Performance of State Road Transport Corporations: Some Assessments and Reflections of Two Indian Cities

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Abstract

The efficiency of an organisation should be used to evaluate its performance. This is especially true in the case of State Road Transport Undertakings (SRTUs). SRTUs are accountable to the public for how much of the money they use from the public exchequer. The study discusses the efficiency of two SRTUs in India, in particular, Delhi Transport Corporation (DTC) and Bangalore Metropolitan Transport Corporation (BMTC). Every year, DTC makes headlines for massive financial losses, whereas BMTC performs reasonably well. The study is based on secondary data from various records and reports. Selected variables concerning the efficiency of SRTUs were identified to carry out the analysis. When the results were compared, it was discovered that the DTC has a lot of room to improve its efficiency by making the best use of its resources.

Keywords: India, Transport Corporation, BMTC, DTC, Performance measurement and Comparative Study

Introduction

India is the second most populous nation in the world and the seventh largest country in South Asia by geographically extending over an area of 32.9 Lakh square kilometres (ASRTUs news, January-March, 2016). It has one of the world's largest road networks which emerged as the dominant segment in India's transportation sector. This sector is accounting for 4.7 percent of India's GDP in 2009-10 (Planning Commission, 2012-2017). Road transport was an auxiliary to railways in the 1950s, but it overtook railways as the dominant segment in India's passenger transport sector during the year 2000-01 (Eleventh Five Year Plan 2007–2012, Planning Commission, Government of India). The massive increase in passenger volumes shifts the market share in favour of road transportation in both urban and rural areas. It is a known fact that transport infrastructure is crucial to the growth of any economy because it contributes to capital formation by providing time and place utilities. To improve the living standard of the people road transport can adequately meet the growth of economic, social, health and cultural

needs. Public transportation has been sponsored for both social and economic reasons, in order to provide mobility to individuals who cannot afford private travel (Mekoth and George, 2005). Hence bus road transport is a cost-effective choice for the public for its efficient mobility in urban and rural areas. After independence, the necessity for a planned and reasonable public transport structure was initiated. Hence road transport corporation act was enacted in 1950 to bring in state transport corporation in to all states. The government authorised the formation of the Road Transport Corporation in order to provide easy accessibility, flexible operations, and dependable bus service to both urban and rural areas. The sustainable mass transportation system has been proved as the best solution among all the other mode of transport. With the growth of State Road Transport undertakings (SRTUs) there was a strong need to deal with the various issues faced by SRTUs like support, Procurement, reliability and familiarity. Alternatively, since inception public transportation undertakings face significant challenges in almost every state, even from one city to another within the state. Presently, almost all state road transport undertakings (SRTUs) have accumulated deficits and are subsidised by the public exchequer (CIRT, 2016-17).These bus corporations have become loss-making over the years and are unable to meet the public's increasing transportation needs. Currently, they are distressed by a number of issues, some of which are external, but the majority of which are self-inflicted. The distress situation of the finances of SRTUs is reflected in the outcome of several factors which are overstaffing, fuel efficiency, cost structure rigidity, high debt burden, constrained autonomy in fare revision and may more. Despite their negative influence on SRTUs' financial health, the majority of SRTUs were prioritised social aims (Vijayaraghavan, 1995). Most importantly, the state government has a large amount of control over the fares of the SRTUs, which is one of the significant aspects of the declining performance in public transportation needs (Singh and Venkatesh, 2003).

Review of Literature

A comprehensive literature of public transportation corporations has been chosen to understand various concepts, methodologies, and interpretations. The review mainly evaluates the contribution of diverse techniques preferred to evaluate the performance of SRTUs. Mekoth (1997) explores the relative competition of passenger road transport in Goa. Kadamba Transport Corporation Ltd. (KTCL) compared with other private operators. The objective was achieved by studying how the operational efficiency is attributed to KTCL and other operators. Eleven parameters in their various combinations determine the cost, revenue, and quality of services at a given fare structure. The profitability has been analysed by using the break-even model. It was noted that KTCL is better than private operators in terms of quality of service, but it is inefficient in making profits compared to private operators. In another study, Singh (2002) used the Total Factor Productivity (TFP) approach to assess the economic viability of municipal transportation units in India. The descriptive statistics of the seven undertakings from 1990-91 to 2000-01 were used in the study. Except for Bengaluru Metropolitan Transport Corporation, the results showed that the majority of the selected undertakings experienced a decline in productivity. Tiwary (2011) compared Haryana State Road Transport Undertaking to other state transport corporations in India. The study highlighted the poor performance as a result of the bureaucratic structure and management. According to the recommendations, the government can propose immediate plans such as stimulus packages and public-private partnership models. Kothia (2012) aims to evaluate the financial performance of reporting SRTUs in India. Cost structures and profit and loss statements have been discussed. A series of recommendations are made towards SRTU's authority to improve the downgrade performance, viz., adequate financial incentives, competitive environment, regularised reimbursement, and market-based pricing. Vishnu and Kumar (2014) focused on the performance evaluation of road transport corporations in south India with the help of the Data Envelopment Analysis (DEA) approach. A comparative study between SRTUs of three states, such as Tamil Nadu State Road Transport Corporation (TNSRTC), Karnataka State Road Transport Corporation (KSRTC) and Kerala State Road Transport Corporation (KSRTC), was identified to contrast strengths and weaknesses. The DEA

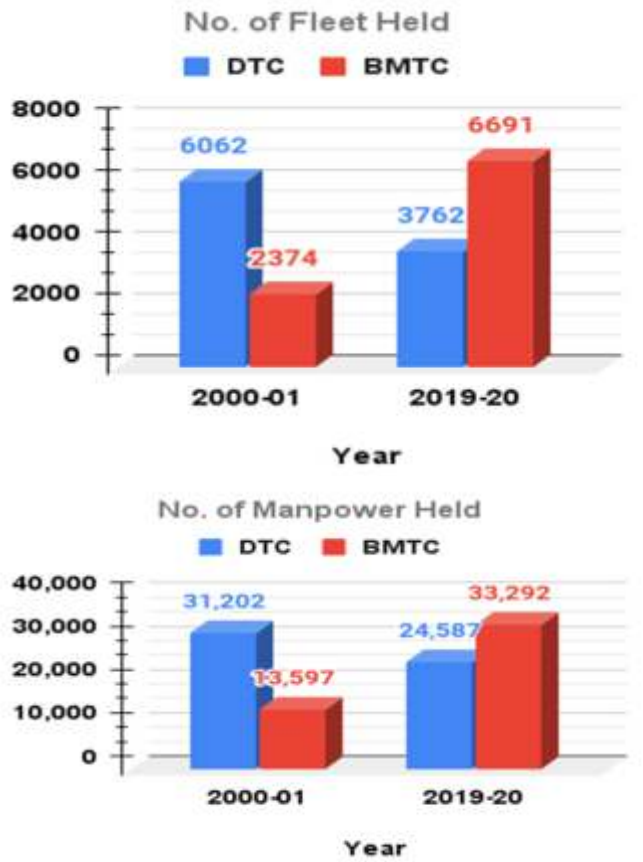
makes an effort to assess the relative effectiveness of particular units. According to the financial results, KSRTC's fuel consumption per passenger kilometre was inefficient, and the staff ratio per schedule was also very high, resulting in higher operating costs in comparison to others. Vaidya (2014) evaluates the relative performance of 26 public transport corporations in India. The tools used in this study include data envelopment analysis and the Analytic Hierarchy Process. This study addressed 19 criteria for analysing performance, which were further grouped into three categories: operations, finance, and accidents. As per the analysis, Kolhapur emerged as the best performer in all three criteria. Hanumappa et al. (2015) used Data Envelopment Analysis (DEA) in relation to the performance evaluation of Bengaluru Metropolitan Transport Corporation (BMTC). The main objective of the study was to analyse the operations of the premium service depots and major premium service routes within the city. The methodology involved the classification of route mapping into three schedules in respect of revenues covered on variable and fixed costs from 2008-09 to 2011-12. Commonly used variables are measured in DEA of the urban transit system. The main finding from the study was that, despite increases in the cost of operation and maintenance, the BMTC premium service depot appeared efficient. Chalam and Ali (2016) compare the Andhra Pradesh State Road Transport Corporation's operating results by zone. According to the analysis, the corporation has been successful in increasing vehicle utilisation, but fuel efficiency has declined. The addition of more fleets is necessary due to population expansion. Singh (2017) intends to assess the technical efficiency of publicly owned urban bus operators in India. The estimation is based on annual data from a sample of eight transportation undertakings from 2000-01 to 2012-13. According to the research, the operators have to be more efficient to control key factors of production. Punita Saxena (2018) justified the adoption of the Data Envelop Analysis technique (DEA) as the efficiency measure of the State Transport Corporation, with special reference to the Delhi Transport Corporation (DTC). Further regression analysis was also performed to identify the explanatory variables. The data for the year 2014-15 of 46 reporting SRTUs has been considered. The results showed that out of 46 units, only 6 units were found to be technically efficient. To fulfil another objective on the question of the performance of DTC compare with peers, the study suggested improving the operations and maintenance of DTC. Vijayan (2018) details the pricing policy of a Kerala state road transport undertaking in comparison with the Karnataka state road transport corporation. A discussion about three fare policies on pricing strategies conducted in different categories. The study concluded that an automatic fare revision system without political intervention could be adopted in order to achieve better financial performance. Raghavendra and Devi (2018) studied cost and management practises in passenger road transport undertakings in the state of Karnataka. Six passenger road transports are classified into two groups. Three from the public sector and three from private sector operators are selected based on ownership. The analysis has been done based on three broad objectives in contrast to public and private sector undertakings. The secondary data regarding revenue and costs incurred by the selected undertakings was collected for a period of five years from 2010-11 to 2015-16. According to the study, there is a significant difference in employee and material costs between private and public sector enterprises. Randhawa and Arora (2018) examined the state road transport undertakings (SRTUs) in Punjab state, India on the basis of certain physical as well as financial performance indicators. Additionally, the study contrasts the state of SRTUs in Punjab with SRTUs in India. The ratios, percentages, and compound annual growth rate from 2010-11 to 2015-16 were used to achieve the objectives of the study. So far as financial performance is concerned, on an average basis, losses reported by SRTUs in India were much higher than losses reported by SRTUs in Punjab. The study identified over-aged vehicles as one of the key determinants, as such vehicles cannot be expected to generate much revenue. It has also been noted that excessive staff was the reason for declining staff productivity over time and should be paid due attention. Moorthi and Ganesan (2019) observe the growth performance of selected state road transport undertakings

in India. The growth of the Road Transport Corporations' indicators was calculated using an exponential functional form from 2000-01 to 2015-16. According to the overall study, all indicators exhibited higher growth performance over the reviewed period. It was discovered that, out of the 14 SRTUs, Tamil Nadu State Transport Corporation performed much better during the research period and holds better potential for the future than other state transport undertakings in India. The review of the selected literature is primarily concerned with the comparative performance of public-sector transportation corporations. According to the review, state-owned road transportation corporations underperform and, in general, lack planning. It has also been observed that the majority of researchers do not specify any precise criteria for selecting SRTUs in respect of comparative studies. Given the foregoing, the current study seeks to compare the performance of a high-performing SRTU (notably BMTC) and a low-performing SRTU (namely DTC). A comparison may not always be accurate owing to unfair competition, but the rationale for selection aims to depict an outline of the competence of the particular SRTUs. The primary goal is to understand changes in the characteristics of performance parameters over a long period of time. In addition, the study reviews the variation and relationship of selected performance parameters between BMTC and DTC.

DTC and BMTC

Delhi's public transportation system is mostly based on buses. Delhi Transport Corporation (DTC) was founded in 1971-72 under the Road Transport Corporations Act of 1950. It has been working towards a safe, economic, people-friendly and efficient public transportation system in the city. As a result, there was a need to mobilisation of resources in order to accommodate a large number of commuters. Unfortunately, the national capital's symbolic 'lifeline' DTC is losing its pulse more than a decade as the government gradually phases out thousands of its decrepit buses on Delhi's streets. Presently the DTC's legacy, as well as its survival, appears to be in difficulty. The corporation's fleet has shrunk to its lowest by the day, with financial losses increasing year after year. In comparison, the Bengaluru Metropolitan Transport Corporation (BMTC) is a relatively new public bus transportation provider, having entered the service in 1997 following the restructuring of the Karnatak but transport service. BMTC is dedicated to providing economical, safe and reliable transportation. Apart from its core activities, BMTC strives to strengthen route network optimization, infrastructure development, user-friendly fare structure, fleet up gradation, planning and monitoring. The BMTC reaches into every corner of the city, making public transportation an attractive mode of transportation choice. The fact that a diverse customer base is increasing passenger trips every day attests to its success. Despite the slight revenue loss in recent past, BMTC has consistently planned to generate revenues from various sources. DTC has been at a loss since 2000-01, whereas BMTC has earned a profit for most of the years under study. The performance status becomes clearer by the brief comparison between DTC and BMTC:

Figure 1: Key Standing Snapshot of DTC and BMTC



Source: (i) Compiled from Annual Reports on Association of State Road Transport, Transport Research wings, India
(ii) DTC Annual Report 2019-20.
(iii) Administrative Report of BMTC.

Material and Method

Given the primary goal of the study, a descriptive research design was adopted. As stated, two metro city-based undertakings, DTC and BMTC are sampled. DTC operates in the city of Delhi and is loss-making in the category. As a comparison, BMTC from the city of Bengaluru is chosen as a comparison, looking into the fact that it has been making a profit for a long period of time. The secondary data presented in the study were gathered from the Association of State Road Transport Undertakings report, the Administrative Report prepared by the Comptroller of Audit General in India, the profile and performance of SRTCs published by the Central Institute of Road Transport and many other sources. Available data refers to the vital financial and operational performance of DTC and BMTC and has been analyses through certain selected financial and operational parameters. The financial and operational parameters are precisely considered due to time and resource constraints. The data includes 20 years from 2000-2001 to 2019-20 and figures out what was happening in DTC and BMTC concerning selected parameters. To understand the phenomenon, the selected ratios are more meaningfully interpreted as a comparable measure. The mean and variations are obtained from each selected ratio to understand the scale of measurement of each observation. Furthermore, the F test has been applied to estimate the equality of sample variances of each selected parameter concerning DTC and BMTC.

Analysis and Findings

The status of DTC and BMTC has been examined on the basis of seven preferred interconnected parameters, including Revenue per km, Cost per km, Profit per bus per day, Staff-Bus Ratio, Staff Productivity, Vehicle Productivity, and Fleet Utilisation. The data has been analysed using ratios and also by comparing between DTC and BMTC.

Figure 2: Revenue per km

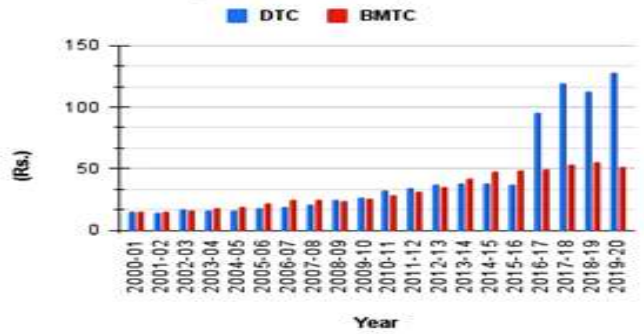
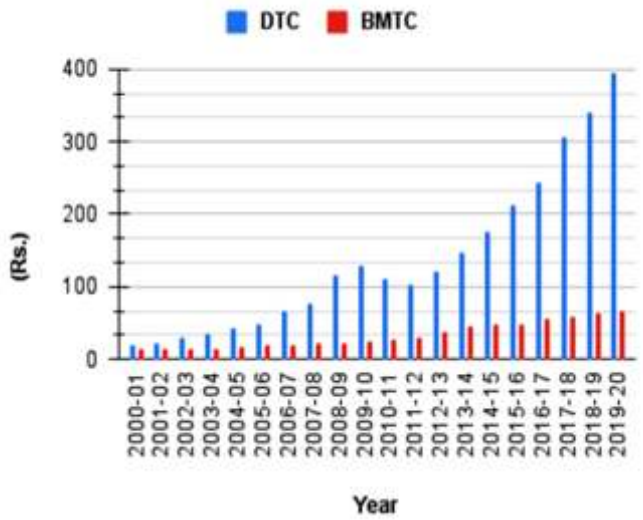


Figure 3: Cost Per Km



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(i) Revenue per km: The performance of revenue per km reflects primarily the issue of fare collection. Figure 2 shows that there was an upward trend in revenue per km on both DTC and BMTC. The revenue per km of DTC and BMTC were side by side from 2000-01 to 2015–16, but DTC's revenue per km was found to be significantly higher than BMTC from 2016–17 to 2019–20. DTC's average revenue per kilometre was Rs.43.36, which is higher than BMTC's Rs. 32.67. The standard deviation of DTC's revenue per km is Rs.37.57, compared to Rs. 14.20 for BMTC, indicating that DTC has more variability in revenue per km.Furthermore, at 95% confidence level, the F test applied to test the null hypothesis (H0) based on the equality of two revenue variances . The calculated value of 'F' (6.99) is greater than the critical value obtained from the F table (2.16). As a result, there is sufficient evidence to believe that DTC and BMTC do not have the same variance in terms of revenue per km.

(ii) Cost per km: The cost per km is directly related to the function of any SRTU. Figure 3 shows that there was an upward trend in the cost per kilometre for both DTC and BMTC. However, DTC's cost per km was found to be significantly higher than BMTC's throughout the study

period. The average cost per km for DTC was Rs.137.43, which was much higher than the Rs.33.29 for BMTC. The standard deviation of DTC's cost per km is Rs.110.37, compared to Rs.18.09 for BMTC, indicating that DTC has more variability in revenue per km. Furthermore, at a 95% confidence level, the F test applied to test the null hypothesis (H0) based on the equality of two cost variances. The calculated value of 'F' (37.21) is greater than the critical value obtained from the F table (2.16). As a result, there is sufficient evidence to believe that DTC and BMTC do not have the same variance in terms of cost per km.

Figure: 4 Fleet Utilisation

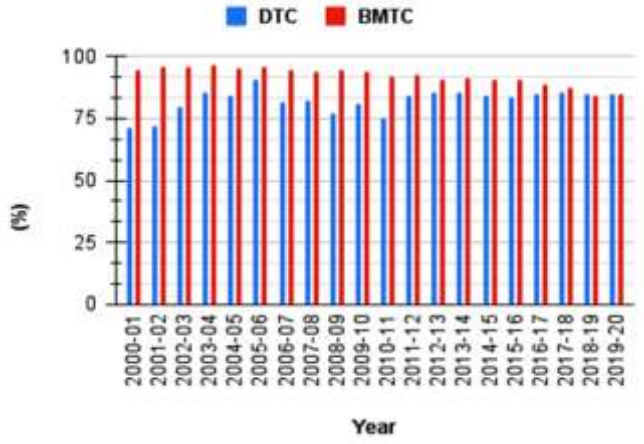
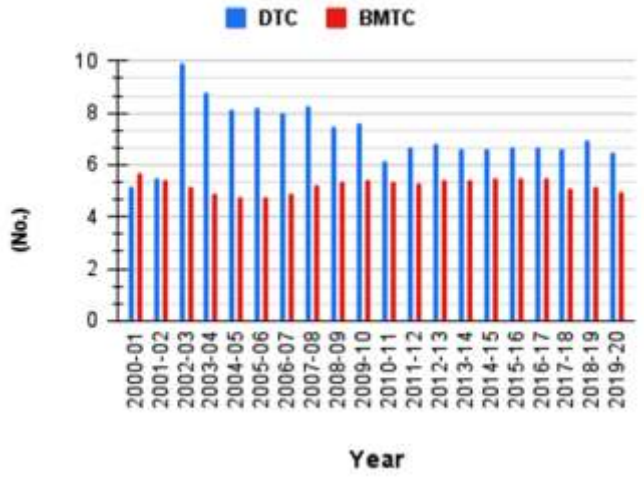


Figure 5: Staff - Bus Ratio



Source: (i) Compiled from Annual Reports on Association of State Road Transport, Transport Research wings, India
(ii) DTC Annual Report 2019-20.
(iii) Administrative Report of BMTC.

(iii) Fleet Utilisation: The percentage of the average number of buses on the road to the average number of buses held by any SRTC is defined as fleet utilisation. Figure 4 shows that the BMTC's fleet utilisation was found to be better with respect to the DTC throughout the study period. BMTC's average fleet utilisation rate was found to be 92.23 percent, which is higher than DTC's 82.19 percent. The standard deviation of BMTC's fleet utilisation rate is 3.59, compared to 4.95 for DTC, indicating that DTC has more variability in staff productivity. Furthermore, at a 95% confidence level, the F test applied to test the null hypothesis (H0) based on the equality of two staff productivity . The calculated value of 'F' (1.89) is less than the critical value obtained from the F table (2.16). As a result, DTC and BMTC have no difference in terms of fleet utilisation variances.

(iv) Staff-Bus Ratio: The staff-bus ratio is defined as the ratio of total staff employed to the average number of buses on the road by any SRTC. Figure 5 shows the staff-bus ratio of DTC has been a mixed trend during the study period, but it was indicated almost stagnant for BMTC. Hence BMTC maintain a good parity among man and machine. However, DTC's staff-bus ratio was found to be higher than BMTC's throughout the study period. DTC reported a high staff-bus ratio due to the utmost number of staff employed per bus. The highest staff-bus ratio reported by BMTC was 5.73, while for DTC it was 9.9. DTC's average staff-bus ratio was found to be 7.71, which is higher than BMTC's 5.26. The standard deviation of DTC's staff-bus ratio is 1.13, compared to 0.27 for BMTC, indicating that DTC has more variability in staff-bus ratio. Furthermore, at a 95% confidence level, the F test applied to test the null hypothesis (H0) based on the equality of two staff-bus ratios. The calculated value of 'F' (17.99) is greater than the critical value obtained from the F table (2.16). As a result, there is sufficient evidence to believe that DTC and BMTC do not have the same variance in terms of staff-bus ratio.

(v) Staff Productivity: Staff Productivity is calculated by dividing the total effective kilometres operated over a given period by the total number of staff days paid by any SRTU. To attain high production, it is essential that employee utilisation be as high as feasible. Figure 6 shows that

BMTC's staff productivity was higher than DTC's throughout the study period. This points out a big gap in staff productivity in both undertakings. DTC's average staff productivity was found to be 12.55 km, which is lower than BMTC's 38.75 km. DTC's standard deviation of staff productivity is 4.01 km, while BMTC's is 4.29 km, indicating that BMTC has more variability in staff productivity. Furthermore, at a 95% confidence level, the F test for two sample variances is used to test the null hypothesis (H0) based on the equality of two staff productivity. The calculated value of 'F' (1.14) is less than the critical value obtained from the F table (2.16). As a result, there is no difference between DTC and BMTC in terms of staff productivity variances.

Figure 6: Staff-Productivity

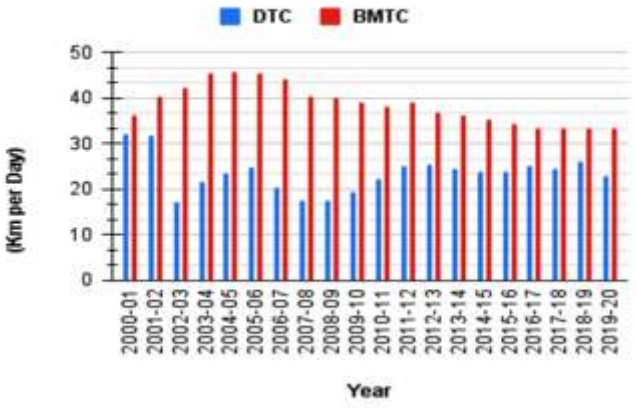
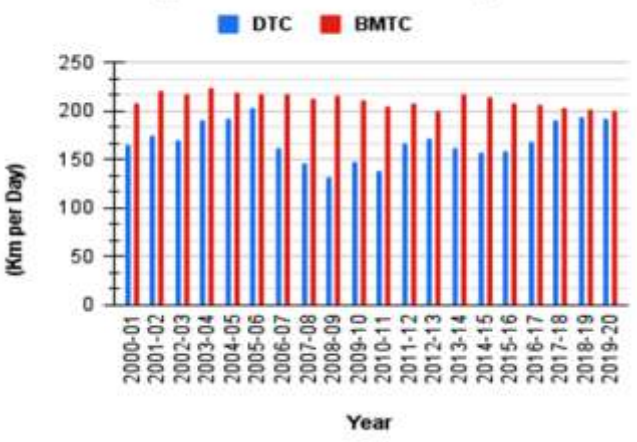


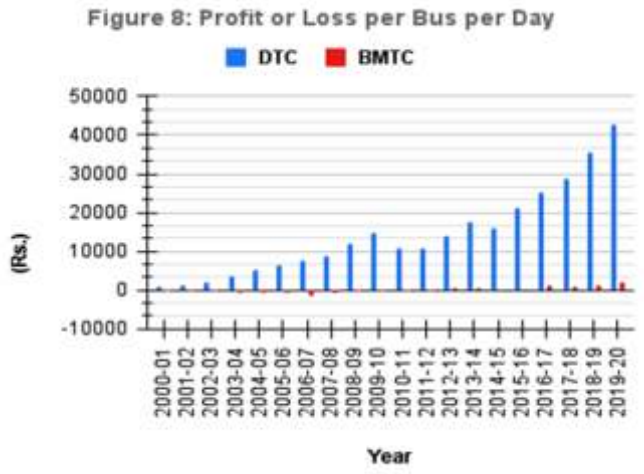
Figure 7: Vehicle Productivity



Source: (i) Compiled from Annual Reports on Association of State Road Transport, Transport Research wings, India
(ii) DTC Annual Report 2019-20.
(iii) Administrative Report of BMTC.

(vi) Vehicle Productivity: Vehicle Productivity is the average number of kilometres driven per day by each vehicle. In order to attain high production, it is essential that vehicle utilisation be as high as feasible. Figure 7 shows that BMTC's vehicle productivity was found to be moderately high in comparison to DTC throughout the study period. The average vehicle productivity of BMTC was found to be 211.86 km, which is higher than the 170.84 km of DTC. The standard deviation of BMTC vehicle productivity is 7.18 km compared to 20.05 km for DTC, indicating that DTC has greater variability in vehicle productivity. Furthermore, at a 95% confidence level, the F test applied to test the null hypothesis (H0) based on the equality of two vehicle productivity. The calculated value of 'F' (7.78) is greater than the critical value obtained from the F table (2.16). As a result, there is sufficient evidence to believe that DTC and BMTC do not have the same variance in terms of vehicle productivity.

(vii) Profit or Loss per Bus per Day: The profit or loss per bus per day is directly related to the operation of any of SRTU's buses. Figure 8 shows that DTC's loss per bus per day was found to be exceptionally high in comparison to BMTC throughout the study period. DTC reported highest loss per bus per day during 2019-20. However, BMTC profited for the majority of the years under consideration, until losses per bus began in 2012-2013. DTC's average loss per bus per day was Rs.14337.65, which is significantly higher than BMTC's Rs.47.45. DTC's standard deviation of loss per bus per day is Rs.11519.05, while BMTC's is Rs.863.10, indicating that DTC has greater variability in loss per bus per day. Furthermore, at a 95% confidence level, the F test applied to test the null hypothesis (H0) based on the equality of two sample variances. The calculated value of 'F' (178.12) is greater than the critical value obtained from the F table (2.16). As a result, there is sufficient evidence to believe that DTC and BMTC do not have the same variance in profit or loss per bus per day.



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(iii) Administrative Report of BMTC.

Conclusion and Recommendation

To conclude, the study throws light on significant parameters which need to be addressed to DTC so that it can be turned from the incompetent position to the modes performing list like BMTC. The irrational status of cost and revenue signifies that there continues to be losses and a discrepancy exists in DTC. Where DTC was not technically focused, BMTC was pragmatic and incremental. DTC should give more emphasis on major cost factors and concentrate on more revenue generation. Both DTC and BMTC have been incurring losses in recent years, but DTC has seen a significant increase in losses per bus per day. In such a situation, DTC should try to reduce the unnecessary costs. The employment policy of the DTC should be more logical. The recruitment of bus crew and other staff should be strictly according to the operational plan in order to keep the bus staff ratio at an optimum level. It is also recommended that the staff-bus ratio should be reduced from 9 to at most 4. The existing staff productivity rate of the DTC should be improved at least twice. Excess employees should be deployed from areas where significant negative externalities have been observed. It is suggested that at least a part of wages should be based on productivity, thus leading to better staff performance at DTC. A proper maintenance schedule needs to be immediately set up for the DTC to improve vehicle productivity. It is also recommended that every fleet should run effectively at least 200 km per day, which is far behind as per the record. Service rules together with strict vigilance should be strictly followed, which will obviously increase the vehicle productivity of the DTC. There has been a slight increase in DTC vehicles' productivity in recent past, which is encouraging. The operation of the fleet employed by DTC needs to be improved urgently. A standard norm of fleet utilisation for each depot should be fixed by the DTC on the basis of distance travelled, overcrowding and the average age of fleets. It is suggested that the DTC should take initiative measures to improve fleet utilisation to at least 90%, which has been successfully done by the BMTC. Therefore, a comparison may not always be accurate owing to unfair competition between DTC and BMTC, but DTC has a lot of room to increase its efficiency by making the best use of its resources.

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Appendix
Exhibit 3: F test results for sample variances

(i) F-Test for Two-Sample Variances of Revenue/Km (Rs.)		
SRTUs	**DTC**	**BMTC**
Mean	43.36	32.67
Variance	1411.37	201.67
Observations	20	20
df	19	19
F		6.99
F Critical one-tail		2.16

(ii) F-Test for Two -Sample Variances of Cost/Km (Rs.)		
SRTUs	**DTC**	**BMTC**
Mean	137.43	33.29
Variance	12181.90	327.31
Observations	20	20
df	19	19
F		37.21
F Critical one-tail		2.16

(iii) F-Test Two -Sample for Variances of Fleet Utilisation (%)		
SRTUs	**DTC**	**BMTC**
Mean	82.19	92.23
Variance	24.46	12.91
Observations	20	20
df	19	19
F		1.89
F Critical one-tail		2.16

(iv) F-Test for Two -Sample Variances of Staff –Bus Ratio (No.)		
SRTUs	**DTC**	**BMTC**
Mean	7.17	5.26
Variance	1.29	0.07
Observations	20	20
df	19	19
F		18.00
F Critical one-tail		2.16

(v) F-Test for Two -Sample Variances of Staff Productivity (Kms/Staff/ Day)		
SRTUs	**BMTC**	**DTC**
Mean	38.75	23.55
Variance	18.43	16.04
Observations	20	20
df	19	19
F		1.15
F Critical one-tail		2.16

(vi) F-Test for Two -Sample Variances of Vehicle Productivity (Kms/Bus/Day)		
SRTUs	**DTC**	**BMTC**
Mean	169.87	211.86
Variance	401.82	51.58
Observations	20	20
df	19	19
F		7.79
F Critical one-tail		2.16

(vii) F-Test for Two -Sample Variances of Profit or Loss per Bus/Day (Rs.)		
SRTUs	DTC	BMTC
Mean	-14337.65	-47.85
Variance	132688604.66	744933.19
Observations	20	20
df	19	19
F		178.12
F Critical one-tail		2.16