution of various organizational functions within the IPP plant. This input will be essential to assist the researcher in gaining insight on the key trends, issues and challenges that are part of managing an IPP.
The information collected will assist to develop a business model template for IPPs operating in South Africa. **"A business model is a system of inputs, business activities, outputs, and outcomes that aims to create value of the short, medium and long term. It can be described as architecture of a firm and its network of partners for creating, marketing and delivering value and relationship capital to one or several segments of customers in order to generate profitable and sustainable revenue streams."**

This interview should be between 45 minutes to an hour.

DEMOGRAPHIC INFORMATION
Candidate Name:
Candidate Company:

Q.1 What position to you occupy in the organisation?

Q.2 How would you describe the management level of your position (Junior, middle or senior management?)

Q3 Number of years of work experience?

Q4. To which of the following categories does the business enterprise belong? (Please mark with an X)

1.1	**Solar farm**		**1.2**	**Wind Farm**	
1.3	**CSP plant**				

Q5. Please provide the size range of the power plant

	Plant 1	**Plant 2**	**Plant 3**	**Plant 4**
5-49 MW				
50-100 MW				
101-150 MW				
151-200 MW				

Q 6. How many projects was your organisation successful in securing during the bidding process?

Q 7. How many commercially active plants does your company manage?

Q8. How many people are employed (full time) by your organization (in South Africa)?

Q9. What is the average number of employees working in a typical wind/solar plant?

Q10. How many employees occupy supervisory and managerial positions in typical solar or wind plant?

A: PROJECT MANAGEMENT PHASE

10.1 What are **the key learning points** that you can identify from the project management of an IPP power plant during development and construction?

_____
_____
_____
_____

10.2 What are the essential **business risks** that you could identify from the project planning to implementation of an IPP? (**construction risks, cost overruns, project approval delays**)

_____
_____
_____
_____
_____

10.3 Can you identify any **financial risks** from the IPP project management point of view (**for example currency risks, financial closure, high interest payments, lack of reflective tariffs**)?

_____
_____
_____
_____
_____

10.4 Are there any **institutional risks** that might be of concern to you? (**For example reliance on a single customer, unilateral change of contract conditions, lack of equity partners**).

_____
_____
_____
_____
_____

10.5 Can you think of any essential value networks that are essential to successfully establish and operate an IPP? (**For example suppliers, customer relationships, information flows, product and service flows**)

_____
_____
_____
_____
_____

10.6 Please describe the technical management essential issues/essential success factors relating to **engineering, procurement and construction (EPC**) during the development of an IPP power plant.

_____
_____
_____
_____
_____
_____

10.7 What are the country **business/policy and economic enablers** that can ensure the successful implementation of the IPP business model? (**For example an enabling investment climate, reforming the electricity sector to allow for fair competition, favourable equity arrangements and debt arrangements, securing revenue**).

B: PLANT OPERATIONS

10.8 What are the **key operational factors** that are essential for a renewable plant operations?

_____
_____
_____
_____
_____
_____

10.9 What are the essential success factors for optimal **plant performance**?

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10.10 How essential are the management of **work streams and business processes** in the operations of a power plant?

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10.11 What are the essential **supply chain operations** that are necessary for the power plant to operate efficiently and effectively?

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10.12 What are certain of the **operational risks** from **business operations** that you can identify and how can they be mitigated (for example **operational cost overruns, poor plant performance, high maintenance costs**)?

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C: VALUE PROPOSITION (A value proposition is a promise of value to be delivered and acknowledged and a belief from the customer that value will be delivered and experienced. A value proposition can apply to an entire organization, or parts thereof, or customer accounts, or products or services.)

10.13 What value proposition does an IPP present to its **customer(s)** (**Price/cost, reliability, service convenience**)?

10.14 What value proposition does an IPP present to its **local community** (**local economic development, transformation**)?

10.15 What value proposition does an IPP present to its **shareholders** (**for example share price appreciation, return on equity**)?

D: SUPPORT SYSTEMS

10.16 To what extent do information **infrastructure and information management systems play an essential role in the IPP's core operations**?

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10.17 Does the management of **corporate governance systems** play an essential role in the management of IPPs and if so what role is this?

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10.18 To what extent do **regulatory affairs/legal affairs** impact on the operations of IPPs and what mitigation strategies can be put in place to manage those impacts?

10.19 To what extent does management of **human resource operations** impact on the IPPs performance (**skills, recruitment, and employment equity**)?

Summary: Researcher to summarise key salient factors emanating from the interview.

The researcher thanks you for your time and effort in participating in this study. The researcher commits to ensure that the information obtained will be treated with utmost anonymity and confidentiality.