ANALYSIS OF PERFORMANCE OF
POWER DISTRIBUTION COMPANIES OF GUJARAT AND RAJASTHAN

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ABSTRACT

In the technological era, power sector is one of the core sectors which are base of every industry need. Power sector is combination of power generation, transmission and distribution. Distribution sector is one which deals with consumer one on one and collects revenue from them to further distribute it to transmission and generation sector. In the paper, analysis of performance of power distribution companies MGVCL and UGVCLof Gujarat and JVVNL, AVVNL of Rajasthan on bases of ratios that are debt-equity ratio and Net profit ratio. Ratio analysis done in a descriptive form by using paired t-test or ANOVA in SPSS software and determined two tailed significant data of the secondary data. Objective of the paper is to determine that which hypothesis is accepted as per analysis of data using test. If the there is no significant difference in the mean effect, then it is called null hypothesis is accepted and if there is some significant difference then it is called as alternate hypothesis is accepted. In this paper, internal and external factors also summarized which affect the performance of power distribution companies.

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Keywords: *MGVCL, UGVCL, JVVNL, AVVNL, t-Test, ANOVA, SPSS.*

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Introduction

In 21st century every country runs behind coal, oil, power and technology. Some countries get developed countries status by technology and some get by investing in putting industries in core sector. For every sector power sector is proved as root of every industry. There are number of ways to generate power it can be renewable or from non renewable resources. Wind mills, solar power plants nuclear power plant, biomass plant and hydro electrical plants are part of renewable energy generation plant. Thermal power plants in which coal is used as primary resource is comes under non renewable resources plant which also dangerous for environment. Any sector has divided into sub sector like power sector divided into three sub-sector that power generation, power transmission and power distribution. All these sectors are interconnected but the power distribution sector is one of the sector which deals with common people or public directly.

Electricity introduced to Indians in late 19th century but nationalization done after independence, at that time there were counted number of people who are facilitated of electricity so this was a tough task for government to make it available for the person sitting on the last mile of country territory.

There were number of reforms done by government for providing electricity to the common people with ease. In the reforms a number of subsidies given to the people to lure them towards the electricity and to make it cheap are according to their pockets which lead to increase of pressure on the power sector functionality and efficiency. As power distribution sector is the one which collect revenue or charges from public and pay further to power generation and transmission sector to further development in capacity and safe transmission to every household. Due to subsidies, meter tempering, power theft and other loop holes results into decrease in revenue of power distribution sector and pressure from

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transmission and generation increase results in deteriorating of efficiency and power distribution companies get into high debt so much that it unable to pay their loans, to transmission and generation sector. A number of reforms in power sector took place to make power distribution companies debt free and to make it profitable to some extent. Geographical area also matters when it comes to power sector because a large geographical area helps in generating more power while it make it difficult for the government to transmit power to large geographical area. If a geographical area has coastal area then it also helps to generate tidal energy. Gujarat and Rajasthan states are totally different in geographical status and by comparing their power distribution companies we get helps in understanding that which state power distribution companies are in profit and to some extent it helps to understand the loop holes behind this situation. Ratios are breath of commerce when it comes to comparison of any two companies or more companies. Ratios are based on secondary data which available on company website, on annual reports or annual annexure.

Debt- equity ratio and net profit ratio are one of the most important ratios when it comes to determine about which company is more profitable. Not only the ratios but when t- test using SPSS applied on the sampled data we get to know how much the test result signifies and to what extent.

Literature Review

To know the present or to predict the future we must know our history, like that to perform any analysis we need to know about the requirement of analysis , what already done in that sector and how it done .

Niedoba el at (2016), "Application of ANOVA in mineral processing", states about the usefulness of ANOVA for analysis of sampled data. When we know that there is variance in the data, on which analysis is little bit difficult, author applied ANOVA. Author took mineral processing for the study where processing of minerals is different or vary from mineral to mineral. This research paper also gave idea about the problem on which ANOVA can be applicable. Author suggested that there are number of factors that affect performance are sometimes controlled factors and sometimes uncontrolled factors. Some random effects appeared during experiment due to which performance affected and analysis of that variance can be difficult, so ANOVA is used in such condition to determine the result.[1]

Sow el at (2014), "Using ANOVA to examine the relationship between safety and security and human development", gives idea about using ANOVA to analysis the data set and determine the minimum and maximum range and mean and standard deviation also. P-value is required for significance and ANOVA use to compare mean of two groups. ANOVA helps in rejecting null hypothesis and supporting the significant difference in the relationship of safety and security and human development.[2]

Adedji el at (2014), "A tool for measuring organization performance using ratio analysis", state that in ratio analysis used to analysis about monitoring the performance of company, measuring its improvement when compare with other organization. It mainly based on secondary data of company available on company's website and it also helps in preparing financial statement of companies. It also helps in determining the trend of company or organization about performance that is determining or improving in previous years.[3]

Theoretical Study

ANOVA and t-test is all about verifying assumption. Assumption about homogeneity of variance of data and variables which distributed normally. In null hypothesis, it is all about verify that there is no significant difference in the sampled data and

$$\mu_{1j} = \mu_{2j} = \mu_{3j} = \ldots\ldots\ldots\ldots = \mu_{nj}$$

In alternate hypothesis, there are atleast one sampled data which is different from other data and it defined as there is significant differences and it represented as

$$\mu_{1j} \quad \mu_{2j} \quad \mu_{3j} \quad \ldots\ldots\ldots \quad \mu_{nj}$$

F is defined as the measurement of difference between the assumption and actual data. If the value of F is nearly 1, then there is no significant difference. But if the value of F is not 1, then there is difference in assumed and actual data. It helps in determining degree of freedom between the groups and within the groups.

T-test use to examine the relationship between two dependent variables. If more than two data sets are compared then it is better to compare with Paired t-test. If there are two groups of sets then independent t-test is applied as it compares one to one comparison of group with each other.

Debt-Equity Ratio

Debt-Equity ratio is defined as the ratio which gives relationship between liabilities of creditors and asset of companies. If the debt-equity ratio is high, it signifies that creditors of company have more share than company and company has more debt. If the debt-equity ratio is low, it signifies that company is in profit and can settle the expenses by own, or by short term loan.

Dept – equity ratio = (non-current liabilities + current liabilities)/ shareholders fund's

Or D/E ratio = total liabilities/total shareholders

Net- Profit Ratio

Net profitable ratio is the profitable ratio which concern about the number in profit. It not only helps in determining the outcome of any company but it also helps in determining the efficiency of any company in market. Creditors of any company are interested in company's profit.[4][5]

Hypothesis of the Study

- **For DEBT-Equity Ratio**

H_0:   No statistical significance difference between debt-equity ratio of Gujarat and Rajasthan power distribution companies.

H_1:   There is significant difference between debt-equity ratio of Gujarat and Rajasthan power distribution companies.

- **For Net Profit Ratio**

H_0:   No statistical significance difference between net profit ratio of Gujarat and Rajasthan power distribution companies.

H_1:   There is significant difference between net profit ratio of Gujarat and Rajasthan power distribution companies.[4][5]

Experimental Data and Observation

Secondary data taken for the ratio analysis from the company's annual report that is from power distribution companies of Gujarat (MGVCL, UGVCL) and Rajasthan (JVVNL, AVVNL) . For analysis data needed from the annual report is balance sheet, profit and loss account and cash flow statement of companies to apply in the formula of debt-equity ratio and net profit ratio.[6][7][8][9]

Formula for Debt- Equity Ratio,

$$\text{Debt-Equity Ratio} = \frac{NonCurrentLiabilities + currentLiabilities}{ShareHoldersFund}$$

Formula for Net Profit Ratio,

$$\text{Net profit ratio} = \frac{net\,profit}{net\,revenue} * 100$$

Debt- Equity Ratio observational data sample:

Paired Samples Statistics		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	MGVCL	1.21633	6	.530662	.216642
	UGVCL	1.62600	6	.880406	.359424
Pair 2	MGVCL	1.21633	6	.530662	.216642
	JVVNL	-1.71033	6	.138773	.056654
Pair 3	MGVCL	1.21633	6	.530662	.216642
	AVVNL	-1.52383	6	.093568	.038199
Pair 4	UGVCL	1.62600	6	.880406	.359424
	JVVNL	-1.71033	6	.138773	.056654
Pair 5	UGVCL	1.62600	6	.880406	.359424
	AVVNL	-1.52383	6	.093568	.038199
Pair 6	JVVNL	-1.71033	6	.138773	.056654
	AVVNL	-1.52383	6	.093568	.038199

Paired Samples Correlations		N	Correlation	Sig.
Pair 1	MGVCL & UGVCL	6	.430	.395
Pair 2	MGVCL & JVVNL	6	.415	.413
Pair 3	MGVCL & AVVNL	6	.381	.457
Pair 4	UGVCL & JVVNL	6	.289	.579
Pair 5	UGVCL & AVVNL	6	-.032	.952
Pair 6	JVVNL & AVVNL	6	.927	.008

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	MGVCL - UGVCL	-.409667	.809402	.330437	-1.259082	.439749	-1.240	5	.270
Pair 2	MGVCL - JVVNL	2.926667	.489633	.199892	2.412828	3.440505	14.641	5	.000
Pair 3	MGVCL - AVVNL	2.740167	.502546	.205164	2.212777	3.267556	13.356	5	.000
Pair 4	UGVCL - JVVNL	3.336333	.850766	.347324	2.443509	4.229158	9.606	5	.000
Pair 5	UGVCL - AVVNL	3.149833	.888334	.362661	2.217584	4.082082	8.685	5	.000
Pair 6	JVVNL - AVVNL	-.186500	.062698	.025597	-.252298	-.120702	-7.286	5	.001

Paired sample statistics contain 6 pair in which four companies all are paired with each other and mean of the sample determined using t-test and N is number of years of sample taken for each power distribution companies.

There are two companies of Gujarat that is MGVCL, UGVCLeach one of them paired with companies of Rajasthan that is JVVNL, AVVNL. Total six pair formed in which mean of debt equity ratio of companies are determined and value of N=6 , standard deviation of mean is also provided and standard error mean also determined. When it comes to correlation of data of companies paired for analysis. If data is more related, its significance is low and if it is less correlated, then significance is more.

When descriptive analysis of data using of data t-test , we get degree of freedom equal to 5 and lower and upper value of the 95% confidence interval of difference. For MGVCL- UGVCL, the CI difference is maximum. According to two tailed p-value of MGVCL-UGVCL paired data is 0.270 which is greater than 0.05, and other pair has p-value less than 0.05.

There are two type of test one tailed test and another is two tailed test. In the two tailed test, the value measured in two directions.

According to Hypothesis μ_1 μ_2 μ_3 ………….. μ_j and all values are not equal which means alternate hypothesis accepted. If the value lies in the upper or lower 2.5% of the graph or value then the value is not significant but if it lies between the lower and upper 2.5% of the value, the value must be significant in nature. In the above two tailed table, highest value is 0.270 and lowest is 0.00 so the significant value range is between 2.5% upper and lower bound that is more than 0.000 and upper bound less than 0.270 . According to the above table and the upper and lower limit of two tailed graph pair-1, pair-6 are the out of the range the value has no significant difference and other companies paired with significant difference.[6][7][8][9]

Net Profit Ratio observational Data Sample

Paired Samples Statistics		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	MGVCL	.93867	6	.525928	.214709
	UGVCL	.51067	6	.331180	.135204
Pair 2	MGVCL	.93867	6	.525928	.214709
	JVVNL	-24.56633	6	31.049618	12.675954
Pair 3	MGVCL	.93867	6	.525928	.214709
	AVVNL	-26.16150	6	35.022255	14.297776
Pair 4	UGVCL	.51067	6	.331180	.135204
	JVVNL	-24.56633	6	31.049618	12.675954
Pair 5	UGVCL	.51067	6	.331180	.135204
	AVVNL	-26.16150	6	35.022255	14.297776
Pair 6	JVVNL	-24.56633	6	31.049618	12.675954
	AVVNL	-26.16150	6	35.022255	14.297776

Paired Samples Correlations		N	Correlation	Sig.
Pair 1	MGVCL & UGVCL	6	.929	.007
Pair 2	MGVCL & JVVNL	6	.631	.179
Pair 3	MGVCL & AVVNL	6	.666	.149
Pair 4	UGVCL & JVVNL	6	.625	.184
Pair 5	UGVCL & AVVNL	6	.657	.157
Pair 6	JVVNL & AVVNL	6	.997	.000

Paired Samples Test									
		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	MGVCL - UGVCL	.428000	.250141	.102120	.165493	.690507	4.191	5	.009
Pair 2	MGVCL - JVVNL	25.505000	30.720360	12.541535	-6.734041	57.744041	2.034	5	.098
Pair 3	MGVCL - AVVNL	27.100167	34.674227	14.155694	-9.288203	63.488536	1.914	5	.114
Pair 4	UGVCL - JVVNL	25.077000	30.843600	12.591847	-7.291373	57.445373	1.992	5	.103
Pair 5	UGVCL - AVVNL	26.672167	34.805700	14.209367	-9.854175	63.198509	1.877	5	.119
Pair 6	JVVNL - AVVNL	1.595167	4.659468	1.902220	-3.294645	6.484978	.839	5	.440

Paired sample statistics contain 6 pair in which four companies all are paired with each other and mean of the sample determined using t-test and N is number of years of sample taken for each power distribution companies.

There are two companies of Gujarat that is MGVCL, UGVCL each one of them paired with companies of Rajasthan that is JVVNL, AVVNL. Total six pair formed in which mean of Net profit ratio of companies are determined and value of N=6, standard deviation of mean is also provided and standard error mean also determined. When it comes to correlation of data of companies paired for analysis. If data is more related, its significance is low and if it is less correlated, then significance is more.

When descriptive analysis of data using of data t-test , we get degree of freedom equal to 5 and lower and upper value of the 95% confidence interval of difference. For MGVCL- AVVNL, the CI difference is maximum. According to two tailed p-value of MGVCL-UGVCL paired data is 0.009 which is less than 0.05, and other pair has p-value greater than 0.05.

According to Hypothesis μ_1 μ_2 μ_3 ………….. μ_j and all values are not equal which means alternate hypothesis accepted. There are two type of test one tailed test and another is two tailed test. In the two tailed test, the value measured in two directions. If the value lies in the upper or lower 2.5% of the graph or value then the value is not significant but if it lies between the lower and upper 2.5% of the value, the value must be significant in nature. In the above two tailed table, highest value is 0.440 and lowest is 0.009 so the significant value range is between 2.5% upper and lower bound that is more than 0.009 and upper bound less than 0.440 . According to the above table and the upper and lower limit of two tailed graph pair-1, pair-6 are the out of the range the value has no significant difference and other companies paired with significant difference.

From the above, the ratio analysis concluded that power distribution companies of Gujarat are more profitable than power distribution companies of Rajasthan. In all these companies taken for analysis, MGVCL is one of the best power distribution companies among other power distribution companies. When debt- equity ratio taken into account, MGVCL has lowest debt –equity ratio in power distribution companies when compared with other three distribution companies. The least performance according to these two ratios is AVVNL and JVVNL.

There are list of factors due to which performance of power distribution companies affected are following:

- Due to subsidies announced by government for the industries and poor people.
- Meter tempering which results in the decrease in revenue of power distribution sector.
- Power theft is one of the major drawback and reason of poor performance of distribution sector.
- In late 1990's ADB provide loan to the power sector of six state and Gujarat is one of them results in push the power distribution components towards profit.

Conclusion

Every state wants to be in power efficient and to walk on the path where power distribution companies will be debt free. In 2012-13, power distribution companies of Rajasthan are in debt, then central government come up with the UDAY scheme and provide a helping hand to get out of debt. While power distribution companies of Gujarat are already in profit, so there is a little bit affect of UDAY yojana.

By studying the financial ratios of power distribution companies and by comparing them, we get to know that MGVCL and UGVCL are in better condition than JVVNL and AVVNL till 2015-16. But after that condition of AVVNL and JVVNL also improved and now these all are in good competition.

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