



Madhya Pradesh Paschim Kshetra Vidyut Vitaran Company Limited Indore after Operational Autonomy: A Study through key Performance Indicators

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ABSTRACT: The electrification and distribution of power system in India has gained tremendous progress over the years. The State of Madhya Pradesh has made a remarkable development in this sector. The aim of the current study is to find out the performance of MP West Discom after operational autonomy on key indicators and the performance of MP West Discom after operation autonomy among the three power distribution companies of M.P. on customer satisfaction criteria. Primary and secondary data was used to quantify the results. The trend line analysis for each KPI through liner regression using SPSS 19.0 was used in this study. The results revealed that the performance of the company has improved on many KPIs for few parameters only. However, the present study has several limitations that has narrowed the scope of the study.

Keywords: Electrification, progress, KPIs, analysis, Madhya Pradesh

I. INTRODUCTION

The Indian power sector has made remarkable progress since Independence. The total installed capacity has gone up from 1,362 MW in 1947 to more than 2, 00,000 MW in 2012 and the transmission network has increased from the isolated system concentrated around urban and industrial areas to country wide National Grid. However, the demand of electricity has always been overstepping the supply [1]. The importance of electricity as a prime mover of growth is very well acknowledged and in order to boost the development of power system the Indian government has participated in a big way through creation of various corporations viz State Electricity Boards (SEB), National Thermal Power Corporation (NTPC), National Hydro-Electric Power Corporation (NHPC) and Power Grid Corporation Limited (PGCL) etc. However, even after this the country is facing power shortage in terms of energy as well as peak demand to the tune of 10.9% and 13.8% respectively [2].

Power or electricity is one of the most critical components of infrastructure affecting economic growth and well-being of nations. The existence and development of adequate infrastructure is essential for sustained growth of the Indian economy. The Indian power sector is one of the most diversified in the world. Sources for power generation range from conventional ones such as coal, lignite, natural gas, oil, hydro and nuclear power to other viable non-conventional sources such as wind, solar, and agriculture and domestic waste. The demand for electricity in the country has been growing at a rapid rate and is expected to grow further in the years to come. In order to meet the increasing requirement of electricity, massive addition to the installed generating capacity in the country is required [3].

In accordance with the MP Reform Act and pre-conditions for obtaining ADB loan, vertically integrated MPSEB was unbundled into 5 independent corporations with MPSEB as the holding company in July, 2002 exhibited as under:-

Table 1: The Power Companies formed in Madhya Pradesh in the year 2002.

Company	Jurisdiction and Purpose
Madhya Pradesh Poorv Kshetra Vidyut Vitaran Co Ltd, Jabalpur	For Power Distribution functions in the commissionerary areas of Jabalpur, Sagar and Rewa.
Madhya Pradesh Madhya Kshetra Vidyut Vitaran Co Ltd, Jabalpur	For Power Distribution functions in the commissionerary areas of Bhopal, Hoshangabad and Gwalior.
Madhya Pradesh Paschim Kshetra Vidyut Vitaran Co Ltd, Jabalpur	For Power Distribution functions in the commissionerary areas of Indore and Ujjain.
Madhya Pradesh Power Generating Co Ltd Jabalpur	For generation of electricity
Madhya Pradesh Power Transmission Co Ltd Jabalpur	For transmission of electricity in the state.

With effect from 2nd June, 2003 India has adopted a new legislation called Electricity Act 2003 to replace some age-old existing legislation of electricity operating in the country. This Act overrode the provisions of 'Madhya Pradesh Vidyut Sudhar Adhiniyam, 2000', wherever the same were inconsistent with it.

Since there was no inconsistency on unbundling issue the five power sector companies, which were created after unbundling of erstwhile MPSEB by 'Madhya Pradesh Vidyut Sudhar Adhiniyam, 2000' continued their existence. (The Electricity Act, 2003). However, even after formation of aforesaid companies, the MPSEB continued to exist and the companies were allowed to function only as an O&M agent of MPSEB till 31 May, 2005 [4]. Thus, while the companies were discharging the duties of electricity generation, transmission and distribution as separate corporate entities, all the results of operations were consolidated in the Financial Statements (i.e. Balance sheet, P&L account and Cash Flow statement) of MPSEB (Government of Madhya Pradesh, 2002). This situation changed in the year 2005, when the state government, vide Gazette Notification dated 31.5.2005 granted operational autonomy to power sector companies. Thus the results of operations were started to be captured in the Financial Statements of the companies themselves (Government of Madhya Pradesh, 2005). In a separate development, the state government created yet another power sector company, namely MP Power Trading Company Ltd Jabalpur, for effectively dealing with the matters of bulk trading in the electricity and meeting the power demands of electricity distribution companies. The purpose of dissertation is to analyze the key performance indicators of the West Discom after grant of Operational Autonomy [5].

A. The Current Power Sector Structure in The State Of Madhya Pradesh

The current structure of the Power Sector in the state is as under

1. The top most coordinating and policy making body is the state government energy department and all the six power sector companies function under the supervision and control of the state government through respective Board of Directors (Government of Madhya Pradesh, 2005).
2. The State Load Dispatch Center (SLDC) is a separate unit under the MP Power Transmission Company, which is mandated with the performance of statutory functions of grid management. (Electricity Act, 2003)
3. The MP Electricity Commission (MPERC) is a statutory body created by Electricity Act, 2003, for regulatory control of the power sector companies in the state [6]. Since the main research question of this study was to find out how did M.P. West Discom perform after operational autonomy hence further literature review was undertaken under the heads 'The Concept of Performance & its Measurement', 'Approaches of Performance Measurement', 'KPI Approach of Performance Measurement', 'KPIs for a Power Distribution Utility' and 'The Concept of Customer Satisfaction' so as to generate sound base for the conceptual framework of this study. The researcher concluded that performance of M.P. West Discom is to be studied through Key Performance Indicators applicable in its case. The objective of the present study was to find out how MP West Discom performed after operational autonomy on key performance indicators and we studied the performance of MP West Discom after operation autonomy among the three power distribution companies of M.P. on customer satisfaction criteria.

II. MATERIAL AND METHODS

A. Hypothesis

- H₀**: There is no significant difference in Aggregate Technical & Commercial Losses for three power Discoms of M. P.
- H₁**: There is no significant difference in Total Operating Expenses/ Energy Delivered for three power Discoms of M.P.
- H₂**: There is no significant difference in Customer per Distribution Employee for three power Discoms of M.P.
- H₃**: There is no significant difference in Network Delivery Losses for three power Discoms of M. P.
- H₄**: There is no significant difference in mean scores of Responsiveness for three power Discoms of M. P.
- H₅**: There is no significant difference in mean scores of Assurance for three power Discoms of M. P.
- H₆**: There is no significant difference in mean scores of Empathy for three power Discoms of M. P.
- H₇**: There is no significant difference in mean scores of Tangibility for three power Discoms of M. P.
- H₈**: There is no significant difference in mean scores of Reliability for three power Discoms of M. P.
- H₉**: There is no significant difference in mean scores of Customer Satisfaction for three power Discoms of M. P.

B. Research Methodology

The research is descriptive and explanatory regarding the variables and constructs of Key Performance indicators and Customer Satisfaction. This research explores both primary and secondary data. The secondary data covers the literature and information collected from various published sources and official records of power distribution companies of M.P. For customer satisfaction, questionnaire survey conducted in Indore, Bhopal and Jabalpur from a convenient sample of 300 respondents from each city. In order to resolve research question 1, performance of MP West Discom was studied through analysis of trend line applied on key performance indicators. In order to resolve research question 2, various hypotheses were tested through ANOVA applied on key performance indicators of the three distribution companies of MP. In order to resolve research question 3, hypotheses were tested through ANOVA applied on customer satisfaction scores of the three power distribution companies of MP.

III. DATA ANALYTICAL METHODS

A. For Objective First (To find out how MP West Discom performed after operational autonomy on key performance indicators)

For achieving first objective the performance scores of M.P. West Discom were measured for the each KPI (except those related with customer satisfaction criteria) for a maximum period of nine years namely financial years 2005-06 to 2010-11. As discussed in previously Conceptual Framework longitudinal study was required which was performed using trend line analysis for each KPI through liner regression using SPSS 19.0. Slope of trend line was used to judge the direction of longitudinal movement, correlation coefficient was used to understand the strength of relationship between time and KPI, P value of ANOVA table was used to judge the linearity and regression equation was used to study the significance and pace of such movement.

B. Objective Second (To find out how was the performance of MP West Discom after operation autonomy among the three power distribution companies of M.P. on key performance indicators)

For achieving second objective the performance scores of other two distribution companies of M.P. namely M.P. East Discom and M.P. Central Discom were also measured for each KPIs (except those related with customer satisfaction criteria) for a maximum period of six years namely financial years 2005-06 to 2010-11. previously Conceptual Framework a cross sectional study was required which was performed using ANOVA for each KPI through SPSS 19.0. P value of ANOVA table was used test the hypotheses set erlier, Conceptual Framework. **Null hypothesis** was rejected each time whenever p value was found below cut off level of significance and it was inferred that significant different exist in performance of M.P. West Discom and its peers so far as that KPI is concerned. Further mean scores were used to study at what level M.P. West Discom is performing compared to its peers.

C. Objective Third (To find out how was the performance of M.P. West Discom after operation autonomy among the three power distribution companies of M.P. on customer satisfaction criteria)

For achieving third objective the performance scores of M.P. West Discom as well as other two distribution companies of M.P. namely M.P. East Discom and M.P. Central Discom were measured for each KPIs related with customer satisfaction criteria with the help of measurement modelling AMOS 21.0 applied on primary data collected through a questionnaire. As discussed in Conceptual Framework a cross sectional study was required which was performed using ANOVA for each KPI through SPSS 19.0. P value of ANOVA table was used test the hypotheses set in earlier Conceptual Framework. Null hypothesis was rejected each time whenever p value was found below cut off level of significance and it was inferred that significant different exist in performance of M.P. West Discom and its peers so far as that KPI is concerned. Further mean scores were used to study at what level M.P. West Discom is performing compared to its peers.

V. SUMMARY OF FINDINGS

The objective wise summary of findings of this study is given here under:-

A. Objective 1: (To find out how mp west discom performed after operational autonomy on key performance indicators)

Distribution Operating Efficiency Related KPIs

1. On technical efficiency related KPIs such as Aggregate Technical & Commercial Losses and Network Delivery Losses, the Performance of M.P. West Discom has improved significantly.
2. On resource utilization related KPIs such as Customer per Distribution Employee and Net Fixed Assets/ Energy Delivered, the Performance of M.P. West Discom has improved significantly.
3. On expense utilization related KPIs such as Total Operating Expenses/ Energy Delivered, Total Energy Related Expenses/Energy Delivered, the Performance of M.P. West Discom has deteriorated. However it does not seem prudent to overlook inflationary effect crept in this deterioration. We can infer that yearly increase in inflation is significant. Hence considering inflation effect it can be concluded the company's performance on these KPI remained steady over the period of study.

Repair & Maintenance Related KPIs

1. On efficiency of maintenance personal related KPIs such as Maintenance Personnel per 100 Customers and Maintenance Personnel per 100 km of Distribution Line, the performance of M.P. West Discom has improved provided it is assumed that general service quality remained steady over the entire period after operational autonomy and infrastructure maintenance needs remained steady over the entire period after operational autonomy
2. On Frequency of Transformer Replacement KPI, the performance of M.P. West Discom has deteriorated. This indicates that transformers purchased are of inferior quality or the maintenance is not properly done.

Other Measures of Customer Service Related KPIs

On Customer Access to Services KPI the performance of M.P. West Discom has deteriorated significantly. This indicates that the company is unable to facilitate the growing number of customers with increase its access points at an equal pace.

Financial Performance Related KPIs

1. On margin related KPIs such as Operating Ratio, Cost Recovery Index and Average Tariff Level, the performance of M.P. West Discom has deteriorated significantly. This issues shows loss making nature of the company. In financial terms working of the company is grossly ineffective and commercially unviable. It can be said that the company is turning out to be financial burden. The company needs to very strongly investigate its financial management so as to make it commercially viable.
2. On profitability related KPIs such as Return on Assets and Net Profit as Percentage of Energy Costs, the performance of M.P. West Discom has deteriorated significantly. This issue shows deficit comfort nature of the company and the company is in very poor state of business conditions. However on Debt Service Ratio the performance of M.P. West Discom has shown improvement but it should be seen in light of the fact that company is consistently making losses. As it is making loss, there is no question of availability of profits to cover interest commitments and hence the significance of change in the value of debt service ratio over a period loses its importance. This is yet another KPI showing unviable commercial operations of the company.
3. On liquidity related KPIs such as Debtor Days and Current Ratio, the performance of M.P. West Discom has shown improvement. However increase in Current Ratio over years cannot always be treated as good sign because it signifies high level of investments in current assets. This is very surprising in lights of previous discussions. This indicates company is getting funds from government to maintain its liquidity despite the fact that it is incurring huge losses. Further, it can be inferred that company is making payment of its current liabilities at a faster pace than that of recovery from current assets.

Operational Cost & Management Related KPIs

1. On KPIs related with per unit costs such as Average Supply Cost and Total Labour Cost per Customer, the performance of M.P. West Discom has deteriorated. However on Distribution Cost per Unit front there is a slight improvement. Further if inflation factor is considered than performance on these KPIs can be treated as steady.
2. On KPIs related with maintenance costs such as Maintenance Expenses / Capital Expenditures and Maintenance Expenses/ Gross Book Value of Distribution Assets the performance of company has improved provided underlying reason is not increase of denominator and inflation factor is considered.

Workforce (Including Health & Safety) Related KPIs

1. On health & safety related KPIs such as All Injury/ Illness Frequency and Non Fatal Accidents While on Work, the performance of M.P. west Discom has deteriorated significantly. However on KPI of Training Participation per 1,000 Employees, the performance of M.P. west Discom has improved.
2. On KPIs related with Labour Efficiency such as Labour Productivity, Employee Cost as % of Revenue Billed, Employee Cost as % of O&M Costs and Employee Cost as % of Total Costs, the performance of M.P. West Discom has improved except in the case of Employee Cost/ Units Sold KPI where if inflation is not considered the performance has deteriorated.

Revenue & Commercials Related KPIs

1. On Cost of Power Purchase / Unit Sold KPI the performance of the company decreased significantly as company was unable to control rising power purchase costs. On the other hand on Average Realization KPI the performance of M.P. West Discom has shown significant improvement. However considering inflation effect it can be concluded the company's performance on these two KPI remained steady.
2. On KPIs related with growth of activity level such as Index of Revenues from Sale of Power, Index of Units Sold and Index of Consumer Base, the performance of M.P. West Discom has improved significantly. This shows increased coverage of geographical areas for electricity supply and increased supply hours.

B. Objective 2: (To find out how was the performance of MP west discom after operation autonomy among the three power distribution companies PF M.P. on key performance indicators)

Distribution Operating Efficiency Related KPIs

1. In technical efficiency related KPIs on Aggregate Technical & Commercial Losses there is no significant difference in performance of Discoms of M.P. whereas and on Network Delivery Losses, the Performance of M.P. West Discom is best.
2. In resource utilization related KPIs on Net Fixed Assets/ Energy Delivered there is no significant difference in performance of Discoms of M.P. whereas on Customer per Distribution Employee the Performance of M.P. West Discom is best.
3. On expense utilization related KPIs such as Total Operating Expenses/ Energy Delivered and Total Energy Related Expenses/Energy Delivered there is no significant difference in performance of Discoms of M.P.

Repair & Maintenance Related KPIs

1. On efficiency of maintenance personal related KPIs such as Maintenance Personnel per 100 Customers and Maintenance Personnel per 100 km of Distribution Line, the Performance of M.P. West Discom is best.
2. On Frequency of Transformer Replacement KPI, there is no significant difference in performance of Discoms of M.P.

Other Measures of Customer Service Related KPIs

On Customer Access to Services KPI the performance of M.P. West Discom is moderate and lies below the performance of M.P. Central Discom but above that of M.P. East Discom.

Financial Performance Related KPIs

1. On margin related KPIs such as Operating Ratio, Cost Recovery Index the performance of M.P. West Discom is moderate and lies below the performance of M.P. Central Discom but above that of M.P. East Discom. However on Average Tariff Level, there is no significant difference in performance of Discoms of M.P.
2. On profitability related KPIs such as Return on Assets, Net Profit as Percentage of Energy Costs and Debt Service Ratio, there is no significant difference in performance of Discoms of M.P.
3. On liquidity related KPIs such as Debtor Days and Current Ratio, there is no significant difference in performance of Discoms of M.P.

Operational Cost & Management Related KPIs

1. On KPIs related with per unit costs such as Average Supply Cost and Total Labour Cost per Customer, there is no significant difference in performance of Discoms of M.P. However on Distribution Cost per Unit from the Performance of M.P. West Discom is best.
2. On KPIs related with maintenance costs such as Maintenance Expenses / Capital Expenditures and Maintenance Expenses/ Gross Book Value of Distribution Assets, the Performance of M.P. West Discom is worst.

Workforce (Including Health & Safety) Related KPIs

1. On health & safety related KPIs such as All Injury/ Illness Frequency and Non Fatal Accidents While on Work, there is no significant difference in performance of Discoms of M.P. However on KPI of Training Participation per 1,000 Employees, the Performance of M.P. West Discom is best.
2. On KPIs related with Labour Efficiency such as Employee Cost as % of O&M Costs and Employee Cost as % of Total Costs, there is no significant difference in performance of Discoms of M.P. However on KPIs of Labour Productivity, Employee Cost as % of Revenue Billed and Employee Cost/ Units Sold, the Performance of M.P. West Discom is best.

Revenue & Commercials Related KPIs

On Revenue & Commercial KPIs such as Cost of Power Purchase / Unit Sold, Average Realization, Index of Revenues from Sale of Power, Index of Units Sold and Index of Consumer Base, there is no significant difference in performance of Discoms of M.P.

C. Objective 3: (To find out how was the performance of mp west discom after operation autonomy among the three power distribution companies of M.P. on customer satisfaction criteria)

1. On Assurance, Empathy, Tangibility and Reliability KPIs the performance of M.P. West Discom is best.
2. On Responsiveness and Customer Satisfaction KPI the performance of M.P. West Discom is moderate and lies below the performance of M.P. East Discom but above that of M.P. Central Discom.

VI. CONCLUSION & SUGGESTIONS

After doing an in depth study of performance of M.P. West Discom, the researcher came to the conclusion that the performance of the company has improved on many KPIs the performance has deteriorated for few parameters as well which is a cause of concern such as:-

1. On expense utilization related KPIs such as Total Operating Expenses/ Energy Delivered, Total Energy Related Expenses/Energy Delivered, the Performance of M.P. West Discom has deteriorated. Prima-facie, this is indicative of poor operational efficiency. However, inflation seems to be a significant contributor in increase of expenses. As the power purchase costs are nearly 80 % of the overall operating costs, efforts must be made to control these costs. Further, unproductive costs like Transformer Failures must be avoided.
2. On Frequency of Transformer Replacement KPI, the performance of M.P. West Discom has deteriorated. This needs to be further investigated. On KPIs related with maintenance costs such as Maintenance Expenses / Capital Expenditures and Maintenance Expenses/ Gross Book Value of Distribution Assets, the M.P. West Discom stands last among peers. Thus the West Discom appears to have some systemic issue causing high maintenance costs. There is a need of further research to examine this issue
3. On Customer Access to Services KPI the performance of M.P. West Discom has deteriorated significantly. This indicates that the company is unable to facilitate the growing number of customers with increase its access points at an equal pace. Further in comparative analysis also it has been revealed that the performance of the company lies below that of Central Discom. On customer satisfaction and responsiveness KPIs also the company's performance is not very attractive. There is a need of further research in this area so as to find out causes of such poor performance and its remedies.
4. On health and safety issue of workers also the performance of M.P. West Discom has deteriorated and is worst amongst its peers. Further research is required to know the reasons behind the same and take corrective actions.
5. On Financial KPIs, all the three Discoms of MP score poor. Moreover, the financial losses show a clear tendency of increase 'year on year'. Financial losses place a burden on state resources. Therefore, this is a very serious issue

relating to performance, which needs to be addressed on priority basis.”More research is required for the entire State’s situation on this front.

VII. LIMITATIONS & SCOPE FOR FURTHER RESEARCH

Following are few limitations considered present in this study:-

1. There was no single universally accepted performance matrix available to evaluate the performance of any distribution company. Hence, the KPIs used were able to judge the performance of the company on those particular criteria only and the sufficiency of these KPIs to assess the performance in whole should be further tested. There is scope of model building research in this area so as to measure the performance of any discom on wholesome basis.
2. The sample size selected for collection of primary data for this study was 350 only which although sufficient for academic purposes but for commercial purposes results cannot be relied upon because the population is very large. Hence there is a scope to conduct similar research with large samples.
3. Present study is limited only up to the assessment of performance and its analysis. However no cause and effect relationship was studied quantitatively. There exist scopes for causal model based study in this area.

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