



**The effectiveness of the use of funds in
Capital Projects: Case study of Eskom a
hedging perspective.**

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by
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Table of Contents

CHAPTER 1: INTRODUCTION.....	1
1.0 Background to the Study	1
1.1 Problem definition.....	6
1.2 Research questions, statement of research objectives and hypotheses	7
1.3 Contribution of the study:.....	8
1.4 Justification of the study:	9
1.5 The Research Layout	10
CHAPTER 2: LITERATURE REVIEW	11
2.0 Introduction.....	11
2.1. Forward Exchange Contract FEC vs other Basic Derivative Instruments.....	20
2.2 Hedging to reduce the exposure to exchange rate risk and other cost saving benefit	22
2.3 Conclusion.....	24
CHAPTER 3: RESEARCH METHODOLOGY	26
3.0 Introduction.....	26
3.1 Research Approach and Strategy.....	26
3.2 Data Collection methods, Frequency and Choice of Data.....	27
3.3 Sampling	28
3.4 Constraints and Limitations of the study	29
3.5 Ethics	29
3.6 Data reliability and validity	29
3.7 Data Analysis Methods.....	29
3.5 Justification of the variables.....	30
CHAPTER 4: RESEARCH FINDINGS, ANALYSIS AND DISCUSSION.....	32
4.1 Introduction.....	32
4.2 Descriptive Statistics	32
4.3 Relationship between variables	34
4.3.1 Pre-take up volumes versus the pre-take up premiums scatter plot.....	34
4.3.2 Renewals volumes versus renewals premiums scatter plot.....	34
4.3.3 Cancellations volumes versus cancellations premiums - scatter plot.....	35
4.4 Correlation.....	36
4.4.1 Correlation of PTU	36
4.4.2 Correlation of Renewals	36
4.4.3 Correlation of cancellations	37
4.5 Regression Analysis	37

4.5.1 Pre-take up (PTU)	37
4.5.2 Renewals	38
4.5.3 Cancellations	39
4.6 Impact of timing on operational strategies.....	39
4.7 Discussion of Findings from the stats results	42
4.7.1 Introduction	42
4.7.2. Interpretation of main findings	42
4.8 Operational hedging benefit.....	46
CHAPTER 5: RESEARCH CONCLUSIONS	47
5.0 Introduction.....	47
5.1 Summary discussion on findings	47
5.1.1 The findings vs literature review vs experience	48
5.1.2 The findings vs the objectives of the study	50
5.1.3 Review of the hypothesis in relation to the findings	51
5.2 Recommendations.....	52
5.3 Limitations	53
5.4 Conclusions.....	53
5.5 Future research.	54
REFERENCES	55

LIST OF TABLES

Table 1: Position of achievement of BRICS countries.....	12
Table 2: Classification of hedging Instruments.....	20
Table 3: Over- the- counter (OTC) foreign exchange derivatives.....	22
Table 4: Key variables description.....	31
Table 5: Descriptive statistics of currencies.....	32
Table 6: Descriptive statistics of key variables.....	32
Table 7: Trend Analysis Volumes.....	33

GLOSSARY OF TERMS

FEC	Forward Exchange Contract
OTC	Over the Counter
JSE	Johannesburg Stock exchange
S&P	Standard & Poor's
FOREX	Foreign Exchange
SARB	South African Reserve Bank
INTCOV	Internal Cover Report
EXCON	Exchange Control Approval
PTU	Pre take up
AICD	Africa Infrastructure Country Diagnostic
LIC	Low-Income Country
MIC	Middle-Income Country
GDP	Gross Domestic Product
PM	Project Manager
PFMA	Public Finance Management Act
TMS	Treasury Management System
TPS	Treasury Payment System
AFS	Annual Financial Statements

DEFINITIONS

Pre-take up: It is a transaction where the supplier payment date is *earlier* than the FEC maturity date of the internal hedge contract.

Renewals: When an internal hedge contract reaches the maturity date and payment/receipt will not have been affected, the contract shall be renewed for a further period, when payment/receipt shall be affected.

Cancellation: It is a transaction where a supplier payment for which the FEC was taken will no longer take place, which means that the currency is no longer required.

Currency exposure: The actual operating effects, short or long term, which a company may experience when a currency in which it has commitments appreciates or depreciates.

Foreign Exchange Co-ordinator (Forex Co-ordinator): A financial person accredited to coordinate matters related to internal hedges between their business and Treasury.

Forward Cover: An agreement to purchase or sell a specified foreign currency amount at a specified spot, purchase or sales rate, at a specified premium or discount, on a specified date in the future.

Embedded Derivative: A financial instrument that causes some or all cash flows to be modified according to a variable, such as a currency, specified in a contract.

Premium: The cost involved in arranging for a fixed rate of exchange against which payment, or receipt, shall be made at a future date.

Spot: In accordance with market convention, a transaction where currency delivery and payment takes place 2 business days after transacting

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ABSTRACT

Eskom is currently one of the biggest importers of goods and services in the country. Companies exposed to foreign exchange rate risk should hedge as a mitigation strategy.

Eskom hedges all commitments above R150 000 according to their policy. The most common hedging instrument that is used is forward exchange contract (FEC) and swaps.

This thesis investigates how the efficient use of funds by using right tools could reduce capital costs for Eskom capital projects. This study will explore how much Eskom has been able to apply hedging instruments and strategies to improve its capital utilisation efficiency.

This study also sets out to ascertain the factors that may have negative implications on the performance of the hedging strategies applied to the management of transactions such as pre-take up, cancellation and renewal of covers.

Timing was identified as one of the main factors and a key cost driver in these transactions which has a destabilising effect on corporate hedging strategies and performance if it is not managed well. This study investigates its effects and the implications thereof and investigates the timing of taking the cover as well as timing for roll-overs or renewal, pre-take ups and cancellations.

Correct hedging strategies like taking the opposite forward contract can be applied when currency is no longer needed at maturity to offset or minimise the impact. Such strategies are more efficient when applied timeously than towards expiry of the cover. Timeous communication from cross-functional teams on any change is therefore vital in order to ensure that a company's portfolio management reflects the interdisciplinary approach between strategic, operational and financial dimensions.

Based on the findings, the research recommends enhanced monitoring of forex processes against operational processes, amongst other things. Financial hedging strategies are complementary to operational hedging strategies.

There is more value in financial hedging strategies when used together with operational hedging strategies as both strategies contribute towards achieving the same goal of reducing costs on capital projects and increasing shareholder value.

CHAPTER 1: INTRODUCTION

1.0 Background to the Study

Africa is taking a different positive direction. Its rate of growth is fast and the continent is now counted amongst the world's fastest growing economies, with six of its economies now featuring as some of the fastest growing. This upward transformation is as a result of the strengthened democratic governance over the past five decades. Infrastructural development in developing countries is critical when it comes to communal and fiscal transformation. Africa still faces serious infrastructure challenges across all sectors which include aspects such as quality and access. South Africa has much more advanced in infrastructure such as roads, educational institutions and welfare when compared to other African countries, but funds or budget allocation in major economic infrastructure like energy still does not match the domestic demand for these services.

In South Africa's large capital projects, one of the key projects approved was the rail system in 2010 was for the Transnet project, connecting rail networks, harbour, and pipelines. Some of the agencies involved in these projects include SANRAL which has the responsibility of building key infrastructure in the country. SANRAL's mandate as per Act No. 7 of 1998 is to build, sustain and fund the national roads. The Gauteng Freeway Improvement Project (GFIP) was one of its recent mega-projects and this entailed the broadening of the freeways by creating more lanes for the smooth flow of traffic to cater for the high traffic volumes in Gauteng.

A number of key infrastructure development projects have been undertaken in South Africa. The Airports Company of South Africa (ACSA) also built the new airport in the KwaZulu-Natal province, as well as worked on upgrades to O.R Tambo and the Cape Town International airports by 2010. The Department of Water Affairs (DWA) also had six major

projects of whose execution was scheduled for the period 2011/12 to 2013/14. Additionally, Sasol's base load gas-fired power plant has just recently been commissioned while the Passenger Rail Agency of South Africa (PRASA) refurbishment of 500 Metrorail coaches project was undertaken in 2013.

The South African government has by far been the main funder for the large infrastructure projects in Sub Saharan Africa. Over the years, it has supported the infrastructure and project finance markets with both cash and/or guarantees. Despite all these efforts, South Africa still faces a very precarious situation with regard to its electricity supply, a critical focus area to support any economic growth. Eskom, the country's utility supplier, operates 23 power stations amounting to a capacity of 42 090MW. These comprise of coal-fired stations generating 35 721MW, nuclear power also generating 1 860MW, pumped storage stations with a capacity of 1 400MW, 2 409MW generation capacities from gas-fired station and 600MW capacity from hydro (Eskom Integrated report, 2015).

Due to its aging fleet of power generation plants against the growing electricity demand that is currently outstripping supply, the country's electricity utility, Eskom, is constructing high voltage power lines and new power stations to mitigate against the risk of future shortage of electricity in South Africa. The build programme is expected to be concluded in 2021. Eskom is currently busy with one of the biggest electricity infrastructure capital projects which has very high capital demands which needs to be raised from the international capital market. Expenditure by national, provincial, local government and its agencies is showing a considerable increase since 2011. Historical figures between 2019/10 and 2013/14 reflect a R1.02 trillion public sector expenditure on infrastructure. The forecast for the energy subsector for the next three years is a total of R166.3, which is about 20 per cent of the overall public-sector infrastructure budget. Eskom's allocation is R138 billion which accounts for 83 per cent of this amount, a substantial portion by any means. (SA Budget Review, 2015)

This capital raising and expenditure is happening within backdrop of significant deficits and high sovereign debt levels which are posing a substantial threat to the country's international credit rating by international credit rating agencies. Previously, Eskom's credit rating status was reduced to a lower grade of sub-investment by both Moody's and S&P during the 2015

financial year. Standard and Poor rating agency raised concerns on the stability of its operating performance and very tight generation capacity margin in South Africa. Such performance and ratings have resulted in significant cost increases for large capital projects that Eskom is involved in. This is mainly due to both the increased cost of finance and currency volatility and the resultant very high cost of capital equipment that needs to be procured using foreign currency.

Project management is a key part of any project and plays a vital role in infrastructure development as it assist with cost monitoring and controls so as to keep spend within the allocated budget. Project management is also a tool essential in managing schedules and mile stones so as to avoid unnecessary delays and ensure that the project is completed on time and that it complies with the required standards. Infrastructure development projects require enormous investments and depend on a number of different stakeholders to be completed successfully therefore, the risk of projects not meeting the budget, time and required standards is very high if there is no proper management strategy in place. A professional project management approach can be of great assistance in reducing the risks to these programmes considerably.

Clear risk management plans should be formulated much earlier in the planning at the project development stage rather than later on during the execution stage. Systematic and timely project planning approaches applied much earlier are more effective and more cost efficient for the project. Derivative costing models and schedule probabilities are risk quantification models that are helpful when used as monitoring and control processes of project management.

Eskom is exposed to currency fluctuation risks through the import of capital equipment and the use of foreign skills. According to Eskom 2013/14 financial results, it has a huge foreign exposure of about R101.5 billion as per. Financial risk management is therefore essential in controlling cost. Eskom uses hedging as one of its strategies towards cost containment. Financial risk management emphasises the importance of timing in hedging as well as the use available financial tools to efficiently manage funds.

Companies which are exposed to such risks should hedge against currency fluctuation in order to reduce unpredictability of project returns and help provide stability to otherwise unstable prices and in challenging capital environments, (Franke and Rechtsteiner, 2014).

A more proactive approach to managing volatility can enable companies to create greater value from their financial planning, capital allocation, hedging, and large capital project investment processes. By connecting the management of volatility to hedging, a company can optimise its overall hedge strategy.

Eskom's financial risk management strategy includes hedging all commitments above the value of R150 000 in line with its policy. The most common hedging instruments that are used are Forward Exchange Contract (FEC) and swaps. For Eskom Group Capital that is in the process of building the 3 mega projects, almost all the FECs entered into are "buy" FECs. Buy FECs refers to FECS where Eskom is buying a foreign currency from a bank to pay a supplier for imported goods and services and this has to be paid for in a foreign currency in terms of a purchase contract entered into between Group Capital and the supplier.

The FEC means that on the maturity date of a "buy" FEC, Eskom is obligated to pay the bank a specified amount in local currency (calculated as a indicated quality of foreign currency multiplied by a indicated exchange) in exchange for a specified quantity in foreign currency. Long positions allow consumers to be in a better position safeguard against price escalations in the primary asset as they are buying an asset in the future whereas short positions protect hedgers against price decreases, as they sell the asset in the future therefore assuming a short position.

When the FEC is entered into the hedging relationship between an FEC and a supplier payment, it is not always possible to have the deal as perfect as intended due to the nature of project environment. The relationship can only work if the maturity date and quantity of foreign currency equals 100% to supplier payment.

The mismatch in maturity dates is referred to as delivery basis risk. (Sundaram & Das, 2010). Frequently, there can be unforeseen delays of delivery or early deliveries due to different reasons, resulting in a number of types of FEC transactions on Maturity Date. The possible

transactions are Pre-take up, renewals and cancellations which are also identified as factors that can negatively impact the performance of hedging strategies applied or hedging effectiveness, owing to operational inefficiency.

Pre-take up: refers to a case where the supplier payment date is earlier than the FEC maturity date. As a result, on supplier payment date, the supplier is paid in a foreign currency using a short term cover. At the same time Eskom should apply a hedging strategy by taking an opposite FEC, a sell FEC for the same quantity of foreign currency as the supplier payment and maturity date as the original buy FEC.

That is to ensure that it partially or fully off-sets the original buy FEC on maturity date since Eskom will no longer need that foreign currency because the supplier has already been paid. On FEC maturity date, which is for both the original buy FEC and sell FEC, the transaction results in a swap cash flow being realised by the division because the buy FEC and the sell FEC have different FEC rates.

Renewal: In the case where the supplier payment date is later than the FEC maturity date, a renewed buy FEC is established on maturity date to cover the later supplier payment. In both cases, a renewal results in a swap cash flow being realised by the division

Cancellation: This refers to a situation where the foreign currency is no longer needed and therefore, the treatment of a cancellation of transaction depends on the timing of when a cancellation instruction is given to Treasury. In a case where a cancellation instruction is given to Treasury at least a week in advance before the FEC maturity date, the transaction is dealt with in more or less the same way as a pre-take up, whereby Eskom applies an opposite hedging strategy by taking a sell FEC for the same quantity, foreign currency and maturity date as the original “buy” FEC so that it can fully off-set the original buy FEC on maturity as Eskom no longer needs that foreign currency.

This is not done automatically by Treasury, but on instruction by the authorised official at the business area. All these transactions depend on timing when an instruction was given to Treasury.

1.1 Problem definition

In preparation of 2010 Soccer World Cup which was hosted by South Africa, a bigger portion of funding was allocated to infrastructure development as part of the national development strategy and this led to the implementation of major capital projects. Electricity, roads, transport and telecommunication have been expanded, raising the level of investment spending. Post 2010, government acknowledges the inadequacy of public-sector capacity in implementing such massive projects. Consequently, financing capital projects in a sustainable way is imperative (Budget Review, 2014).

In an effort to increase the power generation, South Africa has planned two large coal-fired power plants at Medupi and Kusile which are currently under construction. These were forecasted to go on commercial operation in mid-2015 and 2016 respectively, however, due to extensive delays, the commencing date for Kusile's first unit was delayed owing to detection of boiler-tube welding defects. Owing to its construction projects, Eskom is currently one of the biggest importers in the country, importing costly equipment such as boilers and transformers. This sort of equipment is mostly financed in foreign currency, mostly Euros, thus resulting in a huge foreign exchange rate exposure or risk. Consequently, financial risk management in project management is imperative and as a result, Eskom's strategy is to hedge the foreign currency since the majority of the equipment is imported.

Eskom needs business stability and to achieve that, it is in the process of improving efficiency and reducing costs. In this light, it is imperative for Eskom to hedge in a way that will reduce costs. Thus, the purpose of this study was to explore how much Eskom has been able to apply hedging as one of the financial risk management strategies to improve its capital utilisation efficiency, especially for its flagship mega projects like Kusile.

This research therefore deliberately focuses on the analysis of hedging foreign exposure through forward exchange contracts. Electing the appropriate hedging programmes for a firm exposed to currency risk is imperative in mitigating the risks associated with exchange rate fluctuations. This thesis is restricted to analyses of single currency hedges. The trend of the

depreciation of the Rand against the Euro makes it even more necessary to hedge exchange rate exposure. The depreciation in currency means that the costs of capital goods bought outside the country that are required for investment programmes will increase.

The imperatives of project management include time, quality and cost (budget). The challenge to managing the budget includes dealing with currency volatility. Companies manage the currency volatility through hedging, however, even when a company has hedged, the reality is that due to the mismatch in maturity dates, sometimes payments are required earlier than planned, i.e. maturity hence pre-take up transactions, or later than maturity and hence renewal transactions and sometimes a portion is no longer required and a cancellation happens. The study seeks to ascertain the factors such as a mismatch in maturity dates mentioned above and how they may result to ineffective hedging owing to operational inefficiencies.

Projects like the three mega-projects which are Kusile, Ingula and Medupi that Eskom has undertaken require proper planning to mitigate risks associated with scheduling, communication and logistics challenges. The mega-projects challenge is that their success depends on cross functional areas to be efficient and therefore better collaboration and sharing information across the value chain is vital for cost management, quality inspections and delivery schedules monitoring. An increasingly difficult and unstable business environment requires sound solutions to help minimise risk and thus cut costs.

1.2 Research questions, statement of research objectives and hypotheses

The study will explore the following questions in relation to its stated objectives:

- Is Eskom efficient in the use of funds in capital projects and the reduction of cost by using right tools such as hedging?
- How do operational inefficiencies impact the hedging effectiveness?

Research objectives:

In light of the given background and problem stated the core objectives of this study are as follows:

- To investigate how the efficient use of funds through the use of tools such as hedging could reduce capital costs for Eskom capital projects.
- To investigate how operational inefficiencies impact on the effectiveness of hedging.

Hypothesis:

Ho null: Eskom's capital utilisation has been efficient through the use of appropriate financial tools like hedging and has resulted in significant cost savings.

Ha: Eskom's capital utilisation has not been able to effectively use appropriate financial tools and instruments such as hedging to improve efficiency, resulting in insignificant cost savings.

1.3 Contribution of the study:

The effect of exchange rate fluctuations on current value of expenses for foreign-currency denominated imports of uncertain future cash flow is called economic risk in this research. It is more difficult to hedge longer term because of the vagueness of cash flow as there is a high possibility of over or understating the amount to be hedged. Under-hedging refers to the part that is exposed to currency fluctuation risk meaning it's not fully covered. Over-hedging refers to the existence of a residual, the part that is unnecessarily exposed to exchange rate fluctuations. Operational strategies are normally used to decrease longer-term exposure to such risk.

Short term maturities cover can be modified to cover long-term exposure. However, the modification of short-term cover doesn't constitute perfect hedging compared to an instrument matching maturity. The value of modified covers is sensitive to changes in interest rates and forward rates.

1.4 Justification of the study:

With the on-going electricity crisis and the escalating capital cost requirements that is draining the fiscals, it is important to investigate Eskom's capital utilisation efficiency. Large capital projects like the Eskom's electricity build programme, large amounts of funding need to be raised in the capital market. Lack of proper financial planning could result in expensive money through high costs of borrowing, leading to heavy debt servicing obligations. In extreme cases, it could even result in the failure of a project.

Eskom is currently one of the biggest importers in the country due to the nature of Capital Expansion Projects it is undertaking which expose the utility to foreign exchange risks.

The sales Eskom is making from contracts of sourcing electricity to businesses that consume a lot of electricity are linked to commodity prices and foreign currency rates that give escalation to embedded derivatives. As referred to in our literature review, which states that:

“The embedded derivatives have been separated into three classes:”

- *commodity and/or foreign currency derivatives*
- *foreign currency or interest rate derivatives*
- *United States production price and foreign currency derivatives(AFS,2015)*

The Eskom annual report 2015 further shows that the fair value of embedded derivatives is determined by means of a forward electricity price curve to assess the host agreement and the derivative contract is assessed by means of market forecasts of future commodity prices, foreign currencies and exchange rates, interest rates differentials, future sales volumes, production price and liquidity, model risks and other economic factors.

Market risk is mostly as a result of fluctuations in exchange rates and to some extent can also be as a result of fluctuations in commodity prices as well as equity prices. Electricity contracts that contain embedded derivatives are normally hedged. According of the South African Reserve Bank (SARB) regulations, hedging in respect of both exposures from these embedded derivatives takes place on a short-term basis.

Financial risk management places emphasis on the timing of hedging and how to hedge using financial tools efficiently to manage the risk exposure. Currency risk is mainly caused by purchasing of goods and services outside the countries denominated in any other currency than our own, that can be direct or indirect through our local suppliers through foreign sales and foreign borrowings. Eskom group is exposed through the imported assets like boilers and transformers, imported skills and liabilities from foreign investments.

1.5 The Research Layout

This study entails five chapters in the following order:

Chapter 1: Introduction of the Study

The chapter presents the background of the study and the problem statement. It also explains the main objectives of the study, the research hypothesis as well as the contribution and justification of the study.

Chapter 2: Literature Review

This chapter scrutinises the theoretical and empirical literature. It includes the comparative evaluation of all previous researches on the subject. In addition, the chapter defines and compares the hedging instruments used. It also unsympathetically reviews the theories that have been previously considered.

Chapter 3: Research Methods

This chapter specifies the research methods used to collect and analyse the data. The in-depth analysis of the method that the study uses is also discussed. Research Approach and Strategy, data reliability and validity is also discussed.

Chapter 4: Research findings analysis

This chapter presents the research findings. It also provides the data analysis and interpretation and discusses the test statistics from the data.

Chapter 5: Summary, Conclusion and Recommendation

Chapter entails the summary, the conclusions of the study and makes the recommendations for the future study.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

Infrastructure development is the economic strength of any country, hence this section will start by reviewing the infrastructure literature. In this section, we will also review the literature on financial hedging strategies against currency exposure which help reduce the cost of capital projects. The risk mitigation instruments for foreign exchange volatility can be addressed through currency hedging.

The main focus of this thesis is on hedging, the literature on other ways of cost savings on capital projects or how funds can be effectively utilised is not covered. Eskom is one of the biggest importers hence the study seeks to explore this cost driver. In addition, we also consider other operational means of hedging as complementary to financial hedging.

Because Africa still lags in development, there are huge demands for investment on the continent. According to the AICD (2009), Africa needs a total of about US\$ 93 billion to cover its infrastructure development needs, whereby one-third of this amount will be for operations and maintenance. The standard of living and the quality of life is directly related to the availability of infrastructure such as electricity, water, waste disposal, road networks, rail transport, communication channels, supply chain, logistics framework, schools and health facilities, etc.

Aschauer (1989) investigated the impact of the infrastructure investment on what an economy produces and the growth in productivity. The findings were that in the USA, the low investment in public infrastructure led to the private sector shut down in the 1970's and 1980's. He calculated the private output elasticity pertaining public capital to be about 0.42, demonstrating a substantial level of sensitivity.

Furthermore, statistical evidence also confirmed an optimistic relation between infrastructure investment and GDP. It must be noted that between 1950-79, investment in public infrastructure led to an equal growth in the economy where GDP showed a growth of 4.1%, almost close to the 4% growth in infrastructure investment. Nevertheless, between 1980-2007 public infrastructure investment declined to 2.3% and the GDP also declined to nearly the same levels to 2.9 at the same period. (Heintz et al. 2009).

In South Africa, Perkins, Fedderke and Luiz (2005) also conducted a similar study. Using Pesaran, Shin and Smith's (1996, 2001) F-tests, these studies confirmed the correlation between GDP and infrastructure development such as roads and other developments. They also confirmed a direct relationship between economic growth and investment.

Table 1 shows the positions realised by the BRICS countries in the infrastructure pillar10 of the GCI for 2008/09 to 2011/12. The highest ranks signify the best quality of infrastructure and vice-versa

Table 1: Infrastructure GCI, BRICS, 2008/09-2012/13

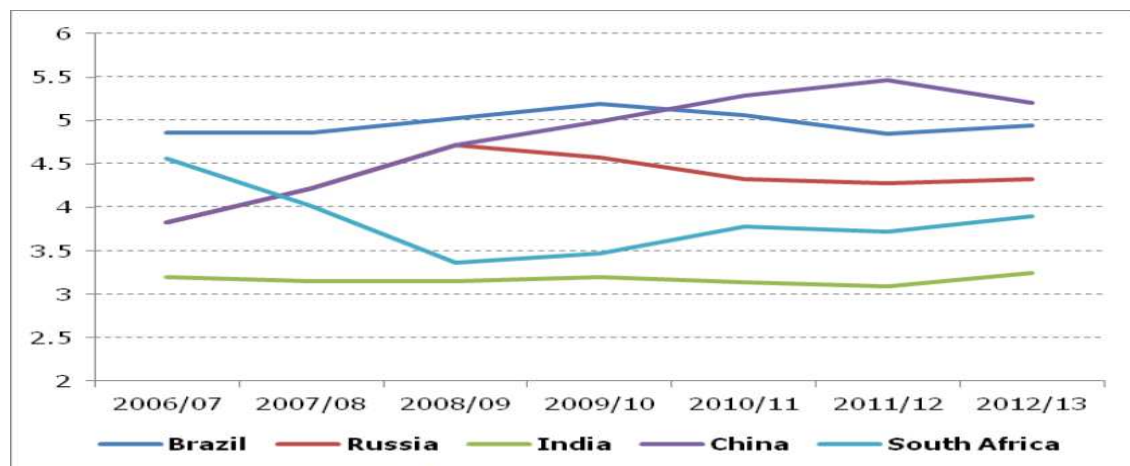
	2008/09	2009/10	2010/11	2011/12	2012/13
Brazil	98	81	84	104	107
Russia	78	86	94	100	101
India	90	89	91	86	87
China	58	66	72	69	69
South Africa	46	43	56	60	58

Source: WEF, 2012

Table 1 show that South Africa has performed better than its counterpart in terms of quality of infrastructure and it ranked 46th during 2008/09. In 2009/10, it also ranked number 43 because of the 2010 World Cup investments in infrastructure in preparation for this event where roads, accommodation and stadiums were improved.

The WEF in figure1 includes the quality of electricity supplied in its GCI. Below are the ratings for electricity access in BRICS countries.

Figure 1: Electricity GCI Ratings, BRICS Countries, 2006/07-2012/13



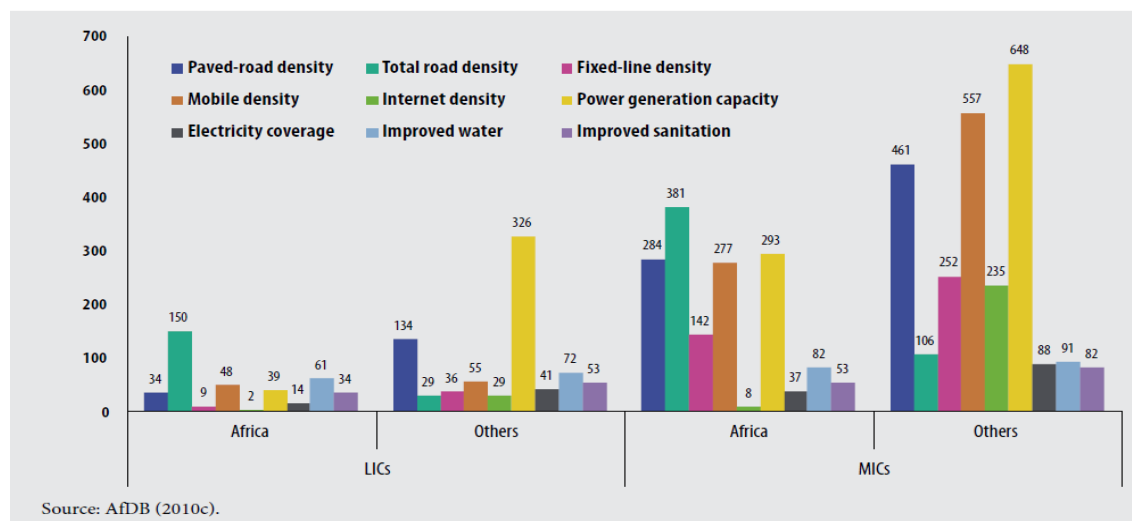
Source: WEF, 2012

The picture of accessibility to constant electricity supply is shown by a number individuals and companies. The ratings of a country range between one and seven, with one being the lowest and seven the highest. The basis for growth and improvement of an economy includes continuous, constant supply of electricity. According to Stats SA (2012), the electricity, gas & water sub-sector contribute negative 1.4 per cent to GDP. The reason why demand is higher than supply is owing to quite low electricity costs, industrial and economic growth prior 2008.

One of the highest challenges in Africa is infrastructure that includes inadequate supply, low access rates and high costs. Access to electricity in 2009 in Africa was only at 42 per cent and on the other hand, all developing countries were sitting at an average of 73 per cent, 78 per cent for developing Asia, and 93 per cent for Latin America. The figure is even lower for Sub-Saharan Africa where it now stands at 31 per cent (International Energy Agency, 2010).

A contrast on the source of countries' income levels plainly demonstrates Africa's infrastructure shortfall. Africa's infrastructure benefactions compared to other emerging regions is inspiring only in relations to access to clean water for its population (Figure 2)

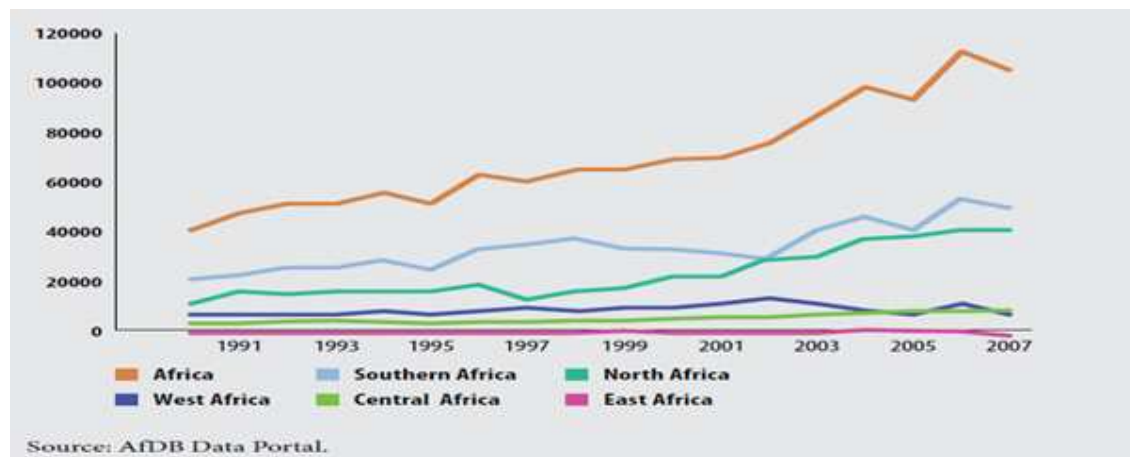
Figure 2 Infrastructure benefactions for African LICs/MICs compared to other global regions



The region's infrastructure shortfall affects its low-income countries (LICs) more than middle-income countries (MICs). Where power capacity is concerned, the numbers are no healthier, with African LICs 8 times more inferior to their counterparts elsewhere (39 MW per million people vs 326 MW), whereas its MICs are 3 times more inferior.

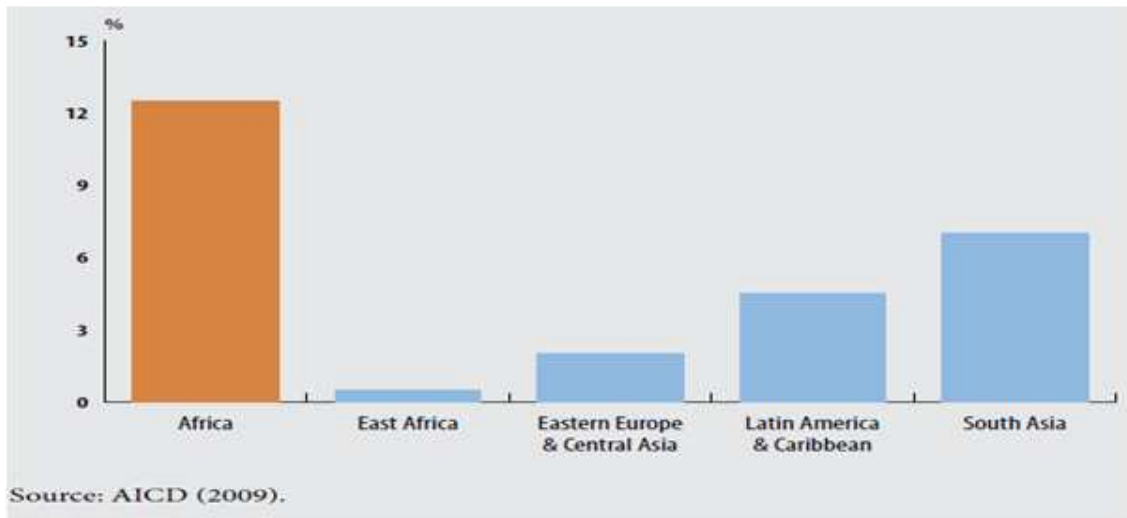
Indeed, the arrival of Independent Power Producers (IPPs) indicates extensive variations that are being implemented in the energy space. For example, the National Energy Regulator of South Africa has developed a monitoring atmosphere that would permit ascending amendments in tariffs and hence develop the feasibility of private sector suppliers.

Figure 3. Electricity balance in Africa; million kilowatt-hours (-deficit; +surplus)



The power interruptions owing mainly to lack of maintenance budget and in capability growth to reach the target of ever increasing demand, also to an absence of regional interconnectivity of the electricity grids and scarcity in impacted countries. At these moments, regional excesses in generation volumes were prominent in 4 of the 5 sub-regions. The exclusion was East Africa which experienced irregular deficiencies (Figure 3).

Figure 4. Working hours lost due to power outages 2009



Other remaining countries like South Africa experience shortage owing to their needs exceeding supply. The power interruptions are costing Africa considerably as the continent is losing nearly 12.5 per cent of production period compared to 7 per cent for South Asia, which is the next worst case scenario (figure 4). This industry is currently confronted by unusual extraordinary influences of added costs e.g. exchange rate volatility that makes hedging through exchange rate related financial derivatives, a key risk management tool. With the growing project scope come greater demands to manage project risk. Capital project funds must be used managed effectively to achieve a company's objective. Capital market variables are unstable and largely irregular, derivatives authorises managing risk of instability e.g. in exchange and interest rates. (SA budget review, 2014)

Managing forex risk:

Managing capital projects in a globalised environment with internationally intertwined supply chain systems heightens exposure to currency volatility. Currency volatility can often result in very serious risk exposure which can cause large capital projects to experience very high cost overruns. The Asian crisis of 1997 recorded currency swings of between 20 and 40% within a single year, weaker currencies like the Indonesian Rupiah suffered very significant devaluations overnight. Lack of appropriate planning for such strong macro- economic shocks can be detrimental to project budgets, resulting in project failures, especially for the high capital expenditure projects. (Dong, L. 2013)

Globalisation has brought with it many opportunities, the world has become a global village and businesses can operate in multiple countries at the same time. However, the lack of predictability due to currency volatility especially for developing economies can often bring about very serious currency risk making it difficult to plan. This is also evident in capital projects where high capital equipment is purchased from various countries with different currencies. Global company executives around the world are starting to prioritise the management of currency risks in their operations, the recent financial crisis from 2008 demonstrated that the lack of appropriate risk mitigation could wipe out even established companies. Unfortunately, it is not possible to predict the level of currency volatility or even the direction of the swings (positive or negative). (Dong *et al*, 2013).

Hedging is a tool that is used to mitigate currency volatility risks, it involves dropping or eradicating financial risk by transferring that risk on to someone else. Although hedging cannot eliminate currency volatility, it can provide some level of certainty of cash flows, which assist with planning and budgeting, making it possible to manage capital projects, reducing the chances of the possibility of catastrophic project overruns. Foreign currency hedging explicitly tries to mitigate the risk related to future activities in an exchange rate. This is a two-way risk since exchange rates can change to unfavourably or favourably. Organizations hedge for opposing changes only, as hedging for positive movements is seen as speculation. (Bligh, C. 2012)

Hedging is very similar to buying an insurance policy, you pay for it with the hope that you would never have to use it. Therefore, it would seem that you want to “waste” money on hedging, because you hope to never have to use it. However it allows for planning through mitigation against any negative eventuality. What is clear is that realistically you cannot make a conclusion on whether a hedge was necessary or not provided there is a bad event or not. Just like insurance, the choice to hedge is a mitigation strategy based on the unknown and any evaluation of a hedging decision must also be understood in that context. (Bodnar, G. 2008)

Definitions of Hedging Strategies:

It is crucial in large capital projects to seriously consider and manage exchange-rate exposure. To alleviate the influence of exchange-rate variations, capital projects can apply

various risk management approaches not only through financial derivatives, but also through operational hedges. (Allayannis, G. 2004)

Operational hedging

The use of the term “operational hedging” in the previous decade has considerably increased in the finance literature and mostly deliberated together with its financial complement, financial hedging. According to the finance literature, operational hedging is the sequence of exploits that hedges the company’s risk using non-financial instruments, mostly through operational activities”. (Boyabatli and Toktay, 2004)

Huchzermeier (1991) cited in Ding and Kouvelis (2001, p.2), indicates that “Operational hedging strategies can be viewed as real (compound) options that are exercised in response to demand, price and exchange rate contingencies faced by firms in a global supply chain context.” (Ding and Kouvelis, 2001)

Van Mieghem (2003), without referring to real options, but making a comparison to financial hedging, defines operational hedging as “mitigating risk by counterbalancing actions in a processing network that do not involve financial instruments.” He states dual-sourcing, section cohesion, alternative to run overtime, active swaps, routing, transshipping, or flowing of processing among different kinds of capital, sites localities, holding safety stocks i.e. shares or bonds and lastly procuring securities contracts as operational hedging strategies. (Van Miegham, 2003)

Chowdhry and Howe (1999), in their model, “claim that operational hedging emerges only if a firm faces a combination of exchange rate and demand uncertainty. They predict that firms are likely to use financial instruments to a greater extent to hedge short-term exposure and rely on operational hedging more heavily to hedge long term exposure”. (Chowdhry *et al*, 1999)

Gleason (2005) uses other four separate methods of operational hedging: a variety of foreign countries in which a firm works, the number of wide-ranging regions where a firm works, and two distribution actions based on the Hirshman-Herfindal concentration index. (Gleason *et al*, 2005)

Chiang (2007) in his study also uses four but slightly different proxies for a firm's operational hedging: (i) a variety of countries in which it operates, (ii) a variety of wide-ranging regions in which it is situated, (iii) the geo-graphic distribution of its branches across countries, and (iv) the geographical spreading of its branches across areas (Chiang and Lin, 2007)

“Boyabatli (2004) made several observations concerning this definition listed above. One of the main contributions of this definition is the observation that operational hedging can be employed in the absence of tradable risks, particularly exchange rate risk, all the other academic fields mostly consider operational hedging in an exchange rate framework. Again departing from the literature, Van Mieghem (2003) does not consider any particular risk measure to formalise the effect of operational hedging in terms of risk mitigation”. (Boyabatli and Toktay, 2004)

In the international business literature, Pantzalis et al. (2001) define operational hedging as “the firm’s operational decisions (related to marketing, production, sourcing, plant location, treasury) that are best suited to managing the exchange rate exposure on the firm’s competitive position across markets” (Pantzalis et al, 2001)

Boyabatli (2004) states that “while the existing definitions of operational hedging in operations management capture the fundamental principles of operational hedging, they are not completely or fully consistent with the usage in other academic fields. We believe that there is room in operations management for an operational hedging framework that incorporates and unifies findings from other fields”. (Boyabatli and Toktay, 2004)

It should be noted that in this particular study, operational hedging refers to the fine-tuning of operational efficiency strategies that mainly involve the execution of financial hedging policy. Financial hedging effectiveness is only as effective as how it is robustly carried out. Operational hedging in this study refers to activities such as the actual timing of transactions (e.g. buying and selling forward contracts), clearly thought through policies that govern the philosophy around transactional optimisation and the prudence with which staff adhere to the

policies to enhance financial hedging. In summary, this study's definition of operational hedging strategies includes efficient management of cost drivers for pre-take up, renewal or cancellation of a buy FECs.

Financial Hedging

Financial hedging and operational hedging normally work together than substitutive.

“Financial hedging is defined as the use of foreign currency derivatives including forward and futures contracts, swaps and options”. (Gleason *et al*, 2005)

Derivative instruments were made after the 1970s in order to manage risk and create insurance against shortcoming. The motivation was driven by the latest occurrence of the fall of 50% in the U.S. stock market, risen inflation and the oil blow. As a result, tools such as options, which are advantageous from the upside without keeping the security or defend against the downside by paying a minor premium, were designed. Derivatives are risk-transfer tools, and are a very important tool for financial institutions in the provision of financing and risk-management solutions to clients, (Zucchi, K. 2010). The three basic kinds of derivative securities are forwards and futures; swaps; and options (see table 1). The most used derivatives are forward exchange contracts and options.

A derivative is a type of agreement that originates its worth from the performance of an primary entity. This primary entity includes an asset, index, or interest rate. There are numerous functions of derivatives namely; insuring against price changes referred to as hedging, growing experience of price changes for speculation or lowering the barrier to entry to trade assets or markets. Advantages comprise of enhanced investment choices, lower distress costs, tax reduction and more educational financial statements.

Table 2: Classification of hedging Instruments

classification in hedging literature	financial hedges		operational hedges
classification in financial statements	derivative hedges	natural hedges	
examples	forwards (futures), options, swaps	foreign-currency debt	diversification across currency zones, operational matching of revenues and expenditure

2.1. Forward Exchange Contract FEC vs other Basic Derivative Instruments

With a forward exchange contract FEC, a party pledges to buy (or sell) a financial asset at a stated price at a future date. This forward price is fixed in such a way that the contract bet has no worth when it is entered into, i.e. the likelihood of loss equivalent to the likelihood of gain. “A forward contract is an agreement between two parties to trade in a specified quantity of a specified good at a specified price on a specified date in the future” (Sundaram & Das, 2010).

One of the advantages of a forward contract being traded on the OTC market is that it is not a one sided contract, the terms of the contract are discussed openly between the buyer and seller. As such, the forward exchange contract is customisable and can be designed to meet the specific needs of the buyer or seller. This makes forwards the most popular contract for hedging foreign exchange rate risk as it eliminates both the delivery basis risk problem unlike futures.

A futures contract is a forward contract that is traded on a controlled exchange rather than discussed jointly. Futures contracts were produced by forward contracts in the mid-19th century. They are identical, and the exchange guarantees performance on the contract. (Sundaram & Das, 2010).

The major disadvantage of the futures contract is the standardisation created by the exchange rate and the likelihood of delivery basis risk or delivery date mismatches. Another major problem of hedging with futures is that they are marked-to-market, making it almost incredibly difficult to hedge cash flows and values simultaneously (Mello & Parsons, 2000)

Swaps, same as *fec*, are over-the-counter agreements. In a *fec*, the two parties commits to a particular trade or particular interchange of cash flows. In a swap, the parties commits to numerous exchanges of cash flows over numerous dates in the future centred around on the primary value of currencies exchange rates, bonds/interest rates, commodities exchange, stocks or other assets. Swaps are generally utilised in the interest-rate derivatives market where the normal contract has the parties switching one interest index for alternative calculated on stated estimated main amount. (Sundaram & Das, 2010)

Options are contracts that provide the owner the right, but not the obligation, to purchase an asset in an event of a call option or sell in an event of a put option. The price at which the sale takes place is identified as the strike price, and is indicated at the time the parties enter into the option. The option agreement also states a maturity date. Different options have different rules in terms of the maturity date. If it is a European option, the owner has the right to necessitate the sale to occur on, but not before the maturity date; if it is an American option the sale may be requested any time before maturity date. If the owner of the contract exercises this right, the counter-party has the obligation to deliver (Hull, J. 2002).

While a forward contract is an instrument for hedging, an option offers a form of financial insurance. The forwards and options at maturity, options offer a choice where forwards have a compulsion to deliver. Lastly, options produce unbalanced hedges whereas forward hedges reduce both upward risk and downward risk.

Options trade both on structured exchanges and in the over-the-counter (OTC) market. Exchange-traded options are found on equities, equity indices, currencies, and interest rates and bonds, among others. Exchange-traded options are regular in terms of expiry dates and strike prices. Sundaram & Das, 2010 point to that OTC options are adaptable and show more selection. Although a forward contract is an instrument for hedging, an option affords a form of financial insurance.

Giddy, I. (1983) recommends criteria that will simplify the conclusion of whether to use option or *fec* for hedging the firm's risks. He argues if the currency flow is known, forward contracts offer a wider defence and therefore a better choice. If the currency flow is unknown, options are a better bet since a equivalent forward contract cannot be created.

After conducting a survey of risk tools for currency risk that consisted of 500 multinationals in USA the results confirmed that fec still takes a lead as the best financial instrument for risk management and that there is a swing from hedging transaction exposure to economic exposure (Jesswein K., Kwok, C. C. Y. and Folks, W. R. Jr., 1995)

For exchange-traded derivatives (in South Africa traded at JSE), the status quo of the market price is usually obvious as it is published live by the stock exchange, based on all the current bids and offers. However, difficulties can be experienced with Over the Counter (OTC) or a floor-traded contract, as trading is controlled manually, it's not easy to automatically publicise prices. Worldwide, it is projected to be superior to the exchange-traded market (notional amounts) five times more, (J, Hull (2012), based on BIS and WFE data). OTC income in rand-denominated interest rate derivatives is the eighth largest worldwide (at par with Brazilian real denominated instruments), (BIS (2013). See on Table 1 the history of OTC market progress.

Table 3: Over - the - counter (OTC) foreign exchange derivatives

Notional amounts outstanding (bn US\$)

by instrument and maturity				by currency*	
	Dec-04	Dec-05	Dec-06		Dec-06
total contracts	29,298	31,364	40,179	USD	33,775
forwards and swaps	23,174	24,377	30,600	EUR	15,907
<i>with maturity one year or less</i>	17,522	18,157	22,640	JPY	9,548
<i>maturity between 1 and 5 years</i>	3,676	4,050	4,886	GBP	6,128
<i>maturity over 5 years</i>	1,976	2,170	3,074	CHF	2,307
options	6,115	6,987	9,579	CND	1,764
<i>with maturity one year or less</i>	5,312	5,753	7,587	AUD	1,498
<i>maturity between 1 and 5 years</i>	710	1,115	1,772	SEK	1,219
<i>maturity over 5 years</i>	93	119	220	total	40,179

source: BIS Quarterly Review June 2007

2.2 Hedging to reduce the exposure to exchange rate risk and other cost saving benefit

Owing to strengthened activities by derivative, there is a noteworthy increase in cost reduction and investment t in the long run. There is variety of competing products to choose

from once a company decides to hedge to accomplish this objective. The correct financial tools must be used in order to achieve an appropriate hedging strategy. However the potential costs and benefits of hedging must be considered. The risk that must be hedged is where profits of hedging outstrip the cost. Referring to the optimistic theory of corporate hedging established by Smith and Stulz (1985), corporate hedging can be justified upon weighing the benefits on condition that market position where the benefits of hedging are more as well as in cases where it can balance the cost and add value to the company.

Hedging foreign exchange risk by balancing a spot market location by taking a contrasting one in forward exchange is essential for international firms which have profitability concerns and are anxious about risk of their operations (Zilcha and Eldor (1991), Froot, Scharfstein and Stein (1993), Wolf (1995)). Forward markets are offered in most major currencies of the world.

Campello, Lin, Ma, and Zou (2011) stress the fact that the correct hedging policies can lower the odds of negative firm realisations, i.e., profits and cash flow variability. This in turn shrinks the estimated cost of financial distress as indicated by Smith, C.W and Stulz, R.M (1985), resulting in hedgers having to pay lower interest spreads and thus these corporations have more opportunities for capital expenditure.

In a 1999 study, Graham and Smith offer some empirical evidence on the possible tax reimbursements for corporates that hedge on observing the tax structures of U.S. firms. The assessment shows that 50% of U.S. companies face convex active tax functions where tax rates risk with proceeds, about a quarter have direct tax functions where tax rates are not correlated to income and a quarter actually have hollow tax functions where tax rates and income are positively correlated meaning that when rates fall income also falls. It was also identified that companies with unstable income closer a curve in the statutory tax schedule, and companies that fluctuate from profits in one period to losses in another, are greatly expected to have convex tax functions. In some instances, the cost reduction amounted to more than 40% of the overall tax liability, (Graham, J.R., and C.W. Smith, 1999).

[Some arguments against Operational hedging as an effective strategy](#)

Chiang (2007) states that in mitigation against the bearing of foreign exchange rate fluctuations, firms can apply financial hedging approaches through the usage of Foreign

Currency Derivatives (FCD) and Foreign Currency Denominated debts (FDD). This is supported by numerous empirical studies which have demonstrated that there is common use of FCD or FDD by firms for hedging reasons (Chiang and Lin, 2007).

Chiang (2007) on the other hand argues that applying the operational hedge approach cannot decrease foreign exchange risks, this is corroborated by similar results from a study by Allayannis, Ihrig, and Weston (2001). (Chiang and Lin, 2007)

“An empirical study on Taiwanese firms also shows that the use of operational hedge strategies does not help reducing foreign exchange exposure. The study found that firms that use operational hedges do not lower their exchange-rate risk; however, on average, firms that are employing operational hedging strategies, are more likely to use financial hedging strategies which do reduce exchange-rate risk. The firms that rely exclusively on operational hedges for their exchange-rate risk management may not maximize shareholder value”. (Chiang and Lin, 2007)

2.3 Conclusion

In terms of financial vs operational hedging strategies, it is said that financial hedges are effective on their own according to various literatures, and similarly grouping of financial and operational hedging. Carter et al (2003) also investigated US multinationals (1994-98), and are more optimistic on the efficiency of operational hedges. They discover that operational hedges and financial hedges lessen exchange rate risk, whether used independently or together and determine that: *"operational and financial hedges are complementary risk management strategies"*. Cowan et al (2005) reach related inferences for a sample of Chilean firms.

However, de Jong et al (2006) argue differently about the effectiveness of financial hedges when using a sample of Dutch firms. Their outcome advocates that financial hedging does not lessen exchange rate risk, while operational hedging lessens exchange rate risk.

In contrary to de Jong et al investigation, a study of Swedish firms Hagelin and Pramborg (2004) indicates that derivative hedging as well as hedging with foreign-currency

denominated debt reduce a firm's exchange rate risk Furthermore, they discover that hedging can cause a decline to both transaction risk and translation risk.

In light of the opinions for and against financial hedging and operational hedging, these diverse results advocate that there might be a more complex connection between financial hedging and operational hedging than the prior studies could discover. There seems to be more literature that is consistent with Carter et al 2003 and Cowan et al (2005) analysis which bring us to the conclusion that both financial and operational are complementary.

There is however a gap identified on operational hedging literature because all their examples there's an observation that it does not include or mention timing as another important form of operational hedging strategy. Timing also affects the financial hedging results and influences the effectiveness of hedging hence financial and operational strategies are more effective when they are used together.

CHAPTER 3: RESEARCH METHODOLOGY

3.0 Introduction

This section outlines the research approach and strategy utilised. The data collection method and the choice of the data used are also discussed, giving the reasons for the choice. The sample of the study is described with reasons. The section also indicates constraints and limitation encountered. The reliability and validity of the data is confirmed. Data analysis approach is discussed in detail and justification of key variables used.

3.1 Research Approach and Strategy

The research uses a quantitative approach. This approach is used mainly to generate numerical data that seeks to establish causal relationships among measured variables using numerical devices to test the strength and worth of the relationships (Creswell, 2014). One of the advantages of using the quantitative approach is that a cost analysis can be implemented for choosing the best possible suited measure and this approach is a very efficient method for gathering information. Kealey & Protheroe (1996:141) also highlight the the rationale for this choice of the research approach as that it can also allow for greater impartiality or it eliminates room for personal bias by providing summaries of data that supports a broad view about the sensation under study, employing approved procedures to ensure validity. For this reason, it is recommended for its accuracy of results.

However, this method also has its disadvantages. The quantitative approach answers do not really reveal people's feelings but the closest estimate. The outcome is partial as only arithmetic descriptions are supplied instead of a thorough report and generally provide less elaborate accounts of human opinion. The other disadvantage is that the collection might be from a much narrower and sometimes shallow data set.

The other approach available is the qualitative approach in which the information gathered is non-numeric but more narrative responses might be in a form of open-ended survey

questionnaire. This approach is often time consuming but the advantage is that respondents can easily write the narrative without obstruction on relevant or appropriate topic which makes it easy to analyse. On the other hand, quantitative data merely counts things while the qualitative approach records behaviour and emotion as it looks further than accurate numerical evidence. It creates openness and simulates people's experiences. The other challenge is that it makes it difficult to make systematic comparisons

3.2 Data Collection methods, Frequency and Choice of Data

To carry out this investigation, ethical approval had to be obtained from Eskom.

The sample is based on an Eskom project, since Eskom is hedging and has a lot of data on a number of deals already done, secondary data option was chosen.

Secondary data was used in order to analyse Eskom hedging strategies used in relation to the currency movement trends and in relation to operational efficiencies. When the equipment is hedged there are transactions arising from the mismatch of delivery basis like pre-take ups, renewals and cancellations that affect hedging results due to operational inefficiencies, hence secondary data collected was categorised per deal type. The researcher identified Eskom Treasury deals Report on the TMS, Company financial statements, Integrated Report as an appropriate data sources for the study. The secondary data was analysed utilising time series data which was collected on a monthly basis over 12 months, beginning October 2014 and ending September 2015.

After receiving the Treasury deals report data from Eskom Treasury, a data clean-up was performed. Data had to be organised per contract number to be able to pick up all transactions that happened per contract as it is possible to have a contract with multiple deals. Excel was used to sort out the data. Mean and standard deviation of defined fields is calculated to determine the benefit of hedging Diamantopoulos & Schlegelmilch (2000: 97) has defined the mean "as the sum of a set of values divided by their number". The standard deviation is also used as describes the distribution in relation to the mean because the mean can be a one-sided depiction of the data obtained. The standard deviation measures variability, which indicates how widely monthly data vary.

Structured interviews were conducted with key personnel at Eskom Treasury to further appreciate the data. To understand the mismatches between maturity date and delivery date, structured interviews were also conducted with Project Managers with more insight into these projects.

Secondary data was sufficient for the purpose of the study and therefore, the researcher used the quantitative approach. While qualitative scales on questionnaires that involve management opinions are beneficial, the challenge can be biasness as it is possible to analyse the identical risk and come with different assessment of their possible influence and can lead to under or overestimation of exposure.

3.3 Sampling

Sampling is a process used in statistical analysis in which a pre-set number of observations are obtained from a larger population. Collis and Hussey (2203:56) define a sample as a subgroup of a population that should characterise the main intention of the study. The magnitude of capital projects that rely in imports suggests a need to improve management of FECs and hence the research object chosen for this research is one biggest importer and state-owned company, Eskom.

The sample in this study is drawn from the transactions of one capital project among the 3 mega projects in Eskom, the Kusile project. There are diverse kinds of sampling which can be used, subject to the research method chosen. Non-probability sampling is mostly used by qualitative researchers as it enables the researcher to deepen their understanding of whatever phenomenon they are studying. The other type is probability sampling which the quantitative researchers believe is the best approach as it can compare random events to their results as random events are predictable. The types of non-probability samples are; Snowball, quota, convenience and theoretical. The types of the probability sampling are; Simple random, systematic random, stratified and multi-stage cluster. This study used simple random sampling as a result.

3.4 Constraints and Limitations of the study

In the case of this study there may be limitations with regards the data. The Treasury system does not give or produce automated data and therefore, the secondary data still needed a lot of manual work to be done before analysis could be used. It needed to be aligned correctly to give a breakdown according to business needs for reporting purposes. There might also be limitations with regard to type of information made available, thus limiting proper benchmarking. Limiting the sample within a parastatal is also a limitation; in future studies, other parastatals are to be included in comparison to further enhance the results.

3.5 Ethics

The Ethical principle that will be adopted in this research is the principle of honest analysis and reporting. The objective for this is to ensure that data speaks for itself. Confidentiality principle was also adopted in this research. The objective is still to protect the interest and welfare of the subjects. Ethics approval was obtained from Eskom and therefore, this research took into consideration and respected the terms of the approval due to the sensitivity of the information provided.

3.6 Data reliability and validity

Secondary data used is from Eskom treasury. The chosen source data is used on the monthly basis for reporting and strategic decision making for the company. The data is also audited by external auditors.

3.7 Data Analysis Methods

The research statistical analysis used is descriptive statistics, trend analysis, correlation and regression approach. Descriptive statistics of secondary data was run. Descriptive statistics

focus on the summary of the data received for a cluster of separate units of investigation (Welman et al., 2005:231).

The data was analysed by using Statistical Analysis (SAS) and Microsoft Excel. According to Welman et al. (2005:210), the main aim of data analysis is to sort data into a significant plan to enable to report on the original research question(s).

The data was analysed per each transaction type i.e. pre take up, renewal and cancellation. Mean and standard deviations of defined fields was calculated to determine the benefit of hedging.

The data was further split according to duration of the deal to determine the timing of transactions as it is vital for applying the appropriate hedging strategy. The timing criteria are defined as part of the Eskom policy which requires notification of pre-take-up and cancellation at least 5 days before maturity.

The data was also categorised to determine the duration of the cover, whether it is short term or long term cover using the deal date versus maturity date. Short term is defined as all covers that have duration of between 0 to 3 months and the ones with duration of 4 to 6 while long term is defined as durations of 7-9 and 10-12.

Trend analysis was conducted to ascertain the volumes per deal type. Then volumes were compared against the premium to ascertain the relationship and a correlation was also used to test the hypothesis. Correlation was used to determine the type of connection between two variables.

While correlation is beneficial in determining potential connections between variables, it does not demonstrate or invalidate any cause-and-effect (causal) relations between them.

Lastly, the Anova regression statistical measure was used.

3.5 Justification of the variables

At the outset of any regression study, one formulates some hypothesis about the connection between the variables. The two key variables used for the regression are volumes and premium. The reason for choosing the volumes and the premium is because they contribute the most to the outcome of FEC. Other variables that are used are listed in table 4.

Table 4: Key Variables Descriptions

Variable	Definition/Calculation	Source
Premium	Net of contract and spot rate multiply by face value	Eskom Treasury
Volumes	Number of deals	Eskom Treasury
Face Value	Capex	Eskom Treasury
Gains and Losses	Net of closing spot and contract spot rate multiply by face value	Eskom Treasury

CHAPTER 4: RESEARCH FINDINGS, ANALYSIS AND DISCUSSION

4.1 Introduction

This section will present and discuss the descriptive statistics for the predictor and predicted variable, the scatter plot, the correlations and regression analysis.

4.2 Descriptive Statistics

Eskom transacts in different currencies namely; USD, GBP, SEK, EURO etc. However, our sample is only going to focus on EURO/ZAR transactions because it is the currency mostly used for the Kusile deals, the project on focus. Other mentioned currencies are only for information purposes. From the below table, it can be concluded that the average EURO/ZAR exchange rate will fall in the range of 13.77 +- 0.66. Therefore any deal that Eskom enters into, the values will be multiplied by the exchange rate to turn it into foreign currency.

Table 5: Descriptive statistics of Currencies

Item	N	Mean	SD
Currencies			
USD/ZAR	12	12.00	0.74
EUR/ZAR	12	13.77	0.66
GBP/ZAR	12	18.53	1.10
SEK/ZAR	12	1.47	0.07

Source: Eskom Treasury Report (Oct 2014 –Sep 2015)

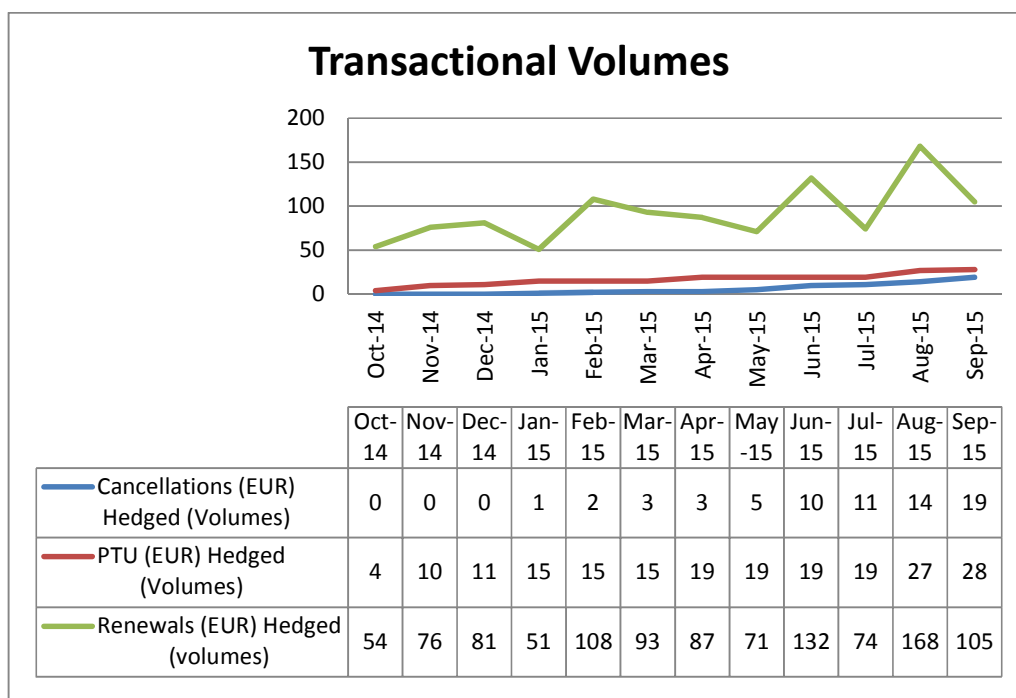
Table 6: Descriptive statistics of key variables

#	Month	Face Value (R)			Premiums			Gains and Losses			Volumes
		Mean	STD Dev	Sum	Mean	STD Dev	Sum	Mean	STD Dev	Sum	
1	Oct-14	27 204 981	364 462 236	3 591 057 513	(1 017 657)	4 587 239	(133 313 068)	(2 132 368)	9 734 329	(279 340 229)	132
2	Nov-14	1 288 523	58 939 221	204 875 109	(443 350)	1 889 988	(70 492 678)	(735 215)	3 153 920	(116 899 179)	159
3	Dec-14	2 180 838	108 477 242	394 731 589	(369 027)	2 387 276	(66 793 817)	(600 612)	4 571 318	(108 710 738)	181
4	Jan-15	573 344	14 575 364	79 121 503	(112 272)	680 337	(15 493 517)	(214 988)	1 753 673	(29 668 352)	138
5	Feb-15	2 349 288	155 872 234	547 384 045	(454 380)	2 168 178	(105 870 564)	(1 682 883)	8 830 750	(392 111 809)	233
6	Mar-15	1 793 848	100 179 497	344 418 905	(256 807)	1 954 675	(49 307 026)	(908 326)	7 310 162	(174 398 661)	192
7	Apr-15	1 502 502	91 343 956	292 987 914	(310 409)	2 173 243	(60 529 713)	(1 019 054)	8 496 354	(198 715 451)	195
8	May-15	1 592 980	124 298 966	250 097 800	(479 416)	3 395 939	(75 268 236)	(1 036 651)	6 912 338	(162 754 191)	157
9	Jun-15	73 083	108 833 124	21 559 398	(193 108)	1 184 412	(56 966 777)	83 835	1 876 987	24 731 470	295
10	Jul-15	884 147	124 875 845	161 798 830	(469 423)	2 372 169	(85 904 342)	11 529	2 550 615	2 109 863	183
11	Aug-15	10 523 700	138 164 569	3 083 444 043	(697 702)	2 906 074	(204 426 775)	(699 979)	3 476 087	(205 093 705)	293
12	Sep-15	269 649	211 508 827	53 390 503	(251 665)	1 244 242	(49 829 732)	1 362 840	9 877 999	269 842 290	198

Source: Eskom Treasury Report (Oct 2014-Sep 2015)

On a monthly basis, Eskom entered into a number of FECs for Kusile ranging from 132 to 285 transactions with the rand value ranging from R21m to R3b, while the face value ranges on average between of R0.073 to R27m. These values include all FECs (e.g. new covers, pre take ups, renewals, cancellations etc.)

Table 7 Trend Analysis - Volumes



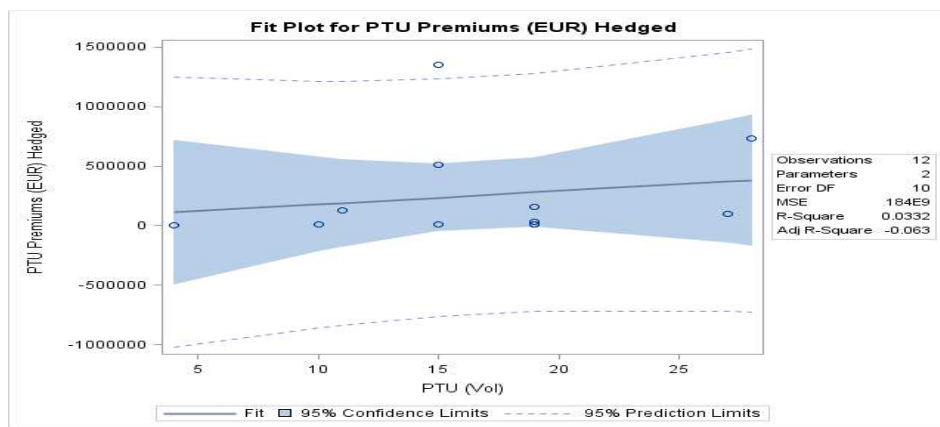
From the volumes observed in Table 6, a high number of renewals are experienced in relation to pre-take ups and cancellations. However the number of cancellations and pre-take ups are steadily growing.

4.3 Relationship between variables

This section presents the relationship between volumes versus premiums to establish if the movement of transactional volumes will impact the hedging results, e.g. gains and losses.

4.3.1 Pre-take up volumes versus the pre-take up premiums scatter plot

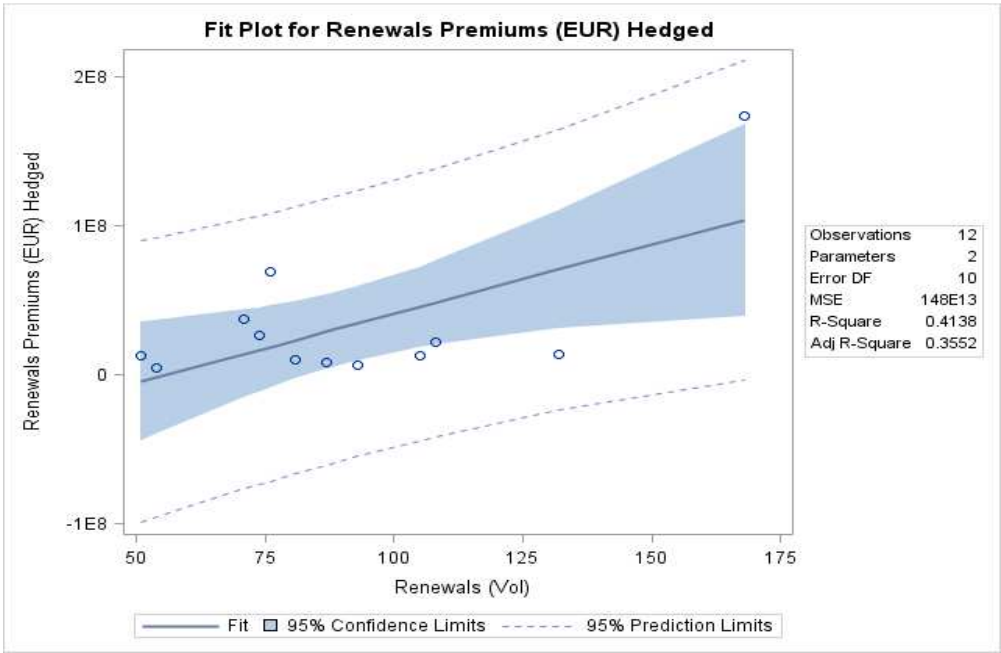
We have used the scatter plot to depict the clearer picture of the relationship between the volume of the pre-take up and premium of the pre-take up .



There's a relationship between the pre-take ups volumes and the pre-take up premiums as it can be seen on the graph above, however, the relationship is not noteworthy $R^2 = 3\%$. The changes in the independent variable will not necessarily impact the dependent variable.

4.3.2 Renewals volumes versus renewals premiums scatter plot

We have used the scatter plot to depict the clearer picture of the relationship between the volume of the renewal and premium of the renewal.

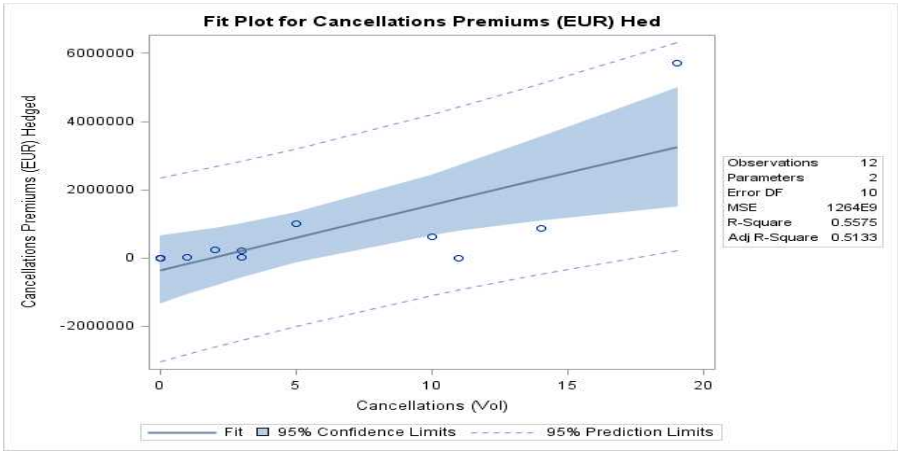


There R^2 is 41% which tells us that any changes on the independent variable which is volumes of the renewal will impact the dependent variable which is premiums of the renewal.

It can be depicted that there's a relationship between the renewal volumes and the renewal premium as it can be seen on the graph above.

4.3.3 Cancellations volumes versus cancellations premiums - scatter plot

The scatter plot was used to depict the clearer picture of the relationship between the volume of the cancellation and premium of the cancellation.



The $R^2 = 55\%$ and this tells us that any changes on the independent variable, which refers to the volume of cancellations, will impact the dependent variable which is the premiums of the cancellations. It can be depicted that there's a relationship between the cancellation volumes and the cancellation premium as it can be seen on the graph above.

4.4 Correlation

In this section we use the Pearson correlation to identify the significance and the direction of the relationship between the variables, volume and premium for each deal type (PTU, Renewals and Cancellations) reported in Tables above.

4.4.1 Correlation of PTU

Pearson Correlation Coefficients, N = 12	
	PTU (Vol)
PTU Premiums (EUR) Hedged	0.18222
	0.5708

The correlation between the PTU volumes and premiums is 0.18. There is a weak positive correlation with P-value of 0.57, therefore, it can be resolved that there is no statistically significant correlation between PTU volumes and PTU premiums since the P-value of 0.57 is greater than 0.05. This means that, growths or reductions of PTU volumes do not significantly relate to increases or decreases in PTU Premiums.

4.4.2 Correlation of Renewals

Pearson Correlation Coefficients, N = 12	
	Renewals (Vol)
Renewals Premiums (EUR) Hedged	0.6433
	0.024

The correlation between the renewal volumes and premiums is 0.64. There is a strong positive correlation with a P-value of 0.024 which is lower than 0.05, hence it can be resolved that there is a statistically significant correlation between renewals volumes and renewals premiums. This means rise or declines in renewals volumes do significantly relate to increases or decreases in renewals premiums.

4.4.3 Correlation of cancellations

Pearson Correlation Coefficients, N = 12	
	Cancellations (Vol)
Cancellations Premiums (EUR) Hed	0.74667
Cancellations Premiums (EUR) Hedged	0.0053

The correlation between the cancellations volumes and premiums is 0.75. Therefore, there is a strong positive correlation with a P-value of 0,005 which is lower than 0.05, hence it can be concluded that there is a statistically significant correlations between cancellation volumes and cancellation premiums. This means that growth or a drop in cancellations volumes do significantly relate to a growth or drop of cancellations premiums.

4.5 Regression Analysis

A regression was used to assess the ability of a control measure, number of PTU, renewals, and cancellations transactions to predict the costs (premium) incurred during when the transactions are observed/ settled before the time, or deals are renewed and during cancellation

4.5.1 Pre-take up (PTU)

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: PTU Premiums (EUR) Hedged

Number of Observations Read	12
Number of Observations Used	12

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	63258551086	63258551086	0.34	0.5708
Error	10	1.84E+12	1.84E+11		
Corrected Total	11	1.91E+12			

Root MSE	429164	R-Square	0.0332
Dependent Mean	254995	Adj R-Sq	-0.0635
Coeff Var	168.3029		

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	1	67014	343852	0.19	0.8494
PTU (EUR) Hedged	1	11223	19150	0.59	0.5708

The R^2 value (0.0332) indicates how much of the total variation in the dependent variable, PTU premiums, can be explained by the independent variable, PTU volumes. In this case, 3.3% can be explained, which is very low.

The table above specifies that the regression model does not predict the dependent variable significantly well. Looking at the P -value = 0.5708, which is greater than 0.05, indicates that, overall, the regression model does not statistically significantly predict the outcome variable. Therefore, there is insufficient evidence to reject the null hypothesis.

4.5.2 Renewals

Linear Regression Results

The REG Procedure
Model: Linear_Regression_Model
Dependent Variable: Renewals Premiums (EUR) Hedged

Number of Observations Read	12
Number of Observations Used	12

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1.04E+16	1.04E+16	7.06	0.024
Error	10	1.48E+16	1.48E+15		
Corrected Total	11	2.52E+16			

Root MSE	38424622	R-Square	0.4138
Dependent Mean	33219228	Adj R-Sq	0.3552
Coeff Var	115.66982		

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	1	-51887405	33896505	-1.53	0.1568
Renewals (EUR) Hedged	1	928436	349421	2.66	0.024

The R^2 value (0.4138) indicates how much of the total variation in the dependent variable, renewals premiums, can be explained by the independent variable, renewals volumes. In this case, 41.4% can be explained, which is large enough.

The table above indicates that the regression model predicts the dependent variable significantly well. Looking at the P -value = 0.024, which is less than 0.05, indicates that, overall, the regression model statistically significantly predicts the outcome variable. Therefore, there is sufficient evidence to reject the null hypothesis, meaning Eskom's capital utilisation has not been able to sufficiently use appropriate financial tools/instruments (e.g. hedging) to improve efficiency, resulting in insignificant cost savings.

4.5.3 Cancellations

Linear Regression Results
 The REG Procedure
 Model: Linear_Regression_Model
 Dependent Variable: Cancellations Premiums (EUR) Hed Cancellations Premiums (EUR) Hedged

Number of Observations Read	12
Number of Observations Used	12

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1.59E+13	1.59E+13	12.6	0.0053
Error	10	1.26E+13	1.26E+12		
Corrected Total	11	2.86E+13			

Root MSE	1124483	R-Square	0.5575
Dependent Mean	724184	Adj R-Sq	0.5133
Coeff Var	155.27587		

Parameter Estimates						
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	Intercept	1	-353285	444424	-0.79	0.4451
Cancellations (EUR) Hedged		1	190142	53567	3.55	0.0053

The R^2 value (0.5575) indicates how much of the total variation in the dependent variable, cancellations premiums, can be explained by the independent variable, cancellations volumes. In this case, 55.8% can be explained, which is large enough.

The table above indicates that the regression model predicts the dependent variable significantly well. Looking at the P -value = 0.0053, which is less than 0.05, indicates that, overall, the regression model statistically significantly predicts the outcome variable, therefore, there is sufficient evidence to reject the null hypothesis, meaning that Eskom's capital utilisation has not been able to sufficiently use appropriate financial tools/instruments (e.g. hedging) to improve efficiency, resulting in insignificant cost savings.

4.6 Impact of timing on operational strategies

For consistency and analysis of movement of the range only a sample was taken for the below stats, not the entire population.

Based on Eskom forex policies, notification for these three transactions should happen 5 days or more to maturity, hence this section is to determine if there are any deals that happens within 5 days and the cost implication of those transactions. This section also analyses short term covers where the cover is taken for a short period for PTU, renewals and cancellations

using deal date vs maturity date with specific attention to the volumes of short term covers that are within 5 days.

Table 4.6.1 Pre-take up (PTU) more than 5 days

Mont	Bucketing	Volumes (Bu)	TotalMaturityValu
Oct-14	More than 5 day	1	8 370 109
Nov-14	More than 5 day	3	47 080 858
Dec-14	More than 5 day	5	159 629 570
Jan-15	More than 5 day	8	278 659 976
Feb-15	More than 5 day	4	95 584 307
Mar-15	More than 5 day	6	190 169 940
Apr-15	More than 5 day	8	216 478 401
May-15	More than 5 day	4	40 817 467
Jun-15	More than 5 day	11	91 184 974
Jul-15	More than 5 day	9	65 759 021
Aug-15	More than 5 day	7	188 666 130
Sep-15	More than 5 day	3	121 030 226

Table 4.6.2 Pre-take up (PTU) less than 5 days

Mont	Bucketing	Volumes (Bu)	TotalMaturityValu
Oct-14	Less than 5 days	3	141 620 566
Nov-14	Less than 5 days		-
Dec-14	Less than 5 days	6	219 021 007
Jan-15	Less than 5 days	4	194 109 409
Feb-15	Less than 5 days	2	32 445 949
Mar-15	Less than 5 days	5	238 765 457
Apr-15	Less than 5 days		-
May-15	Less than 5 days	3	224 241 255
Jun-15	Less than 5 days	3	106 884 283
Jul-15	Less than 5 days	9	292 558 454
Aug-15	Less than 5 days	2	126 660 722
Sep-15	Less than 5 days	4	179 948 790

Table 4.6.3 Renewal more than 5 days

Mont	Bucketing	TotalVolume	TotalMaturityValu
Oct-14	More than 5 day	31	307 583 724
Nov-14	More than 5 day	26	1 169 022 467
Dec-14	More than 5 day	28	1 194 150 144
Jan-15	More than 5 day	15	719 549 412
Feb-15	More than 5 day	33	1 501 159 635
Mar-15	More than 5 day	26	1 067 055 656
Apr-15	More than 5 day	32	1 559 640 729
May-15	More than 5 day	33	1 332 957 356
Jun-15	More than 5 day	22	814 947 187
Jul-15	More than 5 day	16	516 976 520
Aug-15	More than 5 day	29	1 336 983 710
Sep-15	More than 5 day	12	533 731 268

Table 4.6.4 Renewal less than 5 days

	Mont	Bucketing	TotalVolume	TotalMaturityValu
1	Oct-14	Less than 5 days	7	(2 629 567 717)
2	Nov-14	Less than 5 days	26	(1 527 410 655)
3	Dec-14	Less than 5 days	26	(1 189 346 120)
4	Jan-15	Less than 5 days	14	(717 074 335)
5	Feb-15	Less than 5 days	40	(1 886 821 491)
6	Mar-15	Less than 5 days	24	(936 438 148)
7	Apr-15	Less than 5 days	24	(1 048 502 105)
8	May-15	Less than 5 days	5	(854 317 669)
9	Jun-15	Less than 5 days	25	(989 352 317)
10	Jul-15	Less than 5 days	18	(695 964 182)
11	Aug-15	Less than 5 days	30	(1 287 663 902)
12	Sep-15	Less than 5 days	11	(477 091 588)

Table 4.6.5 Cancellations more than 5 days

Mont	Bucketing	Volumes (Bu	TotalMaturityValu
Oct-14	More than 5 day	-	-
Nov-14	More than 5 day	6	139 327 770
Dec-14	More than 5 day	1	19 576 187
Jan-15	More than 5 day	1	25 879 986
Feb-15	More than 5 day	4	104 377 771
Mar-15	More than 5 day	3	181 260 800
Apr-15	More than 5 day	1	33 818 167
May-15	More than 5 day	1	11 660 194
Jun-15	More than 5 day	10	44 734 675
Jul-15	More than 5 day	3	110 425 792
Aug-15	More than 5 day	7	131 037 627
Sep-15	More than 5 day	5	52 288 790

Table 4.6.6 Cancellation less than 5 days

Mont	Bucketing	Volumes (Bu)	TotalMaturityVal
Oct-14	Less than 5 days	-	-
Nov-14	Less than 5 days		(171 599 793)
Dec-14	Less than 5 days	1	47 428 647
Jan-15	Less than 5 days		-
Feb-15	Less than 5 days		-
Mar-15	Less than 5 days		(256 355 309)
Apr-15	Less than 5 days		-
May-15	Less than 5 days		-
Jun-15	Less than 5 days		(41 817 389)
Jul-15	Less than 5 days		-
Aug-15	Less than 5 days		(177 272 251)
Sep-15	Less than 5 days		-

4.7 Discussion of Findings from the stats results

4.7.1 Introduction

The descriptive stats demonstrate that there is room for improvement because there are accumulated losses for Kusile on the chosen period between October 2014 and September 2015. It must however be noted that only Euro deals are sampled in this study of Kusile. Eskom showed accumulated gains by end of that financial year.

4.7.2. Interpretation of main findings

The study also addresses exchange rate exposure in terms of transaction risk from the importer's perspective and analyses risk or cost reduction strategies of Eskom through embedding the operational strategies to financial hedging for the capital projects

The duration of payables from import contracts is longer as the delivery is committed for a long time in advance i.e. between contract and payment referred to as transaction risk.

4.7.2.1 Pre-take up (PTU)

Pre-take up transaction happens where the payment to a supplier is done on an earlier date than the maturity of the FEC. One of the reasons for such transaction can be due to acceleration of the project deliverables. When the buy FEC is entered into and there is premium that is incurred for the currency that will be received at maturity.

From the findings in table for scatter plot in table 4.3.1 and table 4.4.1 for correlation, there is weak relationship between the variables i.e. volumes and premiums, meaning growth or reductions in PTU volumes do not significantly relate to growth or reductions in PTU Premiums. However, because the supplier is paid earlier than maturity date, to source the funds, Treasury would have to buy currency at the spot rate or take a short term cover to pay the supplier, which exposes the company to exchange rate volatility (and this volatility might or might not favor the company). To determine how much of the total variation in the dependent variable is explained by the independent variable, meaning how volumes impact the premium, we ran the regression analysis in table 4.5.1 which came to the same conclusion as correlation indicated in table 4.4.1.

Impact of timing as an operational strategy is huge. The findings in the ranges in table 4.6.2 demonstrate that there are still PTU transactions that happen within 5 days of maturity. Ideally PTUs should not happen within 5 days to maturity date as it would make better economic sense to just wait for maturity. If it happens more than 5 days before maturity, the benefit is that Treasury would be able to take a sell FEC in time, for the same quantity of foreign currency as the supplier payment as well as the same foreign currency and maturity date as the original buy FEC so as to offset the original buy FEC at maturity. The reason for this would be to reduce the impact on costs as currency will no longer be required since the supplier would have been paid, resulting in a swap cash flow being realised because the buy FEC and the sell FEC have different rates.

The PTU is triggered by invoice received from the supplier, therefore, the Project Manager (PM) will know 30 days in advance that a PTU will be necessary, allowing them enough time to communicate the changes or maturity date mismatch to Treasury. Therefore, in a well-managed environment, the PMs have sufficient time to notify treasury to avoid PTUs happening within 5 days of maturity.

4.7.2.2 Renewals results

There are two kinds of transactions that can result in a renewal of the FEC when implementing projects. The renewal transaction happens when Eskom enters into long term

contract over 12 months but can only use FEC as per company policy. As a result, renewal is bound to happen as most projects take longer than 12 months, especially for mega projects like Kusile. In the case of long term contracts, the cost is hedged and accounted for. Renewals also happen with short term contracts that are within the 12 months, such renewals are as a result of mismatch referred to above as delivery basis owing to changes in delivery date.

Table 7 shows that there is a high volume of renewals, also noting that the numbers include long contracts which are over 12 months. For the contracts that are not longer than 12 months, if one contract is renewed or modified 3 times due to changes in delivery dates, the premium follows the same pattern because each time the renewal is done, premiums are incurred. This is consistent with the findings which indicated a strong positive correlation in table 4.2.2 between volume and premiums. Therefore, it is imperative for delivery schedules to be monitored closely and suppliers to notify of delivery changes in advance and in writing. To determine how much of the total variation in the dependent variable is explained by the independent variable, meaning how volumes of renewals impact the premium of renewals, we ran the regression analysis in table 4.5.2 which came to the same conclusion as indicated in table 4.4.2.

The impact of timing in these types of mismatch in delivery can be managed better when changes are communicated in time. Eskom's policy states that submission for a renewal to Treasury should happen 5 days or more prior maturity date, which will result in renewals happening within of maturity. The best practice is to notify and submit to Treasury as soon as the PM is aware that a renewal transaction is needed in order to enable Treasury to apply the relevant strategy like taking an opposite sell FEC in time to offset original buy FEC as funds will no longer be required at maturity. The renewals that are done earlier or more than 5 days before maturity will, as a result, yield more benefit than when it is done within the 5 days of maturity. The reason being that, if the notification to treasury is done within 5 days it will result in cancellation of the cover (cancellation without instruction) instead of renewal. The cost impact will be the premium paid in vain on cancelled FEC and the new cover that must be taken as a result the rate may be higher.

The findings on table 4.6.4 indicate the volumes of covers rolled over for 5 days or less. This raises a question of balance of scales as there's a premium that is paid to roll that cover even

if it is for 5 days or less. It is better to pay at maturity even if the payment terms are 5 days after maturity in order to save on paying a premium to roll a cover. In the interest of cost savings, no cover should be rolled or renewed for 5 day after maturity because there is no benefit in renewing a cover at a cost for 5 days only.

4.7.2.3 Cancellation results

Cancellations happen when the currency expected at maturity of FEC is no longer needed. The reduction in volumes of cancellations will reduce wasted premium since the buy FEC premium was paid in vain if full before cancellation happens. The findings shown on the table for scatter plot in table 4.3.3 and table 4.4.3 for correlation, there is strong relationship between the volumes and premiums, meaning the rise or the decline in cancellations volumes significantly relate to increases or decreases in cancellation premiums.

When a cancellation happens, the opposite sell FEC is taken as a hedging strategy to offset the original buy FEC at maturity. The premium for sell FEC is not always off-setting the premium of original buy FEC in full but rather, reduce the cost impact depending on the current rate of the sell FEC. Hence, a reduction in the number and effective management of cancellation through operation efficiency is the best way to reduce the costs. To determine how much of the total variation in the dependent variable is explained by the independent variable meaning how volumes of cancellations impact the premium of cancellations we ran the regression analysis table 4.5.3 which came to the same conclusion as indicated in the correlation table 4.4.3.

Impact of timing where the cover was cancelled with no instruction because treasury was not notified on time (more than 5 days) to cancel, the losses arising will result in wasteful expenditure and reported in PFMA. The closer the cancellation of a cover is to maturity date, the lesser the benefit, and the opposite is true - the further away from maturity the better the benefit.

Ideally, cancellation should not happen within 5 days of maturity because there will be nothing to sell to offset the original buy to reduce the cost impact as per Zilcha and Eldor et al (1991), The volumes of this transaction as shown in table 4.6.6 indicates that it is well managed. If cancellations happen with more than 5 days to spare, Treasury is able to transact in such a way that the net impact will reduce the cost.

4.8 Operational hedging benefit

From the discussion of results above, the efficiency of financial hedging strategies seem to be largely dependent on operational efficiency. Operational hedging is a complete risk-management approach that permits flexibility in how market-facing activities are planned and improved. The operational efficiency clearly impacts the hedging results. This positive results derived from financial hedging can be further enhanced through an improvement in operational efficiency. Eskom's long-term financial success mostly depends on cultivating the proficiency of its processes. If operational strategies are embedded into financial hedging strategies, it will result in effective hedging.

Eskom should use operational hedging strategies and financial hedging simultaneously to combat the results of exchange rate movements affecting its cost structure. Typical operational efficiency strategies could involve purchasing strategies, timing etc. based on their unique business environment.

Hedging results have a potential of going either direction due to unpredictable currency volatility but the results indicate that in the case of Eskom, the bigger impact is due to poor FEC management or operational inefficiency even though overall, Eskom have shown a positive trend in net gains at the end of the financial year.

CHAPTER 5: RESEARCH CONCLUSIONS

Summary of findings, Recommendations, limitations and conclusions

5.0 Introduction

This chapter provides the summary of discussions of the results presented in chapter 4. Recommendations forthcoming from the findings that may further improve the hedging results are suggested. Limitations and implications for future research are discussed and further, conclusions are drawn from the findings.

5.1 Summary discussion on findings

The three transactions discussed namely; Pre-take up (PTU), renewals and cancellations should be kept at minimal as they cannot entirely be avoided and can negatively affect financial hedging effectiveness. They must be effectively managed through embedding operational hedging. The results specify that there's a weak, positive and non-statistical correlation between PTU premiums and PTU volumes. The weak, positive correlation based on scatter plot, correlation and regression numbers indicates that increases or decreases in PTU volumes do not significantly relate to growth or reductions in PTU Premiums. However, there shouldn't be PTU within the 5 days.

There is, however, a strong, positive and statistical correlation between renewals premiums and volumes as well as cancellation premiums and volumes. The strong, positive correlation based on scatter plot, correction and regression numbers indicates that if the volumes of renewals and cancellation increase, the premium of the renewal and cancellations will also increase, therefore, if Eskom increases volumes of renewals and cancellations with less than 5 days, the cost will also increase.

If hedging is not well managed operationally, it defeats the purpose of financial hedging in terms of budget management, avoiding operating under unpredictable circumstances for planning purposes and also for reducing costs. Although financial hedging does not eliminate losses due to currency volatility, it is crucial for planning purposes, it brings about certainty and predictability for budgeting purposes. Good management of these transactions

operationally is strongly correlated to keeping within project budget as it enhances the effectiveness of financial hedging.

5.1.1 The findings vs literature review vs experience

All dealings more than R150 000 are hedged by Eskom (i.e. economic or cash flow hedges). Zucchi. K. 2010 states that derivatives are essential tools by banks in providing financing and risk management strategy resolutions to its clientele. Currency risk is identified and assessed by the business, hedged and monitored by the treasury division. Hedging tools primarily entail forward exchange contracts FEC, most of which have a maturity of less than one year from the deal date and they are renewed at maturity when deemed necessary. The group also uses cross-currency swaps. The hedging contract is entered into once the exposure is firm at acknowledgement.

When the FEC is entered into the hedging relationship between an FEC and a supplier payment, it is not always possible to be perfect (at maturity date) as intended due to the nature of project environment which always has delivery changes, which Sundaram & Das, 2010 in our literature, refers to it as delivery basis. This mismatch results in transaction mentioned like pre-take up, renewals and cancellation which may negatively affect the results of hedging if not well-managed operationally.

Our literature results agree with the finding that financial hedging and operational hedging go hand in hand to lessen the exchange rate risk. Cowan et al (2005) concluded that financial and operational hedging are complementary.

There are recommendations stemming from our findings that Forex Policies require attention to be developed further for the efficiency of hedging. Campello, Lin, Ma, and Zou (2011) also stressed the fact that the correct hedging policies can lower the odds of negative firm realisations, i.e., profits and cash flow variability.

The duration of payables from import contracts is longer, the delivery is committed for a long time in advance i.e. between contract and payment referred to as transaction risk, de Jong et al. A survey of Swedish firms Hagelin and Pramborg (2004) found that hedging can shrink both transaction risk and translation risk.

Volumes of transactions within 5 days must be dealt with by Eskom as waiting for maturity for 5 days yields more benefit instead of taking short term cover for PTU 5 days before maturity. Further, no cover should be rolled or renewed for 5 days after maturity because there is no benefit in renewing a cover at a cost for 5 days only.

The optimistic theory of corporate hedging established by Smith and Stulz (1985) is in agreement with weighing the benefits as it states that on condition that the market position where the benefits of hedging are more, it can also balance the cost and add value to the company and only under those circumstances can company hedging can be justified.

As already mentioned, Chiang (2007) argues that the utilisation of operational hedge approach cannot reduce foreign exchange exposures and is corroborated by similar results from a study by Allayannis, Ihrig, and Weston (2001). However, this study indicates that operational hedging or efficiency does reduce currency exposure risk. The difference could potentially be due to how this study defines operational hedging, which is quite different from how various definitions advanced in the literature review. Operational hedging in this study refers to operational efficiencies that enhance financial hedging.

This study indicates that financial hedging without operational efficiencies does not work as effectively as it should. This is in alignment with the Taiwanese empirical study that we referred to in our literature review, which states that:

“Shows that the use of operational hedge strategies alone does not help reducing foreign exchange exposure. The Taiwanese found that firms that use operational hedges do not lower their exchange-rate risk; however, on average, firms that are employing operational hedging strategies, are more likely to use financial hedging strategies which do reduce exchange-rate risk. While firms that rely exclusively on operational hedges for their exchange-rate risk management may not maximize shareholder value”. (Chiang, Y. 2007)

However, the results of this study is disputed by de Jong’s findings based on a sample of Dutch firms that financial hedging does not lessen exchange rate risk, while operational

hedging lessen the exchange rate risk. Whereas the outcome of this study is in-line with a survey of Swedish firms Hagelin and Pramborg (2004), which established that derivative hedging as well as hedging with foreign-currency denominated debt diminishes a firm's exchange rate exposure. Furthermore, they established that hedging can lessen both transaction risk and translation risk.

In summary, this study suggests that financial hedging effectiveness is enhanced by effective implementation of operational hedging.

5.1.2 The findings vs the objectives of the study

The research questions linked to the objectives of this study are:

- Has Eskom been efficient in the use of funds in capital projects to reduce cost by using right tools such as hedging?

Eskom has been efficient in the use of funds to reduce costs by using right tools such as financial hedging showing the accumulated gains for the year end, although the annual report shows that the gains for 2015 financial year were lower than the previous financial year. According to the Eskom Integrated Report, benefits of hedging have been realised by Eskom. The fair value gain on embedded derivatives amounted to R1.3 billion for the year ended 31 March 2015. However, this is considerably less than the gain of R2.1 billion documented in 2013/14 for different reasons. The findings and results indicate all the reasons that increased costs instead of reducing them and these are discussed in detail and are mostly based on poor management of FEC operationally. As a result, the conclusion is that Eskom has not been able to sufficiently use hedging to improve efficiency, resulting in insignificant cost savings.

- How do operational inefficiencies impact the hedging effectiveness?

This study also discusses exchange rate exposure in terms of transaction risk on importer perspective and analyses risk or cost saving strategies of Eskom through embedding the operational strategies to financial hedging for the capital projects.

There is more potential for further cost reductions or increase in net gains to capital projects by ensuring that operational hedging strategies are embedded into the financial hedging strategy. This study find forwards to be a beneficial method of hedging, but looks more

beneficial for short term contracts than long term contracts. Conventional financial hedging instruments are intended to deal with the short-term cash flow and are most of the time not enough to address large exchange rate swings.

5.1.3 Review of the hypothesis in relation to the findings

Hypothesis:

Ho null: Eskom's capital utilisation has been efficient through the use of appropriate financial tools/instruments such as hedging and has resulted in significant cost savings.

Ha: Eskom's capital utilisation has not been able to effectively use appropriate financial tools/instruments (e.g. hedging) to improve efficiency, resulting in insignificant cost savings.

The statistical tests carried out in scatter plot, correlation and regression analysis indicate that there is insufficient evidence to reject the null hypothesis for PTU. The *P-value* = 0.5708 on PTU, which is greater than 0.05, indicates at 95% confidence level regression model does not statistically significantly predict the outcome variable (volumes and premium). Therefore, there is insufficient evidence to reject the null hypothesis. However, PTU transactions can go either way.

At a *P-value* = 0.024 on renewals, which is less than 0.05 indicate that at 95% confidence level, the regression model statistically and significantly predicts the outcome variable. Therefore, there is sufficient evidence to reject the null hypothesis, implying that Eskom's capital utilisation has not been able to sufficiently use appropriate financial tools/instruments (e.g. hedging) to improve efficiency, resulting in insignificant cost savings. However the impact is due to rise in volumes of renewals even further including the single covers modified multiple times and the ones rolled over for a short period of even 5 days after maturity. The reduction of these transactions is necessary through operational management approach.

Looking at cancellations at the *P-value* = 0.0053 which is less than 0.05, this indicates that, at 95% confidence level, the regression model statistically and significantly predicts the outcome variable. There is sufficient evidence to reject the null hypothesis, meaning Eskom's capital utilisation has not been able to sufficiently use appropriate financial tools/instruments (e.g. hedging) to improve efficiency, resulting in insignificant cost savings.

5.2 Recommendations

Trend analysis results indicate that there's a lot of room for improvement on renewals. The higher number of renewals indicates that there is a mismatch between delivery date and maturity date, with a lot of transactions happening after maturity. This seems to suggest that there might be room to explore factors such as timing, delivery schedules, etc. which might be feeding into this high volume of renewals. It is recommended that the 5 day policy for renewals be amended since there is no demonstrable value being derived from this policy. If the policy threshold of submissions for renewals is 5 days before maturity, it will result in covers rolled or renewed for 5 days and less after maturity. In the interest of cost savings, ideally, no pre-take up should be made before 5 days of maturity and no cover should be rolled or renewed for 5 days after maturity because there is no benefit in renewing a cover at a cost for 5 days only.

Even though we do not expect a perfect match, Sundaram and Das (2010) explain that a mismatch happens when delivery does not happen at maturity date. However, the reality is that there are sometimes unforeseen delays of delivery or early delivery due to different reasons, resulting in mismatches. If operational hedging strategies are embedded into financial hedging strategy, it will result in effective hedging. The timing for roll overs or renewal, pre-take-up or cancellation should be managed correctly to avoid unnecessary cost to the projects.

Mitigation strategies like taking the opposite forward contract can be applied where there will be a need to roll over. It will be more effective to apply such strategies timeously than towards expiry of the cover and hence, timeous communication of any change is vital from cross functional teams. It is also important to make sure that a company's portfolio management reflects the interdisciplinary approach between strategic, operational and financial dimensions.

The timing of taking the cover should be adhered to, the cover should be taken once there's a firm commitment according to accounting principles. The processes should be in place to avoid cover being taken on placing order or on delivery of goods even on receipt of an invoice in some instances. The firm commitment is as early as when the contract is signed.

It is recommended that Eskom chase after a more universal and longer-term approach to risk management, with a specific focus on operational strategies. Similarly, Eskom should consider aligning its policy on to FEC durations in order to also use hedging instruments like futures that better accommodate projects that have duration of longer than 12 months. This consideration should not ignore the stated major disadvantages of the future contracts in the literature and balance of scales should apply.

Companies should approach operational hedging analytically by firstly defining the cost drivers that are hugely affected by the volatility, considering difference circumstances for currency risk effect; conduct an analysis of the impact on the these drivers in order to describe the overall impact to the company; and last but not least, by implementing operational hedging as basis of risk-management strategy Financial Post (2012).

5.3 Limitations

Renewals for longer term contracts that are longer than 12 months are expected and can be managed since it is known on time and are hedged and accounted for. For renewals that are due to delivery basis and that are short term (not longer than 12 months), Treasury relies on cross functional areas to notify them timeously if the contract is going to be renewed or modified to a later date than the maturity date. The data provided includes both long term and short term. It would be more efficient to analyse the volume of the short term contracts within the 12 months of the FEC separately.

Data capturing is not automated or rather, the Treasury system still requires a huge amount of manual work to be done in gathering information for reporting purposes. It doesn't allow one to analyse data in a way that will clearly outline or quantify existing operational efficiencies, thus allowing comparison of the ranges when the cancellation or pre-take up happens before maturity.

The system lumps the costs for payments together, making it difficult to separate the cost of swap cash flows from actual supplier payments for analysis of swap cash flows. It would be beneficial for this study to be able to quantify the swap cash flows by transaction for analysis.

5.4 Conclusions

The benefit of hedging is more when the transaction is happening at maturity than at pre-take up or after maturity (rolled over/renewed) or cancelled. Ideally, more volumes at maturity are better than at pre-take up or after. The results show that there is more value when

transactions are happening at maturity than at pre-take up. The reduction of the PTU, renewal and cancellation transactions will reduce the risk of exposing the company to currency fluctuations. These can be reduced by ensuring operational hedging is embedded to financial hedging.

Based on this research, the following conclusions can be drawn:

- Operational hedging enhances financial hedging as it affects the outcome and effectiveness of financial hedging.
- To efficiently manage the extensive risks, companies should employ operational hedging.
- The research indicates that enhanced monitoring of forex processes against operational processes is needed.
- Transaction done closer to maturity date is not cost effective whether it is a pre-take up, renewal or cancellation.
- Financial hedging strategies are complementary to operational hedging strategies. There is more value to financial hedging strategies when used together with operational hedging strategies.
- Both strategies used together contribute towards achieving the same goal of reducing costs on capital projects and increasing shareholders value.

5.5 Future research.

As much as financial hedging strategies are used by Eskom to protect themselves against rand depreciation against the foreign currency, operational strategies must also be applied. Operational hedging strategies include cost drivers of pre-take up, renewal or cancellation of a buy FEC.

There is not much information provided on the operational hedging strategies with respect to the internal attention of experiences. This leaves room for further exploration of the subject in the form of a future research which can also enhance this research.

REFERENCES

AfDB (2010c). *Infrastructure Deficit and Opportunities in Africa*. Economic Brief, Volume 1, Issue September, 2010. Tunis, Tunisia: African Development Bank.

Africa Infrastructure Country Diagnostic (AICD) (2009). *Africa's Infrastructure: A Time for transformation*. Ed. V. Foster and C. Briceño-Garmendia. Agence Française de Développement and World Bank.

Aschauer, D.A. (1989), "Is public expenditure productive?" *Journal of Monetary Economics*, Vol. 23, No. 2, March, pp.177-200

Bligh, C.2012. *Foreign Currency Hedging*. Financial management. CIMA publishing (Bligh, 2012)

Boyabatli, O. and Toktay, L.B. 2004. *Operational Hedging: A Review with Discussion*. Singapore Management University, oboyabatli@smu.edu.sg. (Boyabatli and Toktay, 2004)

Campello, M., Lin, C., Ma, Y., & Zou, H. (2011). The real and financial implications of corporate hedging. *The Journal of Finance*, 66(5), 1615-1647

Carter, D., C. Pantzalis and B. Simkins (2003): Firmwide Risk Management of Foreign Exchange Exposure by U.S. Multinational Corporations, *Oklahoma State University Working Paper*.

Chiang, Y. and Lin, H. 2007. Foreign exchange exposures, financial and operational hedge strategies of Taiwan firms. *Investment Management and Financial Innovations*, Volume 4, Issue 3 (Chiang and Lin, 2007)

Chowdhry, Bhagwan, and Jonathan T.B. Howe, 1999. "Corporate risk management for multinational corporations: Financial and operational hedging policies." *European Finance Review* 2, 229-246. (Chowdhry *et al*, 1999)

Cowan, K., E. Hansen and L. Herrera (2005): Currency Mismatches, Balance Sheet Effects and Hedging in Chilean Non-Financial Corporations, *Inter-American Development Bank Research Department Working Paper # 521*.

Diamantopoulos, A. & Schlegelmilch, B.B. 2000. Taking the fear out of data analysis. A step-by-step approach. 1st edition. Hamsphire. United Kingdom: Cengage Learning.

Ding, Q., P. Kouvelis. 2001. On the interaction of production and financial hedging decisions in global markets. Technical report, Washington University in St. Louis. (Ding and Kouvelis, 2001)

De Jong, A., J. Ligterink and V. Macrae (2006): A Firm-Specific Analysis of the Exchange-Rate Exposure of Dutch Firms, in: *Journal of International Financial Management and Accounting*, 17(1), 1-28.

Franke, A., Rechtsteiner, R. (2014) available at <https://www.schaeffer-poeschel.de/download/leseproben/978-3-7910-3133-0.pdf>

Froot, K.A., Scharfstein, D.S. and Stein, J.C. (1993): "Risk Management: Coordinating Corporate Investment and Financing Policies," *Journal of Finance*, 48: 1629-1642.

Giddy, I., 1983, Foreign Exchange Options, *Journal of Futures Markets*

Gleason, K.C. Kim, Y.S & Mathur, I. 2005. The Operational and Financial Hedging Strategies of U.S. High Technology Firms. Department of Finance Florida Atlantic University (Gleason *et al*, 2005)

Graham, J.R., and C.W. Smith, 1999, Tax Incentives to Hedge, *Journal of Finance*, v54, 2242-2262.

Heintz, J., Pollin, R. , and Garrett-Peltier, H. (2009), *How infrastructure investments support the US economy: employment, productivity and growth*, Political Economy Research Institute. January, Available at:

http://www.americanmanufacturing.org/wordpress/wp-content/uploads/2009/01/peri_aam_finaljan16_new.pdf. Accessed on March 25, 2010.

Hull, J. 2002. Options, Futures, and Other Derivatives, 5th Edition. Prentice Hall. p. 744.

- Hull, J. 2012. *Options, Futures, and Other Derivatives*. London: Pearson.
- International Energy Agency (2010). *World Energy Outlook*. Paris, France: International Energy Agency
- Jesswein, K., Kwok, C. C. Y. and Folks, W. R. Jr., 1995, "What New Currency Products are Companies Using and Why?," *Journal of Applied Corporate Finance*, v8, 103-114.
- KEALEY, D. J. & PROTHEROE, D. R. 1996. The effectiveness of cross-cultural training for expatriates: an assessment of the literature on the issue. *International Journal of Intercultural Relations*, 20(2): 141-165.
- Lewent, J. and J. Kearney, 1990,"Identifying, Measuring and Hedging Currency Risk at Merck," *Journal of Applied Corporate Finance*, v2, 19-28
- Mello, A. S., & Parsons, J. E. (2000). Hedging and liquidity. *Review of Financial Studies*, 13(1), 127- 153.
- Pantzalis, C., B. Simkins, P. Laux. 2001. Operational hedges and the foreign exchange exposure of US multinational corporations. *Journal of International Business Studies*, 32 (4), 793-812. (Pantzalis et al, 2001)
- Perkins, P., Fedderke, J. and Luiz, J. (2005), "An Analysis of Economic Infrastructure Investment in South Africa", *South African Journal of Economics*, Vol. 73 No. 2, June , pp. 211-228.
- Smith, C.W., and R. M. Stulz, 1985, "The Determinants of Firms' Hedging Policies", *Journal of Financial and Quantitative Analysis*, 20, 4, 391-405
- Statistics South Africa. 2012. *P0441, Gross Domestic Product, Third Quarter*. Accessed from <http://www.statssa.gov.za/publications/P0441/P04413rdQuarter2012.pdf>
- Sundaram, R. K., & Das, S. R. (2010). *Derivatives: principles and practice*. Singapore: McGraw-Hill Higher Education
- SARB. 2013. Quarterly Bulletin, March 2013. Pretoria: South African Reserve Bank.

Van Mieghem, J. A. 2003. Capacity management, investment, and hedging: Review and recent developments. *Manufacturing & Service Operations Management*, 5 (4), 269-302. (Van Miegham, 2003)

WELMAN, C., KRUGER, F. & MITCHELL, B. 2005. *Research methodology*. 3rd ed. South Africa: Oxford University Press.

WFE. 2013. WFE/IOMA Derivatives Market Survey 2012. World Federation of Exchanges.

http://www.treasury.gov.za/comm_media/speeches/2014/2014081101

<http://www.treasury.gov.za/documents/national%20budget/2014/review/FullReview.pdf>

<http://www.eskom.co.za/IR2015/Documents/EskomAFS2015.pdf>

Wolf, A. (1995): "Import and Hedging Uncertainty in International Trade," *Journal of Futures Markets*, 15: 101-110.

Zilcha, I. and Eldor, R. (1991): "Exporting Firm and Forward Markets: The Multiperiod Case," *Journal of International Money and Finance*, 10: 108-117.



