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Determining the Impact of Public Transportation on Urban Mobility: A case study of Banasthali-Sundhara Urban Road

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Abstract
According to a survey of relevant literature on the topic of public transportation and its impact on mobility, a high reliance on this mode of transportation boosts the efficiency of urban mobility while also reducing congestion. According to the literature examined, having an effective public transportation system fosters a safe, sustainable, and egalitarian metropolitan environment.The purpose of this study is to see how public transportation in Kathmandu affects the city's urban mobility. It also evaluates the many techniques and approaches that can be established to enable this mode to play a key part in reducing the city's current level of congestion.The study's research and conclusions are largely based on secondary data; nonetheless, Primary data, on the other hand, has been generated and examined using sample surveys and observation. Despite the fact that an effective public transportation system is the greatest approach to maximize urban mobility, the overall findings of this study revealed that in Kathmandu, this mode of transportation is in critical condition to begin with.
Furthermore, an increasing reliance on vehicles with limited passenger carrying capacity, such as private cars and minibus micro bus, has resulted in clogged intersections and high traffic. Other problems include the city's lack of a prominent core area and demand overlap. The key obstacles that need to be addressed in order to develop an efficient public transportation system in Kathmandu have been highlighted as arising from the similar working hours that are followed for practically all institutions in the city. Other elements at play, such as existing transportation infrastructure, socioeconomic realities, and conventional traffic management procedures, were also addressed while examining strategies to make this mode more efficient. Finally, this thesis offers recommendations centered on policy issues and decision-making factors. In addition, there are some quite precise and specific answers to several existing public transportation issues.

Keywords
Public transportion, mobility, clogged intersections, demand overlap, transportation issues

1. Introduction

Anyone who pays the specified fares can utilize public transportation, which is a shared passenger transportation service. Three-Wheeler's, mini/micro buses, buses, trolleybuses, trams, trains, and ferries are examples of modes that operate on set itineraries. High-capacity public transportation systems may influence the urban form and quality of life in cities, in addition to lowering congestion and air pollution by providing transportation services to a large number of people.[1] The goal of a public transportation system is to maximize the utilization of urban space while also providing well-organized and inexpensive mobility. However, in developing nations like Nepal, a key source of concern is that, while urbanization continues to accelerate, public transportation's modal share remains unchanged.[2] Despite the tremendous increase in Kathmandu's population in recent years, public transportation is still in little supply to provide commuters with a comfortable, hassle-free travel on a daily basis. There are no clearly established schedules, and the cars are often in poor condition, dirty, and overcrowded and uncomfortable.

Private vehicles are becoming more common on Kathmandu's streets. Micro buses, minibuses, and buses are examples of public transportation that are typically quite packed and uncomfortable to stand in as well as sit in. The public transportation system lacks a well-defined travel time plan as well as adequate bus stops. These factors are encouraging people to choose private transportation. The reliability of public transit is deteriorating. Public transportation

has a high level of dissatisfaction.[3]

It is vital to have a system now that encourages people to use public transportation. Four elements are critical in determining public satisfaction with transportation services from the user's perspective: time, cost, dependability or predictability, and comfortable service. The key urban transport requirements for planners in the Kathmandu valley are management of travel demand by modes of transportation, as well as fair allocation of road space in favor of pedestrians and public transportation; an upgraded public transportation network and facilities with improved operations and enhanced traffic management.

1.1 Statement of problem

In the Kathmandu valley, the quality of public transportation is deteriorating, and as a result, the usage of other modes, particularly motorcycles and private cars, has risen dramatically in recent years. The motorcycle and private vehicles account for the largest share of motorized forms of transportation, while the bus has a smaller share. As a result, the city is experiencing traffic congestion and parking challenges, longer commutes, public transportation insufficiency, non-motorized transportation difficulties, and a loss of public space.[4]

In the current state of public transit in the valley, there are a number of issues that the Department of Transportation and the Metropolitan Traffic Police Headquarters are attempting to address. People have been confronted with numerous issues such as traffic congestion, accidents, pollution, and many more, all of which have had a direct impact on their life. People are unable to obtain appropriate transportation services, which has harmed their livelihood. Every day, the scope of the problem has grown exponentially.[5]

1.2 Research Questions

On the basis of above problems following research questions has been formulated

- What are the impacts of public transportation on urban mobility?
- What are the possible strategies and approaches for promotion of public transportation?

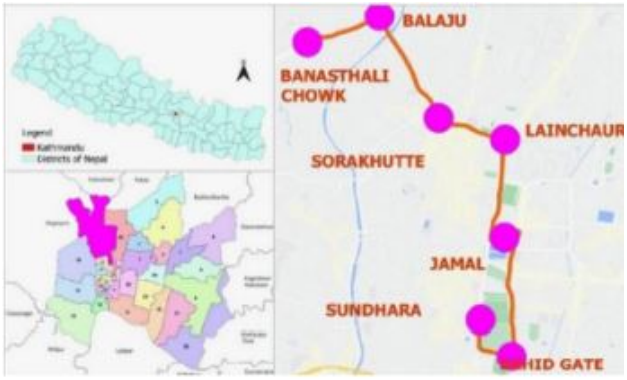
1.3 Research Objectives

The study's major objective is to determine the impact of public transportation on urban mobility. Specific objectives of the research are to

- Determine the factors that influence public transportation performance.
- Determine the linkage between Public Transportation and mobility
- Identify people's travel habits in the study region
- Determine Policy implications for public transit promotion

1.4 Study Area

The study road section lies in the urban area of Kathmandu District. Covers the area of 5 sq. km starting from Banasthali chowk to Sundhara.



2. Research Methods

2.1 Data Collection

Primary and secondary data have been collected for the study

2.1.1 Primary Data collection

Primary Data Collection The major primary data collected during the study involves the trip characteristics of public transportation (speed, delay, passenger in and out) and people of primary data are: perception towards public transportation services. The methods adopted during the collection of primary data are:

- Satisfaction Survey (Questionnaire Survey)
- On Board Survey

The questionnaire survey has been collected from the passenger using the public transportation services within this route, either by collecting at station or during the trip. For On Board Survey, A public transportation is randomly chosen and is travelled through the route in the same vehicle. While traversing all the stopped stations, number of passengers getting in or out of the bus at respective station, time of various types of delay (fixed and operational), time elapsed between two stopping station and total time elapsed to cover the whole route is noted down. The trips were made at different course of time in each direction. Various sets of data from two bus service providers, covering morning peak (9:45AM – 11:30AM), evening peak (6:00 PM6:30 PM) and off peak (3:00 PM) was collected during the study.

2.1.2 Secondary Data collection

Secondary data like number of vehicles operated by the operators in this route, their time tables, vehicular composition, public vehicle route and their frequency, passenger travel trip demand, was collected from these bus operators plying on this route.

2.2 Data Analysis

Following the gathering of study data, the data will be analyzed and its meaning will be determined. The obtained data from various sources is analyzed and arranged into representative categories in order to arrive at logical conclusions. When dealing with qualitative analysis based on evidence gathered from various sources, great care was taken to comprehend and interpret the data so that it could be combined with quantitative data.

The collected data was used to achieve two key goals: determining the level of satisfaction and evaluating performance. For satisfaction level assessment, a questionnaire survey was employed, while for efficiency assessment, an on-board survey combined with significant primary data was used.

3. Case Study

3.1 Description of the study Section.

Routes of Public transport of Kathmandu district were taken for the study. selected routes originate from the Banasthali chowk and destined at sundhara. The study road section Covers the area of 5 sq. km starting

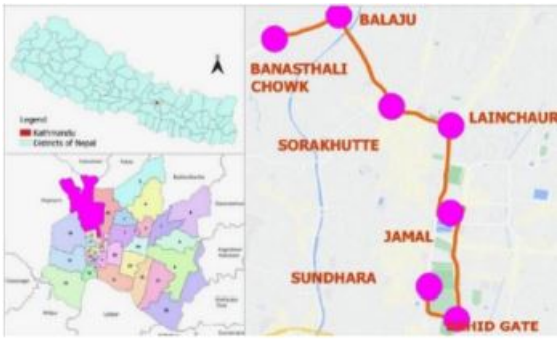


Figure 1: Study Area

from Banasthali chowk to Sundhara. From the visual inspection it is seen that traffic congestion is higher in this study area. So, for the research I have selected major urban road i.e Banasthali chowk to Sundhara. Which is one of the busiest road networks in terms of vehicular movement and traffic congestion. In these cases, random survey was conducted and traffic flow was also studied.

3.2 Road Network

The route starts from Banasthali chowk and end to Sundhara. There is four lane blacktopped road which is connected by many secondary blacktopped and earthen road. Provision of footpaths (1.0m-2m) on both side of road, Except Banasthali-Balaju section. Provision of zebra crossings at various points although some points lack the zebra crossing.

3.3 Public Transportation Along This Route And Related Facilities

Since this route connects many residential areas as well as many schools, hospitals, etc. we can find different mode of transport here. Micro Buses and mini buses are the means of public transportation operated in this route.

This route has many stops where boarding and alighting took place. Such as Bajaju, Dhara galli, Phalful Chowk, Sorhakhutee, Thamel, Lainchaur, Jamal, Sundhara etc. There is one main station of both micro and mini-bus at Banasthali chowk

There are altogether 28 micro buses and 14 mini buses operated from Sundhara to Banasthali Chowk. Departure time for micro bus is about 3-5 Minutes in peak hours and for 5-8 minutes in normal hours. Micro buses wait till they were not fully occupied by passenger. But it is not, then they have to proceed after 10 minutes. Departure time for mini bus is 5-8

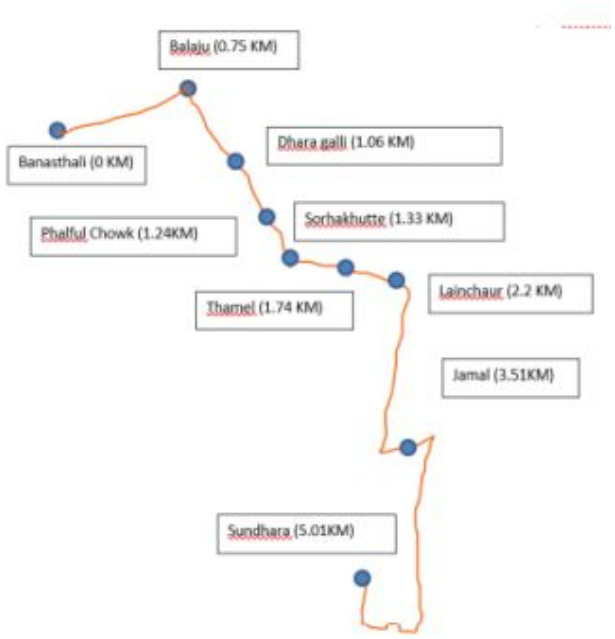


Figure 2: Location of bus stops

minutes in peak hours and 10-15 minutes in normal hours

3.4 Bus Stops

There are altogether 9 nos. of bus stops along this route (Figure:2). As we pass from Banasthali to Sundhara point of these stops are not located properly. And also, almost all these stops are not properly in use. Because according to the requirement of the passenger, micro buses and mini-buses used to stop everywhere

If we consider banasthali Chowk as 0 km, first stop balaju chowk is at a distance of 850m. from balaju chowk next stop Dhara galli is at a distance of 350 m. Third stop is at a distance of 270 m from the second stop. Fourth stop sorhakhutee is at a distance of 450 from third stop. Thamel stop is at a distance of 480 m from sorakhutte stop. Lainchaur stop is at a distance of 400m from Thamel stop. Jamal stop is at a distance of 1330m from Lainchaur stop and is second longest stop in this route. Sundhara stop is at a distance of 1600 m from Lainchaur stop and is the longest stop among this route. This data shows that, there is no any proper distance between stops. Range between stops is 270 m to 1600 m.

3.5 Route Survey

Route survey was done by different mode of transport. Micro-bus and mini-Bus. Normally by using private vehicle, time taken to travel from Banasthali to Sundhara is about 16 minutes, while by using micro it took average of 22 minutes because of boarding and alighting of passenger Travel time by micro bus was recorded during morning and evening peak traffic time as well as in slack time. Three observations were conducted for the route and travel time was manually recorded using watch. The length of the route was measured from map.

Travel time from banasthali (the origin) to Sundhara (the destination) and Sundhara(the origin) to banasthali (the destination) by mini bus was also recorded in the evening time. Travel time was manually recorded using watch. The length of the route was measured from map

3.5.1 From The Observation Using Micro Bus (At Morning)

Route survey in the the morning was done for two days, at 9:45 am from banasthali chowk to sundhara and at 11:30 from sundhara to banasthali chowk by microbus. At that time, stopping and overtaking among vehicles competing for passengers was extensive. Private vehicles mostly motorcycle frequently overtook on high speed.

3.5.2 From The Observation Using Micro Bus(During Day

Route survey in the day was done for one day, at 3:00 pm from Banasthali Chowk to Sundhara by microbus. At that time, stopping and overtaking among vehicles competing for passengers was not extensive as in the morning. vehicles density is generally low as compared to vehicle density at morning.

3.5.3 From The Observation Using Micro Bus (At Evening)

Route survey in the evening was done for one day, at 6:00 pm from Bansthali chowk to Sundhara at 6:45 from Sundhara to Banasthali chowk by microbus. At that time, stopping and overtaking among vehicles competing for passengers was extensive especially in going period because it is a peak hour time and private vehicles mostly motorcycles frequently overtook on high speed.

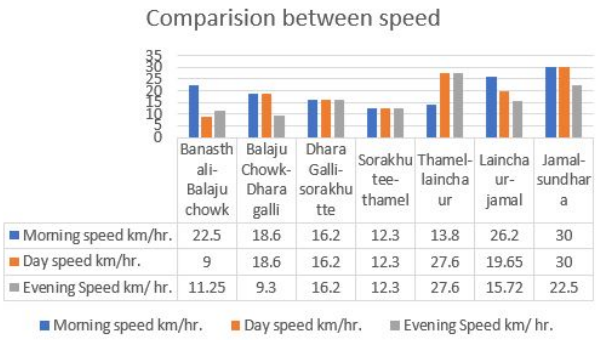
3.5.4 From The Observation Using Mini Bus (At Evening)

Route survey in the evening was done for one day, at 6:00 from Bansthali chowk to Sundhara and at 6:40 pm from Sundhara to Banasthali chowk. At that time,

stopping and overtaking among vehicles competing for passengers was extensive especially in returning period because it is a peak hour time and private vehicles mostly motorcycles frequently overtook on high speed.

3.6 Comparison Between speed of Micro-Bus(Morning, Day, Evening)

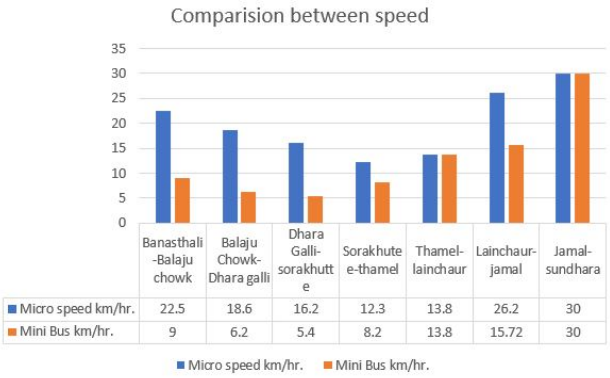
The study area's peak hour traffic is so congested that the speed/flow relationship is becoming more negative. Reduced speed and strained flow have a significant impact on total productivity and energy consumption. As previously stated in the introduction, urban travel in the research area is becoming increasingly inefficient. Mobility can be thought of as a system in which the human, the vehicle, and the road interact. One of the structural aspects that influences the change of urban systems is mobility.



Transport is perhaps the most important factor in determining the overall structure and usage of urban area. When comparing speeds in the study area throughout different time intervals using the same mode of transportation, we can find that morning and evening peak hour speeds are slightly lower than daytime speeds.

3.7 Comparison between speeds (Micro Bus and Mini-Bus)

On Comparison made between the travel speed of micro bus and mini bus on each bus stop on a same travelling time. Slightly travel speed of micro is higher than that of mini-Bus with the average speed of 19.94 km/hr. and 12.61 km/hr. respectively.



3.8 Intersection Observation

3.8.1 Intersection 1: Balaju Intersection

Intersection, the observed length of queue during peak hours was around 210 meters in the direction of Narayan gopal Chowk to kalanki, 90 Meters in the direction Of Kalanki to Narayan Gopal Chowk. 160 meters in the direction of inner to outer ring road. 190 meters in the direction of inner to outer ring road. The recorded vehicle crossing time during peak and slack hours are summarized in Figure 5. The maximum crossing time observed was 7.34 minutes and the observation relates to traffic in the direction of Narayan gopal Chowk to kalanki during morning peak hours.

Direction	Crossing Time (Minutes)					
	Peak Morning (9:00-11:00)		Peak Evening (4:30-6:30)		Slack (13:00-15:00)	
	Range		Range		Range	
	Max	Min	Max	Min	Max	Min
Narayan Gopal Chowk-Kalanki	7.34	4.12	6.12	3.98	3.32	2.16
Kalanki-Narayan Gopal Chowk	5.71	3.86	5.13	3.12	3.56	2.36
In to, out ring road	4.82	3.61	6.53	4.53	2.54	1.75
Out to in ring road	5.91	3.25	5.12	2.98	2.33	1.62

3.8.2 Intersection 2: Sorakhutte Intersection

At Sorakhutte junction the observed length of queue during peak hours was around 61meters in the direction of Balau-Lainchaur, 135 meters on the direction of Lainchaur-Balaju, 56 meters on the Pakanajol-Balaju 160 meters on the teku-lainchaur. The recorded vehicles crossing time during peak and slack hours is summarized in Figure 6. The maximum crossing time observed was 7.32 minutes and the observation relates to traffic in the direction of Lainchaur-Balaju.

Direction	Crossing Time (Minutes)					
	Peak Morning (9:00-11:00)		Peak Evening (4:30-6:30)		Slack (13:00-15:00)	
	Range		Range		Range	
	Max	Min	Max	Min	Max	Min
Balaju-Lainchaur	6.47	4.98	7.12	5.01	3.30	2.12
Lainchaur-Balaju	6.73	4.86	7.32	5.13	3.47	2.03
Pakaniol-Balaju	3.05	2.31	3.50	2.28	2.19	1.65
Teku-Lainchaur	3.91	2.25	3.56	2.47	2.12	1.68

3.8.3 Intersection 3: Keshar Mall Intersection

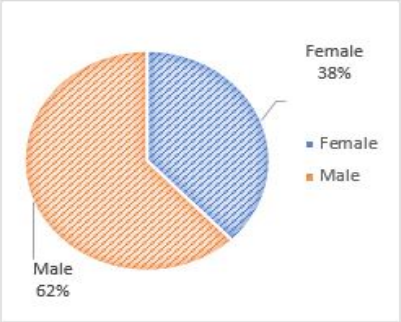
At the Keshar mall junction, the observed length of queue during peak hours is around 112 meters in the direction of Lainchaur-Jamal. 142 m in the direction of Jamal-Lainchaur 132m on the direction of durbar Marg-jamal. 65m on the direction of Thamel-jamal. The recorded vehicle crossing time during peak and slack hours is summarized in figure 7. The maximum crossing time observed was 7 min and this observation relates to traffic in direction of Jamal-Lainchaur, at evening peak hours.

Direction	Crossing Time (Minutes)					
	Peak Morning (9:00-11:00)		Peak Evening (4:30-6:30)		Slack (13:00-15:00)	
	Range		Range		Range	
	Max	Min	Max	Min	Max	Min
Lainchaur-Jamal	6.08	4.91	6.14	5.03	3.30	2.12
Jamal-Lainchaur	6.92	4.39	7.13	5.42	3.41	2.03
Thamel-Jamal	3.62	2.89	3.01	2.20	2.19	1.65
Durbarmarg-Jamal	3.45	2.03	3.49	2.78	2.12	1.68

3.9 Analysis based on questionnaire survey

the questionnaire survey was done for 115 people. To know the travel behavior of the people and for the further improvements, it is necessary to know, user's and non-user's opinion about the public transportation.

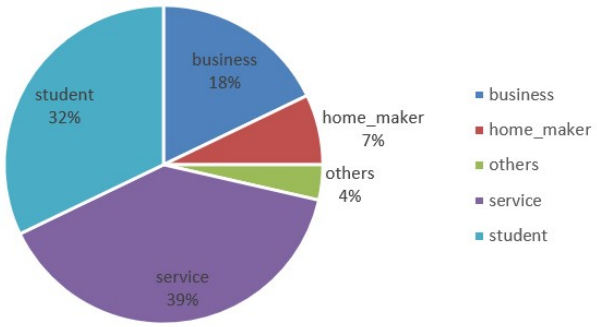
That's why among 115 people, survey was carried out with public transport user private transport user'sand vehicles operators. That number of was also further divided into male and female respondent which is shown in Figure



3.10 Analysis of perspective transport user

3.10.1 Occupation

According to the surveyed data, public transportation users are student, employer,Business man etc.



3.10.2 Use of public transportation

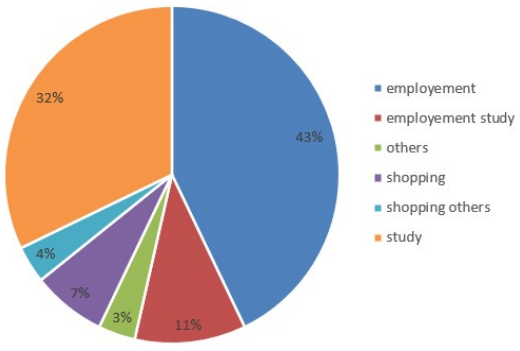
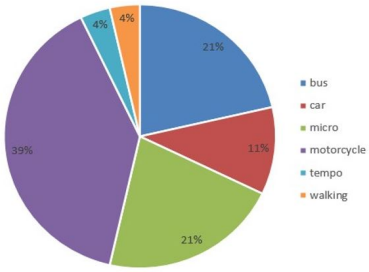


Figure. shows that, about 43 percent of people use public transportation for employment purpose.32 percent Of people use to go for school, campus. Likewise, there is also other purposes for using public transportation such as to Meet their relatives etc. given figure shows that,3 percent of people use public transport for other reason.

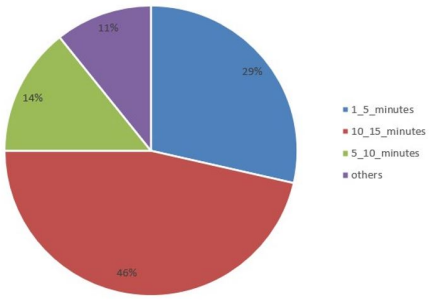
3.10.3 Frequent mode of travel

Figure Shows that people use different mode of transport according to the survey about 21 percent of the people use micro, as well as bus. These data show that, there is same demand of micros and buses.



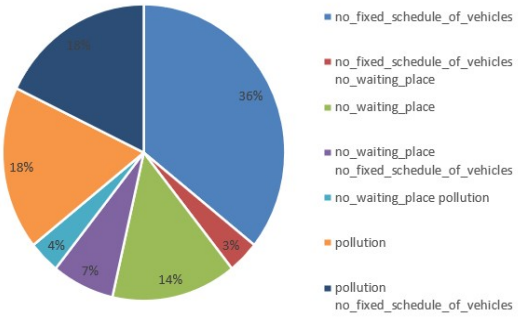
3.10.4 Time to reach station

Most of the respondents feels that bus station should be nearby their homes so they do not have to walk more. Position of stops also plays great role for the use of public transportation because if it is far away, then people think that way should we use public transport. It is just waste of time to reach station. From the surveyed data,As shown in figure 12. 29percent. people who use public transport said that bus stop is not so far away than Home. According to the respondent, it is just about 1-5 minutes' walk from home. 14percent Respondents said that it is about 6-10 minutes far away. Likewise, 46 percent people said that it took about 11-15 min to reach station. This Data shows that, the stop point should be in such location, one can reach there within 15 min.



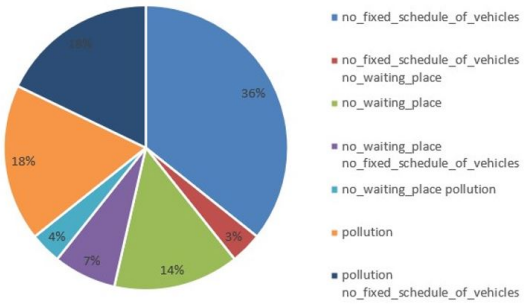
3.10.5 Problem during waiting for public transport

Figure shows that, while waiting for public transport, the main problem that people face is the pollution. Then after, at the waiting areas, some said, there is no proper seating place. They have to stand until the vehicle come. Respondent gave the other reason which they face while waiting for public transport.



3.10.6 Problems face frequently

figure shows that People who use public transport, face different problems which they face are shown in the given chart among them of 36 percent respondent feel, there is no fixed schedule of vehicle in peak hour.



4. Problem and Issues

4.1 Physical condition of walkways

The pedestrian space lacks the proper maintenance. The footpath is undulating and the surface materials are badly damaged at the places. The only protections from the vehicles are pedestrian bars but the provision of those bars is not available from Banasthali to Lainchaur. Throughout the pedestrian space there are very few weather protection facilities. Footpaths are used for parking place for bike and also for garbage collection. Likewise in most places footpaths are covered with plastic bags. Since there is no proper provision of footpath in many places people are walking near by road.

4.2 Existing bus stop:

The existing bus stops are not using properly. Most of the vehicles are used to stop somewhere in other place rather than the stop point due to the requirement of people. That's why those stops are being used by vendors. Likewise, there is no proper maintenance of that area.

4.3 Condition of road

In Banasthali route, though there is four lane black topped road but condition of road is not good in many places. Along this route, there are two hospitals and medicine shops. are at opposite side but there is no provision of zebra crossing.

4.4 Condition of vehicles

In case of public vehicles, there are micro-buses and mini buses. If we consider the height, then apart from the jumbo micro, height of other kia and Chinese micros are not sufficient. In case of kia, people face problem while standing. They have to bent their body because of low height. In case of Chinese micro also, height is so less than one person who is tall have to bent though seated in a seat. Likewise, distance between two seat is not sufficient. In case of mini-bus vehicle height is sufficient and it is easier than micro bus to sit as well as to stand.

5. Findings

5.1 Demand overlap

According to a poll of the reasons for the participants' journeys, there are two main destinations: educational institutions and workplaces. Both of these jobs have the same working hours in Kathmandu at the moment. As a result, practically all of the citizens seek public transportation services at around the same time or for the same length of time, resulting in a demand overlap. Furthermore, even those who rely on private transportation insist that the current roads be used at the same times of day.

5.2 Movement pattern

Based on the traffic count, it was discovered that public transportation is concentrated in the city's core, which is an indication of the land use pattern. This is owing to the city's only primary center, which is located in the heart of the city. As a result, for practically all purposes of travel, a distinct traffic movement pattern that heads into the center has emerged. When this movement pattern is combined with the previously described demand overlap, congestion is undoubtedly increased.

5.3 On street parking

Despite the fact that the ring-road has two lanes on each side, on-street parking dominates the entire length of the route, thereby rendering it a one-lane street. Furthermore, the overflow impact of this concentration with parking operations in the side lane causes traffic backups and congestion.

5.4 Socio-Ecnomic Dynamics

As previously stated, Kathmandu is the country's economic powerhouse; this fact has various ramifications for the city's socio-economic mix. The urban population is continuing to rise at an alarming rate, as demonstrated in the population forecast. In the case of Kathmandu, this is clearly linked to the fact that rural-to-urban migration is at an all-time high.

5.5 Lack of Infrastructure

The lack of proper and adequate infrastructure is one of the key restrictions of buses. There are no shelters at the bus stops. Passenger facilities are lacking in the terminals. There are no established halting and terminating points. As a result, the necessity for uniform transportation facility construction is critical.

5.6 Lack of Public Transport Policy

There is currently no comprehensive policy framework in place to facilitate the expansion of public transportation. The current tariff-level control or subsidy payments are unsustainable in the long run. In fact, they have a negative impact on the impoverished traveling segment of the population because the public transportation infrastructure cannot keep up with demand.

5.7 Overall findings on vehicles crossing time

Road intersections have been a major hurdle to traffic flow in the study area. better intersection management requires improving junctions, installing and coordinating signals, manning all important but uncontrolled junctions by traffic police, using portable

traffic light, and implementing other related measures (e.g., providing traffic updates to redirect traffic flow).

The surveyed Three major intersections of study area (i) Balaju Chowk, (ii) Sorakhutte Chowk, (iii) Keshar Mall intersection. Traffic observation was carried out at these intersections during morning and evening peak hours as well as in day slack time on normal working days. Time takes to cross each intersection by vehicles arriving at the intersection from different directions was observed along with recording traffic load at the intersections. The observed vehicle crossing time at the three intersections averaged over all directions by individual junction is presented in table

Intersection	Crossing Time (Minutes)		
	Peak Morning (9:00-11:00)	Peak Evening (4:30-6:30)	Slack (13:00-15:00)
Balaju	7.34	6.12	3.56
Sorakhutte	6.73	7.32	3.47
Keshar Mall	6.92	7.13	3.41
Average of 3 Intersections	6.99	6.85	3.48

5.8 Overall findings on vehicle travel time

Traffic management is a major program component of DOTM and MTPD aimed at addressing the acute problem of traffic congestion in the Kathmandu valley. A related program of DOTM is geared to improving public transport services through improved route allocation and public transport network management.

Reduction in travel time in the first case reflects easing of traffic flow congestion and the consequent improved movement of traffic; and the reduction in travel time in the second case indicates improved performance of public transport given the traffic flow conditions (the assumption here is that inefficiently run public transport that causes avoidable delays due to service mismanagement, for example, stopping frequently and unnecessarily along a route, gives lower overall speed and higher travel time at the traffic flow rate).

Travel time observation was carried by two different transport modes during morning peak hour evening peak hours and afternoon slack hours, on a normal working hour in a study route from Banasthali Chowk-Sundhara. The table shows fairly close time between morning and evening peak hours, but travel time vary between modes of transport. For example, time to travel a route is little faster in micro bus than in mini-bus

Location	Distance- km	Time taken minutes	Speed / hr.
Banasthali-Balaju chowk	0.75	4	11.25
Balaju Chowk-Dhara galli	0.31	2	9.3
Dhara Galli- sorakhutte	0.27	1	16.2
Sorakhutee-thamel	0.41	2	12.3
Thamel-lainchaur	0.46	1	27.6
Lainchaur-jamal	1.31	5	15.72
Jamal- sundhara	1.5	4	22.5

Micro-Bus Evening Speed

Location	Distance- km	Time taken minutes	Speed / hr.
Banasthali-Balaju chowk	0.75	5	9
Balaju Chowk-Dhara galli	0.31	3	6.2
Dhara Galli- sorakhutte	0.27	3	5.4
Sorakhutee-thamel	0.41	3	8.2
Thamel-lainchaur	0.46	2	13.8
Lainchaur-jamal	1.31	5	15.72
Jamal- sundhara	1.5	3	30

Mini-Bus Evening Speed

6. Conclusion

The existing transportation infrastructure in Kathmandu is insufficient to handle current traffic demands. The surge in private vehicles is owing to public transportation's inefficiency, inconvenience, unreliability, and poor service level. To encourage more people to utilize public transportation, the service level must be high enough to entice private vehicle users. At the same time, public transportation fares must be affordable.

As per route survey:

The route survey was conducted three times, and the results show that the majority of passengers boarded and alighted at Sundhara, Jamal, and Banasthali Chowk. Aside from that, automobiles frequently came to a halt. Because most offices, schools, and universities are located in the central region. in the morning, there were a large number of passengers inside the vehicle during the ongoing time. This means that none of the passengers will be able to take a seat. Because of the flow of people from the residential area to the core region, the micro became less packed on the way back. Similarly, the micro was overflowing with passengers in the evening. According to a survey, the demand for carrying passengers increases during peak hours

Evaluation of facilities

There are numerous buses stops along the route,

however they are not effectively utilized. Vendors make advantage of them. Micros used to stop according to the driver's and passenger's wishes. There is no footpath from Banasthali chowk to Balaju, the width of the footpath does not meet the standard requirement in different locations, and the width of the footpath from Balaju chowk to Sorahakhutte is only 1m, and the footpath is not well maintained in many places. Similarly, there is no street furniture, which inhibits people from preferring to walk.

7. Recommendations

Vehicles should be deployed as per the road condition and size of vehicles should be as per the passenger flow. Provision of subsidy for poor and disadvantaged people should be endorsed for the relief of deprived people. The conventional bus service is not convenient for elderly, disabled and is not efficient. The large low floor energy efficient bus service needs to be introduced with consideration of available infrastructure and topography of Kathmandu. For the late-night services-government should take the security guarantee. The private ownership of single public transport vehicle should be avoided.

The operation design / schedule of public transport should be strictly followed. The high penalty on violation of rule will solve the problem to some extent. The transportation system planning should be done with pedestrian, non-motorized vehicle. Bicycle lane should be introduced to reduce the mixed traffic in same road.

Strict enforcement of traffic rules should be implemented. Zones of footpath should be demarcated wherever the space is available. The edge zone with curb stone and furnishing zone with plantation like hedge plant should be established to act as a buffer strip between vehicular traffic and pedestrians. In case of space constraint, the pedestrian bars can be kept. The effective width of footpath should be minimum of 5'0".

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