

Impact of Kochi Metro Rail on Traffic Environment

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ABSTRACT: Transportation infrastructure development plays an important role in city growth. Prime objective of introducing a mass rapid transport system (MRTS) such as metro rail is to reduce the number of motor vehicles on road, thereby reducing traffic congestion & air pollution. It also ensures that all people living or working within the transit influence area has equal access to the transit.[1] Some of the major issues with Kochi city traffic are the ever increasing traffic congestion on major roads within the city centre and the downward trend of average daily metro passengers. This research aims to evaluate the effect of Kochi metro rail on traffic environment. The study is motivated by the following hypotheses: The introduction of metro rail is likely to reduce city's traffic congestion.

KEYWORDS: Traffic Environment, Transit Influence Area, MRTS, Congestion, Accessibility

I. INTRODUCTION

Kochi is one of the major commercial cities in Kerala and has seen unusual growth in urban form in the past few decades. [2] Rural-urban migration lead to changes in land usage in the city and haphazard development took place. However, the supply of infrastructure need, like transportation and civic amenities has helped in achieving a partially balanced development. But the uncontrolled urban development is raising some serious issues to the city life.

Due to development of construction industry in Kochi there was a huge influx of migrant labours from North & North Eastern India during the period 1990-2000. [3] The urban growth towards the North direction in Kochi was due to the development of satellite towns like Aluva and Angamaly. The urban growth towards the East direction was due to the development of the IT sector and the special economic zone. [1] To meet

the needs of the growing population, metro rail was considered as an ideal solution by the Kerala government and planning authorities. The metro corridor connected 22 stations in a phase-wise manner, starting from Aluva to Petta and it was open to public in 2017. This research aims to carry out an evaluation of impact of metro rail on Kochi city traffic.

NEED OF THE STUDY

A metro rail transport is preferred than other modes when the road capacity becomes insufficient to carry large number of vehicles.[4] According to taxi drivers in Kochi, with the extension of Kochi metro rail from Palarivattom to Maharajas College in 2017 the running time of the vehicles has got reduced to 40- 50 minutes from one hour to reach the city from Aluva.[5] But according to the study conducted by NATPAC on 2020, the traffic is slowest on major road stretch such as Madahava pharmacy junction to Kacheripady junction, Pallimukku junction to Jose junction and Kaloor junction to Deshabhimani junction. So the research aims to find out the current situation of traffic along the major roads and analyse the observations.

AIM

Research aims to evaluate the impact of Kochi metro rail on traffic environment.

OBJECTIVE

The research has four objectives:

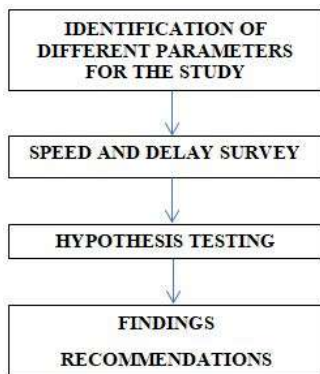
- To study about metro rail transport system and its various impact on traffic environment.
- To study the different parameters required for detailed study of metro rail impact on traffic.
- To study the different methods employed across the world for impact study of metro rail system on traffic and the public.

- To identify the impact of Kochi metro rail on the traffic environment with the help of comparative analysis on traffic characteristics.

LIMITATION

- The study is limited to the major roads within the city centre such as SA road, MG road and Banerji road.

II. METHODOLOGY



III. LITERATURE

[6] Mass rapid transit system is considered as an ideal solution to meet the growing transportation needs of the modern world. It can carry a large number of people and reduces traffic congestion and pollution.[7] With the introduction of mass transit, the station surrounding is likely to experience change of land uses, improved accessibility and reduced road traffic congestion. The area that experiences these changes is called impact area or transit influence area. This area is usually within reasonable walking distance from the metro station. An area of this size tends to experience the greatest impact from station area.

[8] Traffic environment can be defined as a combination of moving vehicles and road traffic situations that can influence the behavior characteristics of a road user. [9]The impact of metro rail on traffic environment can be studied by comparing the traffic characteristics like speed of the moving vehicles and delay time before and after the metro is introduced. The level of traffic congestion incoming to the study area before and after the implementation of the metro station can be recorded by conducting a speed and delay survey along the metro stretch. [10] A minimum of 4 samples must be taken to analyse the average speed and delay time.

IV. STUDY AREA

[1] Mobility need of the Kochi people are met through integrated public transport system. IPT

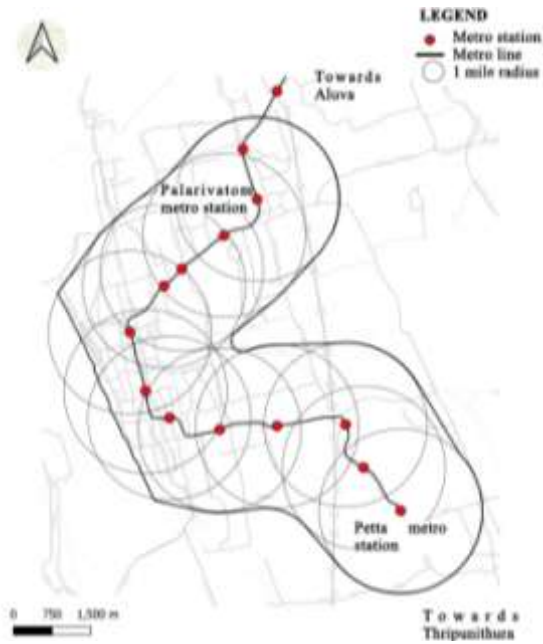
system includes, KSRTC, KURTC, Private buses, auto rickshaws, ferry and metro rail. City area that currently faces the major traffic issues is the commercial area and campus zone in the west side and the mobility hub in the east direction. The study area includes the major road stretches that connects people to the commercial center (Broadway market), campus zones (Maharajas College) and mobility hub (Vytila hub). So the study mainly focuses on the road stretches such as Banerji road, MG road and SA road. The total length of the study corridor is 13km.



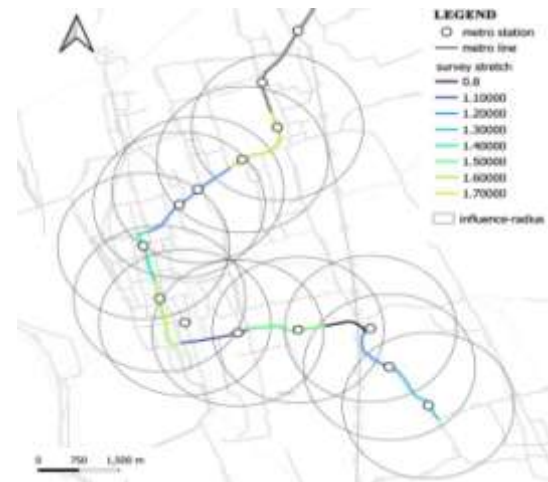
[11]Greater Cochin Development Area & the metro corridor



[11]Cochin Municipal Corporation & the metro corridor

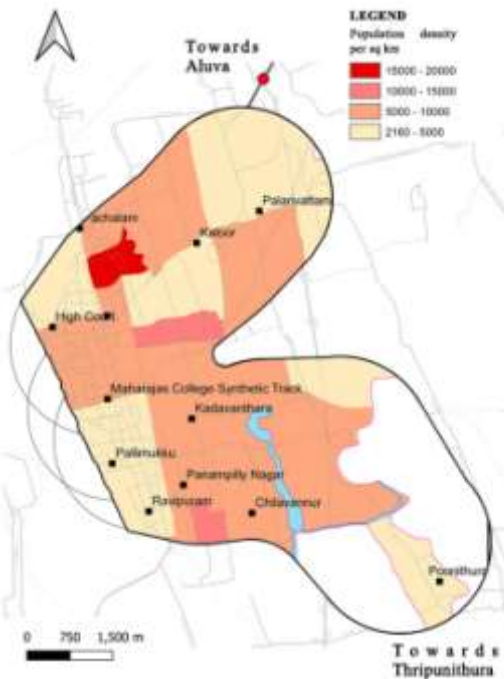


Study Area: Palarivattom to Petta Metro roadcorridor



Survey stretch

Survey stretch taken for the study is from Mamangalam junction to Petta junction. Total length of the stretch is 13 km. It covers 12 metro stations (Palaravattom to Petta) and 15 major road intersection in the city.



[12]Population Density



[13]Major Road Intersections in the Study Area

DETAILS OF THE STUDY AREA

[14]SA ROAD

- Carriageway of the stretch Pallimukku to Petta is 7.5 metres on LHS and RHS.
- Width of the footpath on LHS and RHS is 1.5 metres. Width of the median varies from 0.3 metre to 2 metre.

MG ROAD

- Carriageway of the stretch Pallimukku to Madhava pharmacy is 7.5 metres on LHS and RHS.
- Width of the footpath on LHS and RHS is 1 metre. Width of the median is 0.5 metre.

SPEED & DELAY SURVEY

Survey was conducted during the month May, 2022. A test vehicle was used to record the observations. Observations were recorded four times for each stretch using multiple stop watch application.

V. OBSERVATION AND FINDINGS



DeshabhimaniJn images with observation marks



LissieJn images with observation marks



Kadavanthra JN images with observation marks



PallimukkuJn images with observation marks

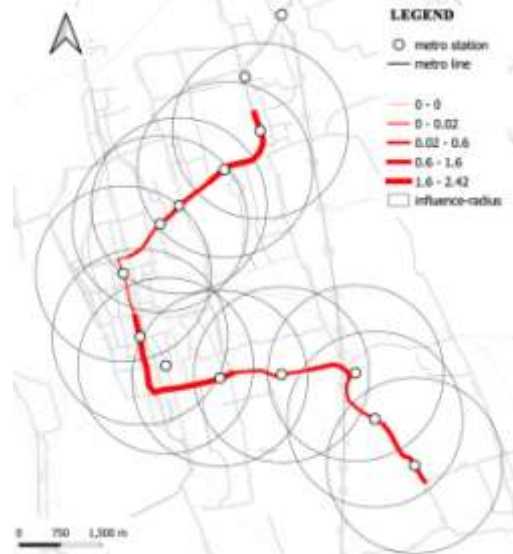


KadavanthraJn images with observation marks

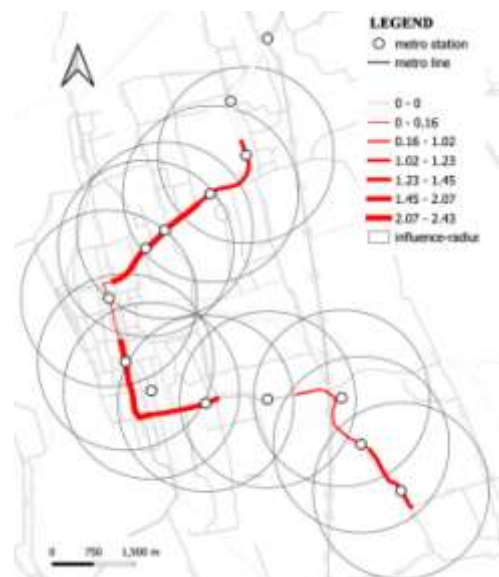
From the observations we can see that the majority of vehicular population consists of two wheelers.



Kacheripady survey point images with observation marks



Level of Congestion/delay along Metro Rail corridor in 2022



[13]Level of congestion/delay along metro rail corridor in 2013

Table 1 Observed Journey Speeds and Running Speeds – Metro Corridor, 2022s

SL.NO	SURVEY POINT TO SURVEY POINT	DISTANCE IN KM	JOURNEY TIME TAKEN IN MINUTES	AVERAGE JOURNEY SPEED (KMPH)	DELAY IN MINUTES	AVERAGE RUNNING SPEED (KMPH)
1	Mamangalam to Deshabhimani Junction	1.7	6.02	16.95	1.95	25.5
2	Deshabhimani Junction to Lissie Junction	1.2	3.83	18.78	1	25.4
3	Lissie Junction to Kacheripady	1.2	3.27	22	005	22.38
4	Kacheripady to Shenoy's	1.4	4.62	18.19	0.02	18.26
5	Shenoy's to Valanjambalam	1.6	6.08	16.76	2.1	25.6
6	Valanjambalam to Kadavanthra	1.1	6.06	11	2.42	18.41
7	Kadavanthra to Janatha	1.5	3.07	29.3	0.05	30.5
8	Janatha bus stop to Vyttila bus stop	0.8	4.11	11.65	1.6	19.07
9	Vyttila bus stop to Thaikoodam	1.2	3.5	20.57	0.6	24.8
10	Thaikoodam to Petta	1.3	3.7	21.08	1.54	36

[13]Table 2 Observed Journey Speeds and Running Speeds – Metro Corridor, 2013

SL.NO	SURVEY POINT TO SURVEY POINT	DISTANCE IN KM	JOURNEY TIME TAKEN IN MINUTES	AVERAGE JOURNEY SPEED (KMPH)	DELAY IN MINUTES	AVERAGE RUNNING SPEED (KMPH)
1	Mamangalam to Deshabhimani Junction	1.7	5.32	19.17	1.25	27.79

2	Deshabhimani Junction to Lissie Junction	1.2	4.09	17.6	2.12	45.86
3	Lissie Junction to Kacheripady	1.2	3.56	20.22	2.07	48.32
4	Kacheripady to Shenoy's	1.4	4.53	18.54	0.14	19.13
5	Shenoy's to Valanjambalam	1.6	5.15	18.64	2.43	35.29
6	Valanjambalam to Kadavanthra	1.1	3.57	18.49	2.04	43.14
7	Kadavanthra to Janatha	1.5	4.59	19.61	0	19.61
8	Janatha to Vyttila bus stop	0.8	2.46	19.51	0.21	21.33
9	Vyttila bus stop to Thaikoodam	1.2	3.59	20.06	1	27.8
10	Thaikoodam to Petta	1.3	3.41	22.87	1.36	38.05

Speed and delay survey (Table 1&2) shows that the average journey speed of the road stretches Valanjambalam to Kadavanthra has gone down to 15km/hr. from 18.49 km/hr. Average journey speed of the stretch Janatha to Vyttila bus stop has also gone down to 11.65km/hr. from 19.51 km/hr. This drop in average speed has occurred due to stopped delay. Waiting time of the public buses and auto rickshaws has caused the stopped delay in addition to the signal time. This delay could have been avoided if there was enough space for the buses to stop and board people safely. A bus bay that could allow three buses to stop at a time is required along this stretch.

Survey data (Table 1&2) also shows that the average journey speed of the road stretch Lissie Junction to Kacheripady has improved. This improvement must have caused due to the metro preference of the people living or working within the passenger catchment area of this stretch.

CONCLUSION

The main thrust of this research was to study the impact of a metro rail on Kochi's traffic environment. Two parameters were chosen to understand the effect of metro rail. Those parameters are speed in Km/Hr. and delay in minutes. Addition of new transit modes which may motivate people to use public transport rather than private vehicles will help reducing traffic congestions.

In the research area, we can see that average running speed of the road corridor such as Valanjambalam to Kadavanthra and Janatha to Vyttila bus stop was better before the implementation of Kochi metro. Close proximity of large number of bus stops along the intersections and absence of adequate bus bay area has caused destruction to moving vehicle. It also causes inconvenience to the pedestrian movement. It is suggested to relocate the bus stops away from intersections in a congested road area. Adopting traffic calming techniques like raised crossing, surface treatment and wider median can ensure the

safe access of the pedestrian to metro, thereby avoiding the vehicular congestion on roads.

The connectivity of the network to other transit mode is necessary for efficient operation of the transit system. In addition to integration of other mode of transport, connectivity to neighboring CBD areas and counter magnets area is necessary for full filling the purpose of the metro system. Further research has to be done for identifying the possibility of Transit Oriented Development in Kochi metro station areas. A properly planned TOD can ensure that the people living or working within the station area has equal access to the transit and other facilities.

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