CHAPTER 7

SUMMARY, CONCLUSION AND SUGGESTIONS

Electricity infrastructure has been prioritized worldwide both in developed and developing economies. This is because of its important role in boosting growth and development. A major portion of the public expenditure in the national budgets in most of the developing countries is spent to creating sustainable supply of electricity at affordable prices without compromising with quality and efficiency.

Initially, Kenya electricity supply industry was structured as an integrated monopoly under the public ownership. All major functions of generation, transmission and transmission were discharged by a single utility. Due to a number of challenges such as; poor financial performance, lack of investment, high T&D Losses, increasing tariffs and high operating expenditure there was a need for restructuring the industry.

Restructuring started in 1997 and two companies were established, Kenya Power and Lighting Company (KPLC) in charge of transmission, distribution and retail supply while Kenya Electricity Generating Company (Ken Gen) took charge of generation. Electricity Act No. 11, 1997 was enacted and the Electricity Regulatory Board was established in 1998. The Electricity Regulatory Board was assigned the responsibility of regulation and Tariff setting. The Ministry of energy remained with the business of policy formulation.

Kenya Electricity Regulatory Board was disbanded later on after it was realized that it failed to fix the challenges the sector was facing due to the conflicting legal loopholes with the 1987 Corporation Act. Energy Act No.12, 2006 was enacted which established Energy Regulatory Commission 2007 which combined the petroleum sub-sector and electricity sub-sector and it was assigned the responsibility of regulating the functions of IPPs as well as tariff regulation.

The current status of the sector shows that investments have increased, IPPs are participating in development of the sector, installed capacity has improved, the financial status of the sector has improved, number of connections has increased from
43,000 in 2003/2004 to 453,544 in 2013/14 and T&D Losses have declined from 21 percent in 2000 to 17.3 percent in 2013. A total of 932 institutions are installed with solar PV Systems, a number of projects are in progress. Despite all these improvements, there are still challenges for the industry.

**Significance of the Study**

The study provides a detailed analysis of the economic impact of reforms on electricity supply industry in Kenya. The study has indicated the critical changes in electricity supply industry in Kenya and it has tried to relate the changes with economic reforms and policy decisions taken by the government. It has also attempted to identify the institutional and other constraints which need to be removed to accelerate development process in the country.

**Objectives**

The overall objective of the study was to help and improve the understanding of the economic impact of reforms on electricity supply industry in Kenya using specific objectives, specifically: (1) to examine technical performance in the operation of Kenya power sector before and after reforms process, (2) to evaluate the financial performance of Kenya power sector during the period 1990-2010, (3) to examine the impact of reforms on rural electrification, (4) to examine the role of the independent regulator in ensuring good governance in terms of transparency, accountability and performance, (5) to assess the impact of reforms on the quality of services available to consumers, and (6) to study the tariff policy followed by Kenya Energy Regulatory Commission (KERC) in relation to sound principles of public utility pricing.

**Methodology and Data Base**

This study attempted to investigate long-term (20 years) growth trend data. The long term trends capture the changes better than short intervals of time because of the poor quality of available statistical material, where specific annual totals and rates in increases and declines do not have much significance. While examining and establishing trends in various indicators of power sector in Kenya, twenty years constitute a convenient stretch of time for identifying a pattern, progress and the impact of reforms on the sector.
The study utilized secondary data for the analysis. The data was obtained from officially published Annual Reports of Kenya Power and Lighting Company (KPLC), Kenya Regulatory Commission (KERC), Ministry of Energy Reports and National Energy Policy Documents, Tariff Orders Published by (KERC), National Household Surveys, AFREPREN Energy Data Base, National Development Plans, and World Development Indicators by the World Bank, KIPPRA Publications, and Annual Economic Surveys.

**Period of Analysis**

Time-series data on the relevant variables were obtained for the 20 year period. The entire period was divided into two sub-periods i.e. first period (1992-93 to 2002-03) was taken as pre-reform period and second period (2002-03 to 2011-12) was taken as post-reform period. Some information of the period 2012-13 and 2013-14 has been included in this study.

**Analytical Techniques**

In this study we used ‘change-point analysis’ technique to assess the critical and multiple change-points in trends of various standard technical parameters used to measure technical performance and financial performance of electricity supply industry in Kenya. The technique has been explained in chapter 1.

**Limitations of the Study**

Binding constraint was the non-availability of reliable performance data of electricity generation as well as distribution companies. The study utilized information from the Annual Reports of Kenya Power and Lighting Company and other government documents. Due to the focus on Economic Impact of Reforms on Electricity Supply Industry in Kenya, the study was restricted only to the operational and financial performance of the power sector reforms. The study did not analyze the pure technical and engineering aspect of the power sector which is also very essential. There was serious problem of data availability to bridge the gaps especially the rural electrification because no separate information is published by Kenya Power and Lighting Company. Because of these reasons the current study relied on whatever data was available to undertake the present study.
Chapterization

The whole study is divided into seven chapters. Chapter 1 is the introduction. Chapter 2 is the review of literature. The review of literature has been divided into three sections:

I. Review of Economic Theories

Electricity supply industry was traditionally left to the governments due to its being a natural monopoly. Capital-intensive nature of the sector required governments to invest substantial financial resources in the sector. The sector may not be opened to the market competition as it will invite private investors who may end up exploiting the consumers as they benefit themselves through creating imperfections in the market.

Neo-classical theory suggests that competitive market economy ensures efficient allocation of resources. Electricity supply industry is monopolistic in character. To leave it completely to market will be exploitative. Therefore, either it should be provided by the government or private companies should be regulated by an independent regulator.

The government regulation of the monopoly’s price, quality of services is what many countries prefer to public regulation. In the United States regulation is standard practice for privately owned and publically owned utilities which provide goods and services usually thought to be natural monopolies?

Tariffs/ Price Regulation

M. Lieberman & E. Hall, (2010) argued that electricity tariffs should be determined either where MC< LRATC or where LRATC= AR. But because of firms experiencing losses in the long term, with marginal cost pricing, many regulators around the world choose average cost pricing. The method sets prices as low as possible to serve as many customers as possible while still covering the firms’ cost per unit. The profits are set which provides owners with a fair rate of return and keep
the monopoly in business. He argues that average pricing does not quite make the market efficient. It provides little or no incentives for the natural incentives for the natural monopoly to control costs.

II. Review of Studies on the Performance of Power Sector

Many studies globally argued that restructuring electricity sector has greatly influenced market competition. There are many private and public utilities competing to provide services to the people. The competition has led to better quality of services, enhanced transparency which has led to the decline in the cost of power generation hence reduction in prices to consumers.

INSEAD (2006) argued that, the unbundling of generation, wholesale and retail parts of energy business with access to electricity transmission grids and transmission prices has an important effect on renewable energy development. They cited the example of access to the transmission grid as the result of unbundling. This was instrumental in accelerating wind power development in India.

The World Bank (1993) argued that a single national utility operated as monopoly was supportive to electricity systems development and the rights of the people to low electricity prices. It was thought that this structure would facilitate expansion of power supplies. Capture economies of scale, and ensure effective use of scarce managerial and technical skills. Most countries made this as the foundation for the vertically integrated state monopolies.

III: Global Experience on Power Sector Reforms

Government of India (2008) has argument that T&D Losses is the primary issue hampering the Indian power sector. The reforms initiatives should take the sector to a new paradigm. It was found out that, apart from fuel and other deterministic cost elements, utilities account for various expansion planning, production costing, operation and maintenance schedule of generating units.

Further, Kulkarni & Bhattacharyya (2009) based their argument on neo-classical model of development that emphasizes liberalization, privatization, reforms and free international trade as its key elements, they found out that power sector in
India was one of the Key infrastructural areas where neoclassical model of economic development has been experiment and the results were promising.

Pollit (2009) argued that the reforms in the European Union applied the theory of competitive markets in the context of an industry that has a number of vertically related stages of production, some of which have natural monopolies. He found out that the 2003 directive specially had set a number of key objectives which were to be achieved by July 2007 in each member states in the European Union.

UNECA & UNEP (2007) examined the sustainability of power sector in Africa through the examining of socio-economic and environmental impacts of power sector reforms. They found out that power sector reforms were not explicitly designed to ensure sustainability of the sector and socio-economic impacts of reforms on the poor appeared to be negative or neutral. This was because the electrification of the poor was not significantly addressed in the reform process and was in several cases almost an afterthought with the exceptions of Cote d’ Ivoire, Cameroon, and Malawi. They also argued that reforms have led the establishment of the rural electrification funds and boards though these developments have failed to increase rural electrification significantly or reduce cost of electricity. The subsidies to the poor were still a concern with many governments.

IV: Studies Based on Kenyan Experience

There was an argument from Abdullah & Markandya (2007) that the government needs to reform the energy sector subsidies, increase market ownership and performance of the private suppliers, establish financial schemes and create markets that vary according to social-economic and demographic groups. They used estimates obtained from a stated preference study, namely a contingent valuation method completed in 2007 to investigate one major impending issue in the rural electrification programme in rural Kenya that is high connection payments. Bonuke M. John, (2008) used Compound Growth Rate OLS method to analyze the economic aspect of the electricity supply in Kenya. He found out that no much impact had been caused by the reforms on the technical and financial performance of the sector.

Many of the studies based on Kenyan experience have a divergence of views. Some suggest that reforms have realized important results while others dispute that
reforms were meant to benefit the IPPs at the expense of the poor. This is because there is lack of any significant electricity grid outside the main urban centers and the establishment of the autonomous Energy Regulatory Commission has failed to deal with the existing problems in the sector. All these studies have used basic trend line plots, control charts, and descriptive tables with annual changes to determine the trends in growth. None of the studies have used sophisticated tools and techniques which have properties to estimate and determine critical change-points and multiple changes and affirm its statistical significance. Hence, our study fills the missing gap.

Chapter 3: Electricity Supply Industry in Kenya

We examined the profile of electricity supply industry in Kenya. The chapter was divided into two parts: Part I an over-view of electricity supply industry, Part II, need for reforms and regulation process. Kenya electricity supply industry falls under the Ministry of Energy. There are two sectors under the ministry, petroleum sub-sector, and electricity sub-sector. The government owns two companies under electricity sub-sector, Kenya Power and Lighting Company (KPLC) responsible for transmission, distribution and retail supply of electricity, and Kenya Electricity Generating Company (KenGen) which is responsible for electricity generating activities. Kenya Electricity Generating Company (KenGen) a government utility dominates with 74 % of electricity generated in Kenya while the rest comes from IPPs and Imports.

Hydro power plants dominate in generation capacity with 52 % followed by thermal plants 26 %, geothermal 21 %, wind and co-generation 1 %. There is a total transmission and distribution network of 49,818 km length in Kenya. More concentration is given to building of 11km/Kv and 33km/Kv to connect more customers to the grid, more especially the rural consumers. Per capita Consumption of electricity is also low at only 157 units which is far much low as compared to the world average of 2429 units. Consumption of electricity is more from commercial and industrial, followed by domestic consumers. The number of customers connected to the national grid has increased from 329,081 customers in 1992-93 to 2,330,962 customers in 2012-13. But still the urban connections dominate the rural. Nairobi region has a large share of number of customers connected to the grid, (47 %). This tells more about the regional imbalance in terms of electricity infrastructure in Kenya.
Part II of chapter 3: Why Reforms and Regulatory Process

Kenya electricity supply industry needed reforms to attract foreign investments and IPPs as it was facing financial problems, increase of T&D Losses, and high operating expenditure. A milestone of reforms have been made, that is the Electricity Act No.11, 1997 which helped in establishing Electricity Regulatory Board 1998 which later was disbanded because of its failure to achieve its objectives. The Energy Act No. 12, 2006 was enacted and later on Energy Regulatory Commission 2007 and the state Corporation Act 1987 was amended in 2009. There is an autonomous Energy Regulatory Commission as by the Energy Act No.12, 2006 whose chairperson is appointed by the President for a four year period, renewable only once. Though, there were legal loopholes based on State Corporations Act 1987 (amended in 2009), Clause 7(3) where President interferes with the termination of the commission. The Energy Tribunal has been put in place to hold the regulator responsible; furthermore the dispute resolution officials seem less informed on what to do since some cases related to tariffs have to be refereed back to the ERC which has expert knowledge on the same. The commission may review tariffs after a period of 3 years. The commission has adopted Rate of Return approach to regulate tariffs.

Chapter 4: Operational Performance of Kenya Electricity Supply Industry

The findings foster that the long-term operational performance of electricity supply industry in Kenya in terms of the seven indicators brings out a few major changes. The major critical changes were caused by change in socio-economic climatic conditions and structural policy reforms. Electricity supply industry was hit more during droughts of 1999-2001 as there was a decline in the generation of electricity, especially from the hydro- based sources. The PLF declined sharply only once over the study period. T&D Losses have remained high still.

However, the critical change-points observed in post-reforms period 2003-2013 are attributed to government efforts for economic development and power sector reforms especially those that emerged from the suggestions made in Sessional Paper No.4, 2004, Energy Act No. 12, 2006 and the Rural Electrification Authority 2007. All the changes that happened post-reform period (2003-2013) indicate certain improvement in all the indicators analyzed.
Overall, we found out a positive relationship between policy reforms and government decisions on the changes in various indicators. However, climatic factors and socio-economic factors also played a great role in the changes indicated more especially the changes that happened between 1999 and 2003 and also 2008-2009. The main reasons were because the government was following weak macro-economic and structural policies which were forced by the World Bank. This is because many of the critical change-points happened four years later as indicated by various indicators 2000-2002 and the results reflect that no policy reforms caused the changes in these periods. However, the second phase reforms 2003-2004 yielded better results on the operational performance of the power utility.

**Chapter 5: Financial Performance and Pricing Policy.**

From this analysis we, found out that the electricity sales had an upward trend as shown in Figure 5.6, except for a decline between 1999 and 2000. All categories of customers indicated an upward trend of electricity sales in the past 20 years of study except electricity sales to off-peak customers which showed a downward trend as shown in Figure 5.3. The critical change-points in Table 5.6 indicate that, during the period when there was drought, the economy was doing poorly. During this period the sales of electricity to all categories of customers declined. When the rains improved the economy also improved and the sales increased to all categories of customers.

The trend for total revenue from sales increased upwards throughout the period of study though change in trend was indicated noticeably in between 1999 and 2001. There was a constant increase in revenue from 2001 to 2007 due to increase in number of customers. The trend for average revenue increased constantly except in between 2000-2003 and 2009-2010 when it declined. The decline in 2000-2003 was due to reduction of power and the economic status of the economy. When average revenue declined the average cost increased in the same period in between 2000-2003 and 2008-2010. Overall findings indicate that the Energy Regulatory Commission increased tariffs during the shortage period and also IPPs charged high prices to recover their cost of production. This was evident when there was drought and shortage of power.

The trend of expenditure on power sector has been constantly low, the trend increased noticeably after 2003 onwards. The increase is due to the government...
policy of Energy Sector Recovery Projects (ESRP) 2004. Loans constitute the main sources of capital formation in the Kenya Power Sector but they seemed to be consistently inadequate as from 1993 till 2005 when the trend increased upwards till 2013. This is due to the government efforts to work with development partners to ensure increase in access to electricity in Kenya through ESRP. The trend for cost recovery ratio has been increasing all the study period, except in 1995, 1999-2002 when there was a decline. Kenya pursues cross-subsidies policy across different categories of customers to compensate the losses on account of subsidized electricity supply. We can say that there was an overall growth in financial performance of Kenya sector as indicated by the growth in trend by various indicators.

Chapter 6: Rural Electrification in Kenya

Rural electrification authority was established in Kenya in 2006 by the Energy Act No.12, 2006. The Rural electrification authority has formed a master plan to have all households and public facilities electrified by 2030. The customer base has improved as the Rural Electrification Authority has taken the responsibility of the government to facilitate the Rural Electrification Projects through various schemes funded by the government out of the 5 percent levy from consumption of electricity by all customers and the donors. The government still remains the major player in undertaking the rural electrification schemes in Kenya. The government contributes 80 percent of the investment to rural electrification while 20 percent is contributed by donors. All the critical change-points happen to have taken place with the influence of either weather conditions or when important policy reforms had taken place especially in 2000, 2004, 2007 and 2009

Policy Suggestions

1. To deal with the problem of shortage of power during the dry seasons, the government needs to explore other sources of energy to move away from dependence on hydro based sources. The available solar, wind and geothermal sources must be utilized to optimum potential to deal with this problem. The rain water should be harvested and stored in the dams for use during the dry season. This means that more dams must be built to store the water.
2. The government needs to invest in the recently discovered oil in the country so that the issue of cost of electricity increasing due to fluctuations of
international crude oil prices will be dealt with as the thermal generation depends much on oil.

3. There is a need to invest more on network infrastructure so that transmission and distribution may be efficient. Also alongside with these regular inspections on network lines to replace the defective lines and transformers which are out of order. Heavy penalties to those who tamper with metering will be of great help to deter the people from being indulged in power theft.

4. Energy Regulatory Commission should be allowed to remain pure autonomous without political interference so that it makes decisions and implements them. The loopholes in the legal and regulatory framework which enables the government to interfere with the affairs of the commission should be sealed. They should be given prosecution powers too.

5. The issue of transparency and accountability should be dealt with by fixing personal responsibility of individual employees/ authorities through performance based checks. Non-Government Organizations (NGO) should be strengthened to carry out Transparency Accountability and Performance (TAP) checks on the public utilities. The sector should implement e-governance to reduce corruption and increase service delivery.

6. To deal with the problem of rural electrification, the government needs to provide subsidies to the rural consumers so that the connection fee may come down. There is need to provide cheaper solutions to each region according to the sources available in each region. For example, in regions like North Eastern of Kenya which are far from the grid, they should invest more on Solar PV Systems as the region is well spread with sunlight throughout the year. This requires the government to mobilize the domestic private investors to take part. The funds for rural electrification should not be diverted to any other use, in other words they should reach the intended end. The current county governments should be empowered through the national budget to monitor and facilitate many stalled projects.

7. The quality of data should be improved by the agency concerned. Database should be developed to keep track of all commercial and technical data regarding various parameters from both public and private utilities.
Last but not the least, we can conclude that overall this study has advanced a number of critical insights on economic impact of reforms on electricity supply industry while connecting it to the contextual policy shifts in Kenyan context. The interpretation of long-run trends changes and the vital occurrence of change-points in this study have certainly enhanced our understanding of trends on operational and financial performance indicators on power sector and its relation with impact of policy reforms. Critical change-points in operational and financial performance of electricity supply industry in Kenya are associated with socio-economic changes, structural changes in the economy and power sector policy framework. The results have not only helped in reassessing the performance of electricity supply industry in Kenya before and after reforms but also advanced a new statistical tool for assessing the trends that are necessary for robust monitoring the impact of reforms in electricity supply industry in Kenya. As someone once said, “The development of a country is seen at night,” so should ensure that our country shines at night both in the urban and the rural areas. Further studies should focus more on rural electrification and its way forward.