

A call for operational efficiencies owing to the imminent diversification of electricity supply & distribution



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Abstract: The imminent introduction of renewable energy in the energy mix in South Africa will among other things challenge the status quo w.r.t several practices in the electricity supply & distribution industries. Chief among those will be the cost of operational performance. It is no secret that in the last five years; revenues have been affected by among others reducing sales, the continuing poor culture of payment for services, the high cost of revenue collection and so forth. On the other side, the cost of the creation of assets, the maintenance and replacement costs have been on the rise. The latter have been made worse by the rise in theft cases of electricity supply & distribution assets. This paper shares some light on some of the inherent operational inefficiencies through 2 case studies involving two networks looking at the realized revenue vs investment on these over the last five years on *inter alia* operations, maintenance and component replacements or partial refurbishment.

Key words: Operational efficiencies, technical and financial performance.

1. Introduction

In his maiden address to Eskom employees, the then Interim Group Chief Executive of Eskom, Mr Phakamani Hadede made the following remark about Eskom's performance: "*Eskom's technical performance is excellent; however its financial performance is a serious concern*", he said. The two logical questions that follow such an observation are (1) is this possible and (2) what could be the cause(s) of such a situation? This paper purposes to answer these two questions by way of introducing the concept of operational efficiency. Operational efficiency is defined as the capability of an enterprise to deliver products or services to its customers in the most cost-effective manner possible while still ensuring the high quality of its products, service and support. This talks to a balancing act between technical and financial performance that will ensure satisfied customers with sustainable revenues and cash-flows. In the context of an electricity utility environment such as Eskom, it refers to an environment where both the business and the customers are fulfilling their contractual obligations i.e. the business is keeping the lights on and the customers are honouring their bills.

The other drivers for operational efficiencies in this space include *inter alia* the introduction of alternative non-grid solutions such as renewables through micro-grids (off-grid) as well as the

general drive for low-cost energy coupled with reducing revenues as a result of general energy efficiencies.

This paper looks at a five-year snapshot of both the technical and financial performance of two networks/assets. With capital expenditure supposedly recoverable over the life of the utilities' assets, capital costs were excluded in these analyses. Instead they (analyses) look at the total cost incurred on these networks vs. the estimated revenue vs. the technical performance over the period 2013 to 2017. Why this approach?

In order to successfully drive operational efficiencies in the business, a new culture will have to be cultivated with the aim to do away with the divide between the so-called technical and finance departments. The thinking that financial prudence is the accountability of the finance department and that technical performance that of the technical departments must be a thing of the past. In fact this chasm must be removed from the lowest business unit in line with Albert Einstein's who said "We cannot solve our problems with the same thinking we used when we created them.

2. The Key Concepts

In order to assist with the analyses of the case studies, this chapter provides a summarised version of how the operational efficiencies have to be looked at – it provides an abridged version of the financial and technical performance indices.

2.1 Technical performance

The National Energy Regulator of South Africa (NERSA) sets the technical performance requirements for all licensees. In Eskom the two customer-based performance indices that are used are SAIFI and SAIDI. The former stands for System Average Interruptions Index and the latter System Average Interruptions Duration Index. A SAIFI of 10 for 1000 customers implies that the thousand customers have, over the review period (usually a month) been interrupted on average 10 times. A SAIDI of 10 hours implies that the customers where on average without supplies for 10 hours. These indices must track each other and their reducing trend implies improvement. There are other performance indices that are measured, however for the purposes of this paper, these two are considered.

2.2 Financial performance

In order to determine the financial health of any firm, the accountants perform financial analyses through the use of several ratios which provide the relative performance of different financial measures that characterize the firm's financial health. These ratios are grouped into four categories of analyses:

- **Liquidity Analyses** tell a story on a firm's ability to meet its maturing financial obligations;
- **Activity Analyses** tell a story on how well the firm manages its inventory;
- **Debt Analyses** tell a story on the relative amount of funds supplied by equity and debt holders.
- **Profitability Analyses** tell a story about a firm's efficiency in generating profits;

With operational efficiency being the focus of this paper, the last category of analyses is of significance and in particular the Operating Profit Margin (OPM). Melissa Horton defines profitability as "*a measurement of efficiency – and ultimately the measurement of success or failure of a firm.*" The OPM measures the percentage of each sales remaining after all costs and expenses other than taxes and interests are deducted. It represents the pure profit earned on each sales rand. An

OPM of 10% means that for every one rand of sales, the business earned a profit of R0.10 or 10 cents in profit.

In order to determine whether a firm is doing good or bad, three ways are used to compare these ratios: either they are compared with like firms in the industry (benchmarking), a year-on-year comparison or do both.

2.3 Energy Losses

In the electricity utility space, no discussion on operational efficiency can be concluded without talking about overall energy losses. These are defined as the difference between energy purchased (from the generator) and the energy billed to customers. The acceptable international best practice for distribution losses is about 12 % - these comprise both technical and nontechnical losses. From a profitability viewpoint, this is the energy that is generated with a zero return to the business!

In summary then, an operationally efficient utility will be one that has near-zero interruptions, minimal losses and a level of OPM that will ensure sustainability or a *going-concern* status of the entity. Admittedly State Owned Enterprises that provide the basic necessities such as water, electricity, public transport, health etc., are not profit-driven, however they must (1) operate efficiently and (2) at the minimum, cover cost in order to remain in operation lest they become candidates for bail-outs year-in and year-out.

3. The Case Studies

Eskom Distribution comprises over 100 Customer Network Centres (CNC) throughout the country, which are the basic building units forming the core of the Distribution Business. These CNC's are there to operate and maintain the electricity infrastructure 24/7. Organisationally each CNC is headed by a Senior Supervisor, with 15 to 20 staff members most of whom are qualified electricians & authorised operators. The typical infrastructure comprises say 2 to 5 ¹HV/MV substations, with a handful of HV feeders as well as anything between 10 and 20 medium voltage feeders. Each of the MV feeders can have customers from 1 to 10 000.

With that background in mind, this chapter focuses on two case studies comprising two medium voltage feeders, which are supplying customers who are mainly prepaid residential as well as ² small power users. The period of the study is five years i.e. from 2013 to 2017. The following aspects are looked per year over the period:

¹ Eskom Distribution voltage levels run within 3.3kV to 132kV with 44-132kV classified as high voltage. In international terms, Eskom Distribution will be classified as Sub-Transmission.

² In Eskom categorization – a small power user is any customer whose notified maximum demand is less than 100kVA and is on a post-paid method of billing.

- a) The Estimated Revenue which is really the potential revenue less the total energy losses;
- b) less, The Cost of Operations, which is made up of the cost of materials used during planned and or unplanned maintenance however it excludes overtime worked.
- c) The technical performance – (SAIFI & SAIDI)

From the table of results, graphs of financial and technical performances over the period are drawn to determine the relationship between these two aspects per year over the period. The $\% \text{OPM}$ is used to express financial performance of the feeder.

3.1 Case Study 1: Feeder A

Feeder A is a 22kV, 22 km and comprises 4511 customers. The table below shows the analyses

	2013	2014	2015	2016	2017
ACTUAL REVENUE	R1.1 m	R1.5 m	R1.4 m	R1.7 m	R1.6 ¹ m
COST OF OPERATIONS	R12 m	R2.9 m	R0.6 m	R1.8 m	R1.49 m
OPERATING EARNINGS	-R10.9 m	-R1.4 m	R0.9 m	-R0.426 m	R0.1 43
PERCENTAGE OPM	-961%	-87%	59%	-2%	9%
SAIDI	79	60	32	28	14
SAIFI	20	10	7	7	4

Table 3.1: The financial and technical performance of Feeder A

Based on the table 3.1 above, the graph below depicts the relationship between profitability and technical performance over the period.

¹ Operating Profit Margin is given as a percentage whereas the rand value is referred to as the Operating Profit Earnings.

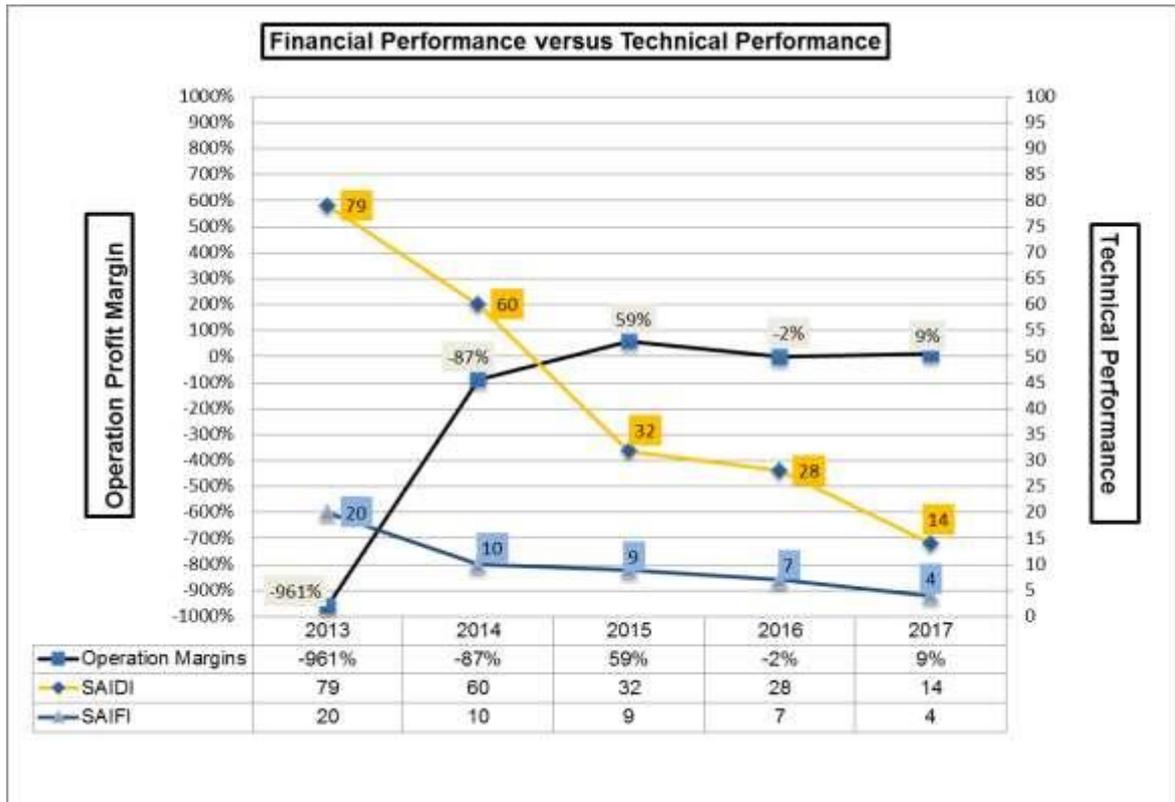


Figure 3.1: Graph depicting the financial vs technical performance for Feeder A

For Feeder A the following observations can be made:

- Over the five year period the OPM for this feeder was consistently negative - this means that the Cost of Operations was consistently higher than the revenue.
- The technical performance on the other hand was consistently improving, which may mean that the interventions were appropriate;
- In summary – over the five year window, the feeder exhibited a high-technical performance and a low-financial performance.

Suppose this feeder was The Business? What does this mean? Without getting lost in complex financial analyses, it would have been classified as a loss-making and non-sustainable business.

3.2 Case Study 2: Feeder B

Feeder B is a 22kV, 99 km and comprises 5886 customers. The table below shows the analyses:

	2013	2014	2015	2016	2017
ACTUAL REVENUE	R 2.0m	R 2.7m	R 4.0m	R 4.3m	R 5m
COST OF OPERATIONS	R 0.3m	R 1.9m	R 0.3m	R 2.4m	R 2.9m

OPERATING EARNINGS	R 1.8m	R 0.8m	R 3.7m	R 1.9m	R 2.0m
PERCENTAGE OPM	87%	29%	92%	45%	40%
SAIDI	6.20	17.7	39.9	117.9	120
SAIFI	5.5	8.67	24.3	51.5	60.5

Table 3.2: The financial and technical performance of Feeder A

Based on the table 3.2 above, the graph below depicts the relationship between profitability and technical performance over the period.

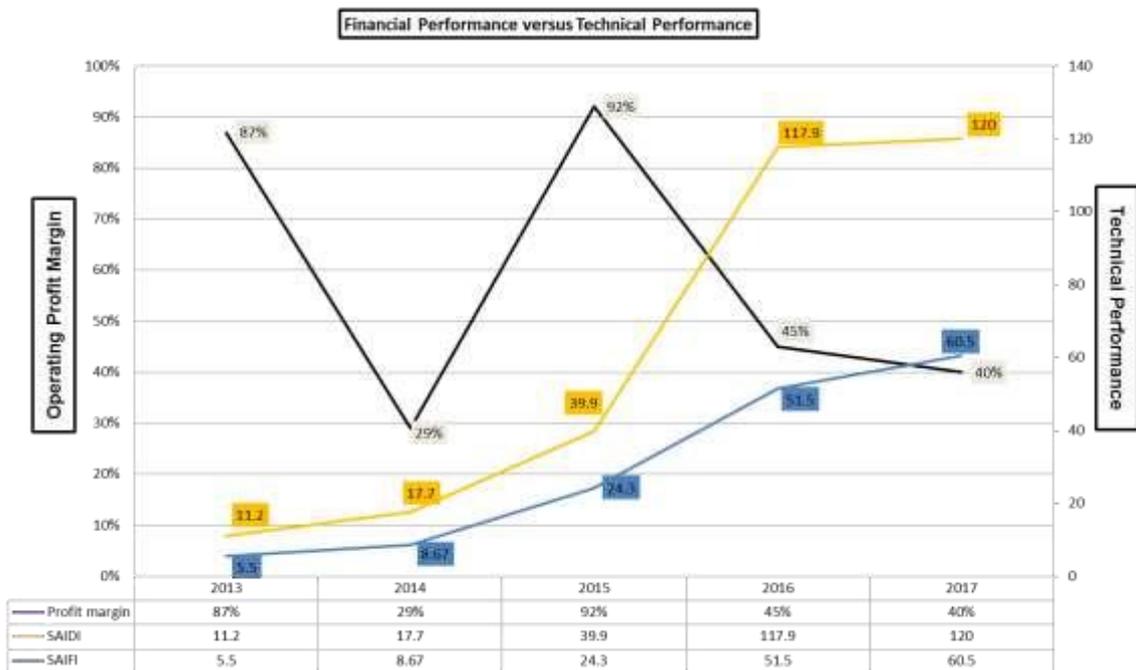


Figure 3.2: Graph depicting the financial vs technical performance for Feeder A

For Feeder B the following observations can be made:

- Over the five year window the financial performance was high during the first half and it deteriorated in the latter part of the period of study.
- The technical performance started high but deteriorated in the latter part,
- In summary then this feeder exhibited two characteristics – it started with a high-financial and high-technical performance but ended with a low-performance for both technical and financial performances.

Suppose this feeder was The Business? What does this mean? It may mean that either the investments made were misdirected, thus resulting into some form of over-capitalisation or the monies were going somewhere else...

4. Conclusions and recommendations

The two case studies that have been analysed do provide answers to the two questions that were raised: (1) Whether or not it is possible that an entity /business unit can perform well technically but produce unfavourable financial results as well as (2) the probable cause(s) of this phenomenon.

The response to the first question is indeed obvious and to the second one somewhat. The studies show that the Cost of Operations i.e. *the cost of keeping-the-asset-to-continue-to-generate-the-originally-envisaged/projected-income* has to be closely managed and monitored so as to avoid what in the real estate fraternity is known as over-capitalisation – e.g. this is similar to purchasing a Maserati to transport four kids to school instead of purchasing a Toyota Avanza.

Admittedly an electricity utility such as Eskom, Municipality etc., is a lot more complex than the simplification in this paper; however with the changing and challenging environment, a new kind of employee is required to ensure that operational efficiency is the new buzzword. The authors of this paper recommend that managing financial and technical performance must no longer be departmentalised nor be managed at high level only but it must be cascaded to the smallest basic unit of that business, the CNC in the Eskom’s case. Figure 4 below presents the proposed matrix, which must be used to plot income-generating assets e.g. feeders in a CNC.

For purposes of interpretation, a high technical performance means low SAIFI and SAIDI whereas high financial performance means a higher OPM.

Quadrant 1 – is not desirable although is it better than Quadrant 2 and 4;

Quadrant 2 – this one is bad for the customers;

Quadrant 4 – this one is bad for the business;

Quadrant 3 – is the desirable one, a win-win for both the customer and the business.

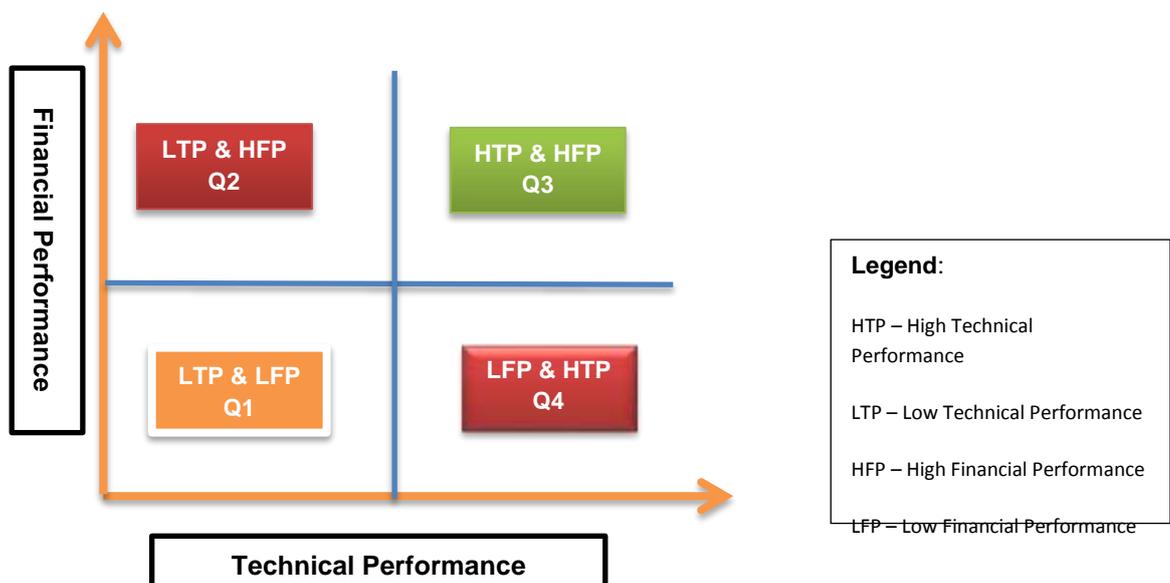


Figure 4: The Proposed Matrix

In these days of dashboards and scorecards, the aim of this matrix is that the CNC Senior Supervisor will be able to plot his or her feeders as either 1 , 2 , 3 or 4, so that he or she can know which are the life-givers and which are the “life-takers”. This must be done over and above the introduction of basic efficiencies w.r.t staff recruitment, their general attitude towards their work, general cost-effectiveness etc.

From the matrix above, it goes without saying that the ideal situation for any business will be Quadrant 3 – HTP & HFP – a scenario of high customers’ satisfaction and high revenues to the business. While Quadrants 2 (not customer-centric) and 4 (not business-friendly) must be avoided over a longer period of time, perhaps Quadrant 1 is not such a bad start for purposes of sustainability.

The authors are of the view that if status quo remains in this space, the kind of load-shedding SA has seen to date has been mild.

5. References

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6. Acknowledgements

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