

Public Transportation Management Strategy for Temple City

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Abstract: *The bus Transport industry has a lion's share in India's economic development. Due to easy accessibility, flexibility of operations, door to door service, the bus transportation is a boon to the public. In fact, the progress of a nation and progress of its transport industry is complementary to each other. India has the world's fastest growing economies today, which increased thrust on development of infrastructure in the country to reduce the traffic congestion due to increased traffic demand. Nowadays, various mode of transportation is being used in metro cities such as Chennai, Mumbai, Delhi, etc [2]. Comparing other modes of transportations bus transportation in India supports for the poor and the lower middle class as an easy and affordable mode of transport. The contribution of bus transport in GDP to the nation is of about 1.2% which is 25% of contribution of all the transportation sectors in India [1]. Hence, to use the bus transportation effectively, bus management and depot management is necessary. Madurai is a lotus shaped city built around the Meenakshi temple with the city streets in concentric circles. Madurai is well versed with air transport, rail transport and bus transport network but most of the people use two wheelers and buses for transportation. The city's bus transportation is contributed by 16 depots totally with five depots in zone I, two depots in zone II, three depots in zone III and six depots in zone IV to spread the bus service throughout the city. This paper, in prior concentrates only on bus transportation, though 70% of Madurai population uses bus transport to migrate. A study of category analysis among the depot in Madurai has described in this paper.*

Index Terms: Bus; Category analysis; Depot; Madurai

I. INTRODUCTION

Tamil Nadu is in the forefront of the Indian subcontinent in providing an efficient transport service to the people. Transport facilities are a basic ingredient in a modern society for bringing people together and for the improvement of the society. The Tamil Nadu Government, with its transport corporations, provides various types of service like metro, mofussil, express, ghat services etc., to bring the people together. Whether it rains or shines, efficient and safe transport operation is continued in all parts of Tamil Nadu by the State Transport Undertakings. The Transport Department is having under its control 18 State Transport Undertakings including Tamil Nadu Transport Development Finance Corporation, Pallavan Transport Consultancy Services Ltd., Institute of Road Transport, Chennai and Motor Vehicles Maintenance Department. The Transport Department is also the Nodal Agency in the State Government in respect of projects implemented by the Southern Railway, Postal and Telecommunication Department and the Civil Aviation

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Department of the Government of India, within the State of Tamil Nadu [11]. This paper deals with the depot Madurai district. The Pandiyan Roadways Corporation Ltd with 346 buses along with the Depots and workmen were taken from M/s Southern Roadways Private Ltd, Madurai. Subsequently the name of Pandiyan Roadways Corporation Ltd. was changed to Tamil Nadu State Transport Corporation (Madurai Dvi I) Ltd [5].

Meanwhile, India, one of the fast developing nations, has well equipped self-sufficient transport system which caters to the needs of people by way of air, water and land. Transportation system in India has been the unavoidable contributory factor for the development of the economy of the nation [3].

II. PUBLIC TRANSPORT

Urban Cities play a vital role in promoting economic growth and prosperity. The development of cities largely depends upon their physical, social, and institutional infrastructure. In this context, the importance of urban transportation is paramount. There must be a general recognition that without public transport, cities would be even less viable. There is a need to encourage public transport instead of personal vehicles. This requires both an increase in quantity and quality of public transport and effective use of demand as well as supply-side management measures. The tasks of urban public transportation are to meet the increasing demands of all kinds of passengers and to earn corresponding social and economic profits in a prescribed period of time by providing high quality of service based on limited public traffic vehicles.

III. BENEFITS OF PUBLIC TRANSPORTATION

The public transportation can help a community expand business opportunities, reduce sprawl, and create a sense of community through transit-oriented development. For these reasons, areas with good public transit systems have economically thriving communities and offer location advantages to businesses and individuals choosing to work or live in them. Public transportation also helps to reduce road congestion, travel times, air pollution, energy, and oil consumption, all of which benefit both riders and non-riders alike. Some of the important benefits of incorporating public transportation are:

- 1) Stimulates economic development.
- 2) Increase of jobs in the related areas like engineering, manufacturing, construction, retailing and other services.

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- 3) Decreases traffic congestion: Traffic is raised due to more number of private vehicles. It can be reduced if the passengers prefer traveling in public transportation vehicles.
- 4) Improves air quality and reduces energy consumption: Public transportation helps promote cleaner air by reducing use of private vehicles and adhere to pollution norms.
- 5) Ensure safety.

IV. ISSUES IN BUS TRANSPORTATION

- Overcrowding due to inadequate system,
- Poor depot management,
- Inefficient & uneconomic bus routes,
- Frequency of service & schedule is not strictly adhered,
- Frequent stopping & starting needs more fuel consumption,
- Wear & tear of vehicle.

V. DEPOT OF MADURAI CITY

Madurai district is constituted with four zones namely Zone I, Zone II, Zone III, Zone IV with 100 wards.

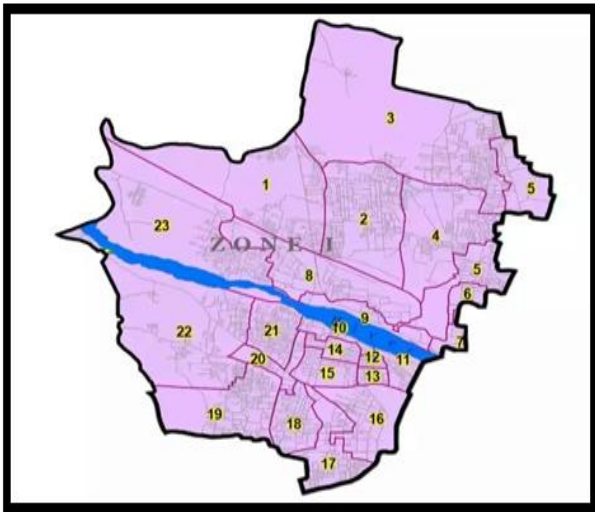


Fig 1: Zone I

Zone I is situated to the North of Madurai. The population of zone I is of about 3,08,013 lakhs. This zone holds the second highest population in Madurai when compared to all the other zones. The area size of zone I is of 37,350 sq.km. This zone comprises of 23 wards with a counting of 1-23.

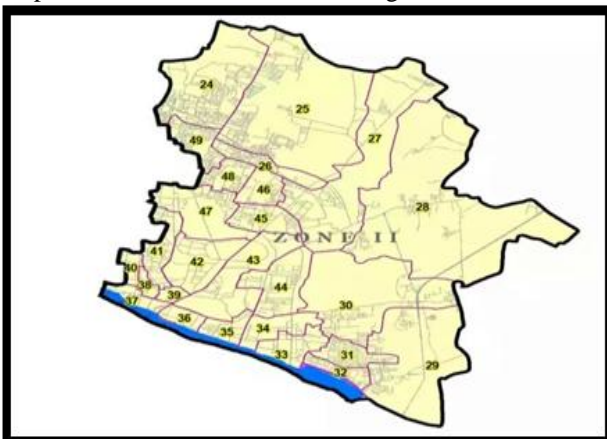


Fig 2: Zone II

Zone II is situated to the North-East of Madurai. The population of zone II is of about 3,02,835 lakhs. This zone holds the third highest population in Madurai. This zone comprises of 25 wards with a counting of 24-49. Zone II covers a larger area of about 46,940sq.km when compared to all the other three zones.

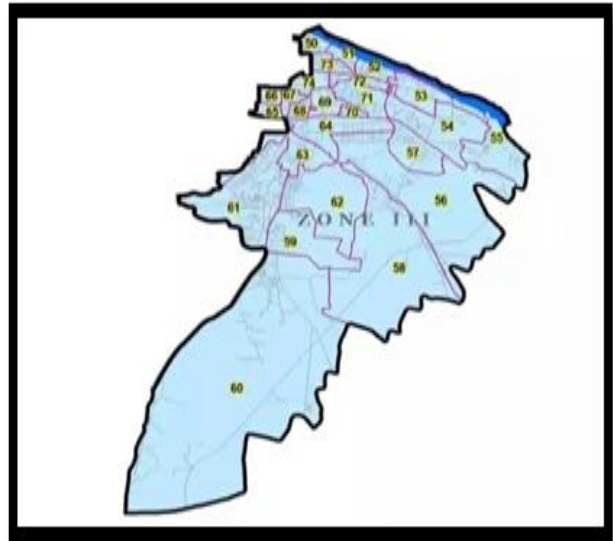


Fig 3: Zone III

Zone III is situated to the South of Madurai. The population of zone III is of about 2,79,652 lakhs. This zone holds the lowest population in Madurai among the four zones. This zone comprises of 25 wards with a counting of 50-74. Zone III covers a smaller area of about 27,012sq.km when compared to all the other three zones.

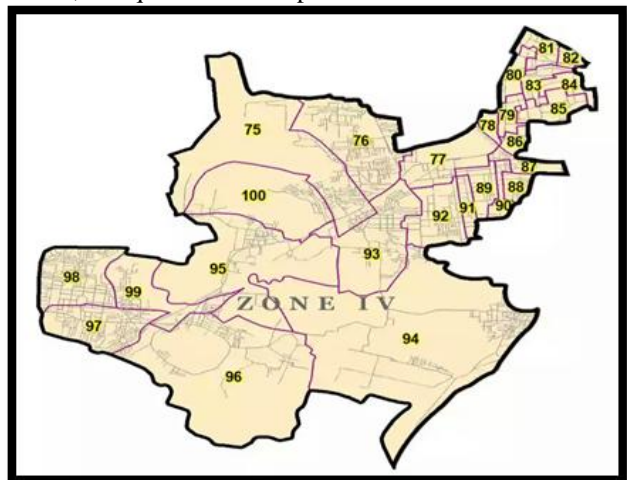


Fig 4: Zone IV

Table 1: List of depot in Madurai

Sl. No	DEPOT	ZONE
1.	Sholavanthan	I
2.	Bypass Central Branch	I
3.	Melur	II
4.	Puthukulam	III
5.	Usilampatty	I
6.	T.Kallupatty	IV

7.	Sipcot	IV
8.	Pasumalai	III
9.	Checkanoorani	I
10.	Thirupuvanam	III
11.	Thiruparankundram	IV
12.	Thirumangalam	IV
13.	Ellis Nagar	I
14.	Ponmeni	IV
15.	Puthur	II
16.	Thirunagar	IV

VI. METHODOLOGY

The methodology of this paper deals with identification of factors, Category analysis of factors and establishing inter-relations were compared with the basis of 7.5 norms. Data was collected from the questionnaire survey and a desired line diagram is created to know the frequency of trips from each depot. A detailed study of literature review has been undergone to understand the management of depot in a city or district. This helped to attain and to understand the factors affecting the bus services in terms of regulatory framework, frequency of trips, vehicle size and type, fleet size, operating costs, operating practices in each depot, vehicle maintenance and bus utilization. The identified factors were taken into an account for category analysis and the trips generated from each depot were projected in a desire line diagram to know the attraction and generation points in the district. Finally, the analysis investigated the issues in depot management by the operators with a suitable suggestion. Further the factors identified above were transposed into a sixteen open and closed survey questions and circulated to the selected key employers working in each depot. Factors were aimed and applied to the main factors such as service, operation and maintenance, time/travel and cost. This was achieved by applying the category analysis in comparison towards the 7.5 norms provided by the government of Tamil Nadu

A. Description of 7.5 norms

A set of rule or a framework is followed by the government of Tamil Nadu in to set the bus depot and to maintain it effectively. Generally every depot should be consisted of,

- Re-fuelling system
- Workshop for repairs
- Wash bay
- Heating ramp and parking lots for buses
- Administrative staff buildings
- Parking for external vehicles

Table 2: Description of 7.5 norms by Government of TN

DESCRIPTIONS	NOMINAL VALUES
Land size	Not less than 35,000m ²
Average buses	45-80
Water supply per day	35-40m ³
Washing a bus	0.35m ³
Employees per depot	200-350
Space needed for a bus	12m x 5m
Spare drivers and conductors	10 / 10

Spare bus per depot	3-4
Recovery van per depot	1-2
Diesel per bus to be filled	130 litres
Workshops	i)Maintenance department ii)Tyre threading iii)Wash bay
Safety	i)Fencing and gates ii)Transponder for buses iii)Card/Code lock iv)Intercom for staffs
Service Limits	10-12km radius surrounding each depot
Trips per day	8-singles & 16 doubles

B. Category Analysis

The parameters extracted from the questionnaire have taken into account to differentiate the existing facilities provided in every sixteen depot of Madurai. This helps to identify the needs and the further progress of each depot. Simultaneously, category analysis provides a citation to suggest each depot with able management strategies. This part discussed graphs and tables about each of the main factors such as number of buses, number of employees, spare drivers and conductors, recovery vans in each depot and other factors and also the desire line diagrams. So, the comparison of each parameters from all the sixteen depots has been enlisted in a table to make clear that which depot satisfies the 7.5 norms provided by the government of TamilNadu.

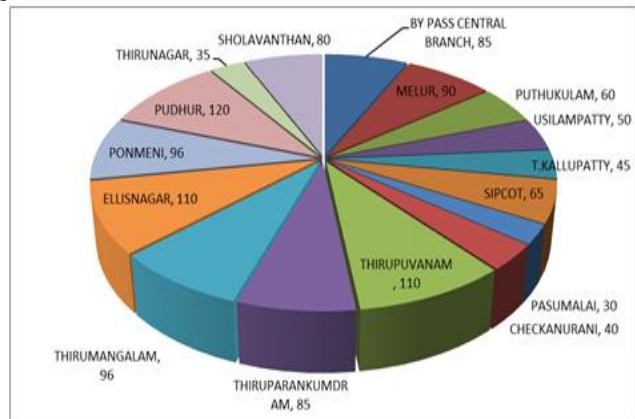


Fig 5: Buses in Depot

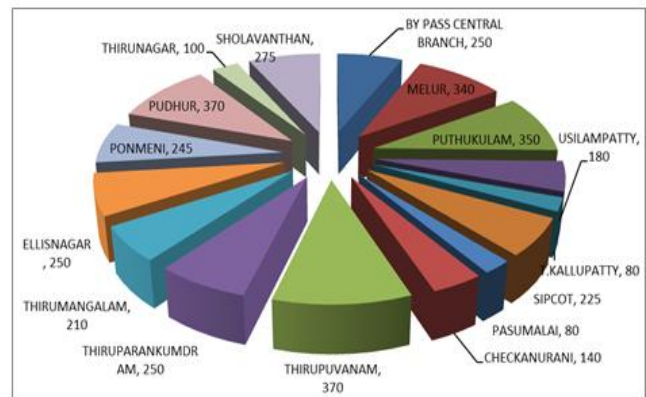


Fig 6: Employee

Buses in each depot should satisfy the norms of having



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90-100 buses. Among the 16 depot, 4 depot does not satisfies in accordance to the norms with a number of less than 40 – 35 buses per depot. Among them Pasumalai and Thirunagar depot suffers a lot with minimum number of buses. The recruitment of employees in each depot was done on a basis of availability of buses per depot. To handle a single bus 10 employees were appointed in terms of 2 drivers and 2 conductors, 1 spare driver and 1 spare conductor, and a set of 4 mechanics in terms of 2 general mechanics and 2 tire re-capping men's were set.

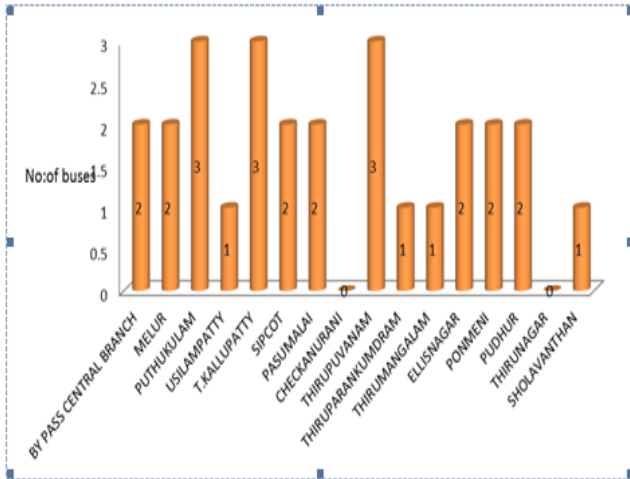


Fig 7: Intake of New Buses

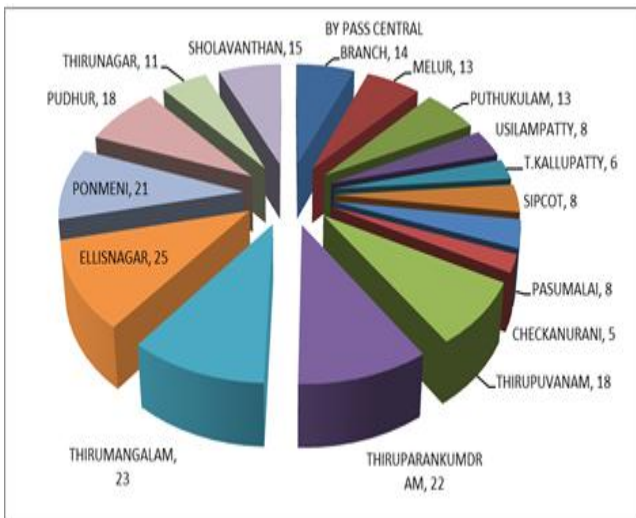


Fig 8: Low Floor Buses

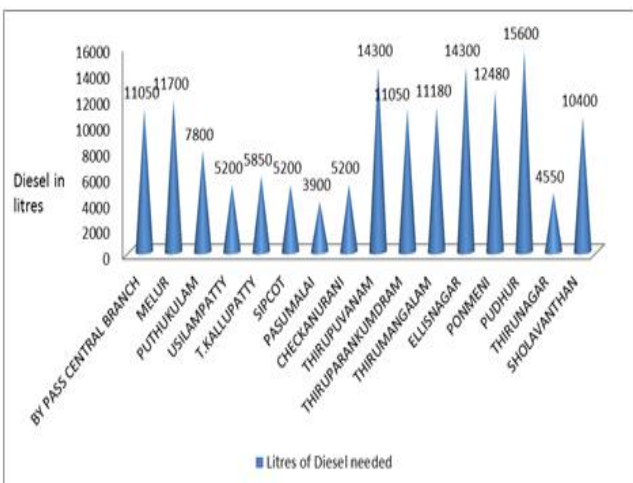


Fig 9: Diesel Demand Per Day

Among the 16 depot the larger depot with ample of buses

satisfies the norms, whereas the smaller depot with less number of buses fails the norms by providing “zero” intake of new buses per year. Super Low Floor buses(SLF) in each depot found to be available at a rate of 10 per depot. The availability or non-availability of these buses in each depot does not affects the norms, but the presence of these buses supports the senior citizens to board and lodge the buses in a comfortable manner, though the floors were at a ground clearance of 80-100 cm. Diesel availability of each depot depends upon the number of buses in each depot. As a rule a bus should be filled with 130 liters of diesel per day. Pasumalai depot fails the norms in this scenario with 80 liters of diesel per buses per day. The other parameters such as Earned Value per Kilometer (EVKMPL), sharing of shifts of drivers and conductors were maintained as a equal target in each depot. The Earned Value Per Kilometre is fixed as 34 rupees per kilometer. Spare drivers and conductors were provided at a range of 2 per buses and shared equally in each depot.

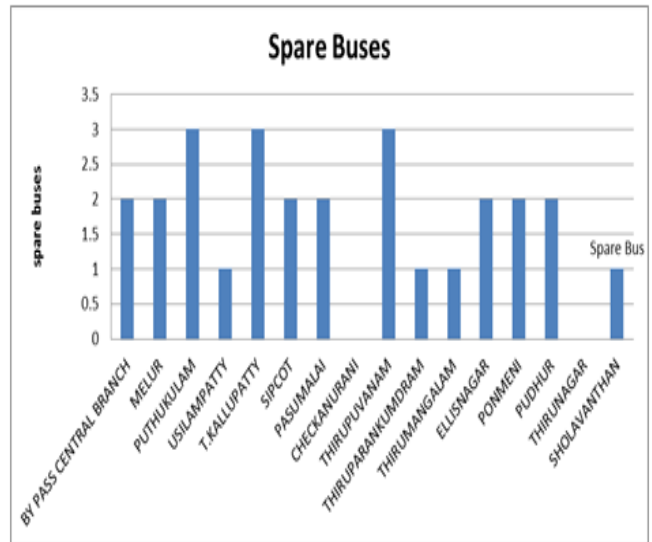


Fig 10: Spare Buses

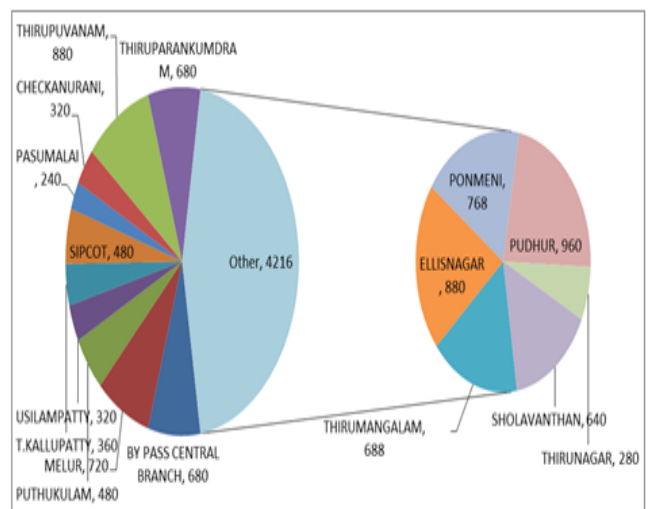


Fig 11: Trips per day

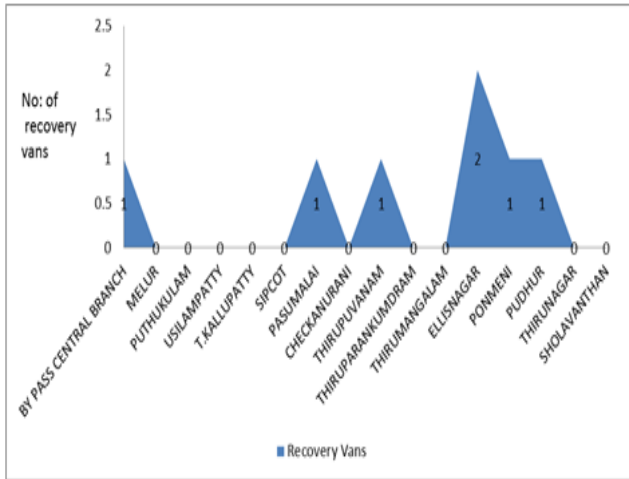


Fig 12: Recovery Vans

The presence of recovery vans per depot should not be less 2 per depot. But the depot administrative regulation scrutinized the act as having 2 recovery vans per zone, so there is no lag in providing recovery vans to each depot. The number of trips from each depot is assigned as 8 trips per buses. This may include single and double trips.

Table 3: Comparisons with Respect to 7.5 Norms

DESCRIPTIONS	COMPRISING 7.5 NORMS	NOT COMPRISING WITH 7.5 NORMS
Buses	Puthur	Pasumalai
Employees	Puthur, thirupuvanam	T.kallupatty
Intake of new buses	Puthukulam	Checkanoorani
Low Floor Buses	Ellis Nagar, T.Mangalam	Sipcot, Pasumalai
Litres of diesel per day	Puthur	Pasumalai
Earned value kmpl	Equal target 34 rupees per kilometre	Equal target 34 rupees per kilometer
P.M. and A.M. Shift of drivers and conductors	Equal target	Equal target
Spare buses	Puthukulam, thirupuvanam	Thirunagar
Recovery vans	Ellis nagar	Remaining 15 depots
Trips per day	With available buses	With available buses
Spare drivers and conductors	Equal target	Equal target

VII. CONCLUSION

Diesel demand in each depot is in an oscillating cycle. Among the sixteen depot provision or demand of diesel for Pasumalai depot makes to feel the operators not to satisfy the stipulation. This makes Pasumalai depot in zone III to experience a least number of trips and with less number of buses. As per 7.5 norms provided by the government of

Tamil Nadu, every bus should be pumped with 130 litres of diesel per day and the bus demand should be satisfied with 45-70 buses per depot. The bus in Pasumalai depot gets only 80 litres of diesel per day, though the buses from these depot experiences less number of trips within and outside zone III. Remaining 50 litres of diesel is used for the body building unit garage in Pasumalai, which makes the operators in Pasumalai to feel perplexity to manage the diesel efficiency in the depot. The lack of these two criteria makes the depot operators to manage the depot of Pasumalai in an ineffective manner. Providing 38.46% of diesel demand will reduces the operator’s difficulty in Pasumalai depot and will increases the number of trips in zone III. So, the follow-up of the 7.5 norms will definitely contribute to the success of bus transport in Madurai.

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