

# Rescheduling of Public Transport Along Pyangaun - Lagankhel Route

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**Abstract**— Public Transportation shares significant trips of Kathmandu valley; thus, vehicles scheduling plays vital role in the urban development. Among various routes within Kathmandu valley, 8.78km Pyangaun – Lagankhel was considered as the study area. Mini buses, micro and tempo are the current operating public transport means within the study area; but is not serving the demand effectively. Due to operational delay and lack of proper system characteristics, it is utmost necessary to reschedule the public vehicles within the route. This paper tries to analyze the status quo analysis and rescheduling the public transportation with significant capacity buses so as to reduce the travel time and increases the operating speed. It also provides the headway and frequency of improved public transportation system.

**Keywords**— Public Transportation, Frequency, Station, Speed

## I. INTRODUCTION

Public transport is transport of passengers by group travel systems available for use by the general public typically managed on a schedule, operated on established routes, and that charge a posted fee for each trip.

Lalitpur Metropolitan City is facilitated with number of public vehicles, various private and government and public private companies are attracted to run their vehicles at the routes among all the routes Pangau-Lagankhel is also one of the routes among the various route, which is all about 8.78km long. Major intersection at the routes are Mahalaxmistan, Chapagaudobato, Dhapakhel Dobato, Chapagau. The major places connected by the routes are Lagankhel, Mahalaxmistan, Dholahity, Sunakoti, Dhapakheldobato, Thecho, Chapagau and Pyangaun, Bajrabarahi temple, Santanesowr temple are religious purpose to travel in the very trip and Lagankhel as the central/major attractive place for shopping, schooling, business. This route incorporates both private and public vehicles.

This route is considered one of the shortest routes, however travel time here is nearly an hour. In this situation though, local buses and micro has been providing some respite to locals. However, the very routes lack the proper management.

## II. OBJECTIVE OF STUDY

The objective is to analyze the status of public transportation including service quality of Pyangaun – Lagankhel route and optimize the operational characteristics of the public transport service with the route.

## III. STUDY AREA

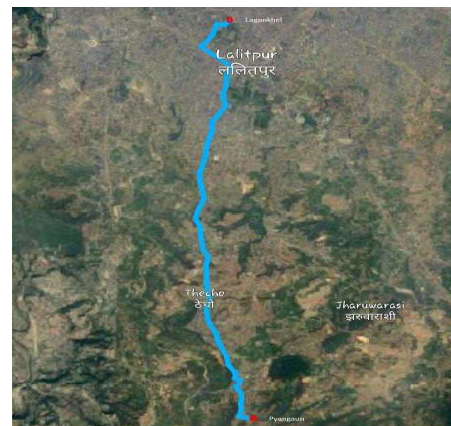


Fig. 1. Study Route from origin (Lagankhel) - destination (Pyangaun).

The route is 8.78km long and the people of the very route are getting trouble to reach their destination in time and feeling discomfort to travel, hard to get seat in the public vehicles.

IV. METHODOLOGY:

Three location within 8.78km segment were selected and traffic volume count, public transport patronage survey a questionnaire survey was performed with the help of the google form.

Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

A. Traffic Volume Count

Three points were selected with in 8.78km route segment traffic volume study at 3 weekdays between 8/12/019-10/12/019 and 14/12/019 Saturday, covering all time of day from morning 5am to 8pm.

B. Public Transport Patronage Survey

No of passengers get in and out of bus was noted, time of arrival and departure in every station. This helped to find out the corridor capacity and find the delays at every stop and at intersections along with various stations at various locations.

C. Questionnaire Survey

To achieve the perception towards the public transportation, acceptable distance of walking to the station, questionnaire survey with sample size of 400 was adopted.

V. STATUS QUO ASSESSMENT

A. Speed

Operating Speed and running speed is the important parameter to access the current scenario of public transportation. 48 trip data was collected consisting of different time and direction was collected. The data related to the tempo was collected based on the sample survey at various location and interview with drivers.

TABLE I. AVERAGE SPEED AT VARIOUS DIRECTION.

Speed	Bus		Micro		Tempo	
	P-L	L-P	C-L	L-C	S-L	L-S
Avg journey time	48m2 5.7 s	51m 0.3s	37m 53.3s	43m 14S	20m 20S	21m 25S
Avg Running time	39m 19.1S	29m 54.5S	31m 47.9S	31m 53.4S	16m 10 S	15m 22S
Avg Delay	9m 6.6s	21m 5.8S	6m 5.4S	11m 20.7S	4m 10S	6m 3S
Avg journey speed	10.87 kmph	10.32 kmph	11.05 kmph	12.61 kmph	13.69 kmph	12.99 kmph
Avg Running speed	13.40 kmph	17.61 kmps h	14.98 kmph	15.02 kmph	17.22 kmph	18.12 kmph

B. Volume Assessment

Different time of day (morning peak, off peak, evening peak) volume proportion of the modes of vehicles running in very route was determined.

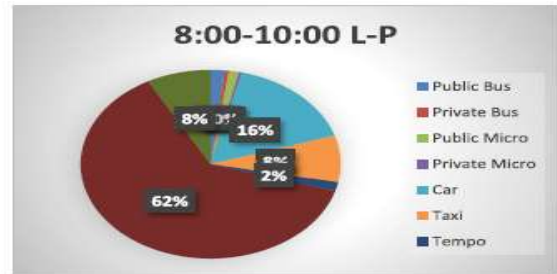


Fig. 2. Study Route from origin (Lagankhel) - destination (Pyangaun).

C. Load Profile of the Route

The survey data was tabulated to allow for easy comparison between the segments of a transit route. The first and last stations had the highest number of boarding and alighting but the middle stops had the highest through passengers.

D. Existing Passenger Demand

This portion of analysis, total number of passengers using the public vehicles per hour in three different times of the day (morning peak, off peak, evening peak).

TABLE II. MAX DEMAND OF PASSENGER AT WEEK DAYS AND WEEK END

Maxhourly demand	P-L	L-P
Morning peak(weekdays)	1691	970
Off peak (week days)	577	754
Evening peak(weekdays)	723	1495
Weekend(max)	696	986

E. Proposed Stations

Based on 400 samples collecting from the public transport users of all means suggest 51.4% suggest to walk within 5 min with 1m/s as avg walking speed yields distance of 300m. Thus, the preferred distance between the stations as per user demand 600m.

Based on demand assessment following stations were proposed, with 45 sec delay at all the stations and Satdobato is suggested as major station with 90sec operational delay and 2min as the intersectional delay .

TABLE III. PROPOSED STATIONS OF THE ROUTE PYANGAUN - LAGANKHEL.

Stations	Recommended	Chainage
1	Lagankhel	0+0
2	Mahalaxmasthan	0+921
3	Chapagaudobato	1+580
4	Khumaltar	2+330
5	Dholahity Babu Store	3+210
6	Sunakoti Simako	4+140
7	Sunakoti Chautara	4+850
8	Civils Homes	5+420
9	Dhapakheldobato	6+130
10	Buddhapokhari	6+780
11	Chauki	7+510
12	Chapagau	7+960
13	Pauli	8+300
14	Pyangaun	8+780

Based on table max 921m and min 340m which is validated due to the user response of travelling 5min i.e., 300m.

F. Frequency

Based on the current journey time and reduction on number of Station, the travel time is calculated to be 46.33 minute. Based on the passenger demand the number of buses with new proposed 45-seater vehicles (13 peoples as standing) and 32 (8 peoples as standing) were analyzed.

$$\text{Hourly bus frequency} = \frac{\text{passenger number} * 0.9}{\text{bus capacity} + \text{standing num}}$$

$$\text{Frequency} = \frac{\text{travel time}}{\text{number of buses}}$$

The total travel time of vehicles based on assessment was found to be 50 minutes with 3 min 40 sec rest for each vehicle. This time is considered to provide some rest time for driver. The minimum value is adopted so as to reduce the number of buses required on each direction. As the vehicles takes less than 1 hour to complete the trip and return, the required frequency is calculated as time required for one trip/hour = 50 minute/60 minute.

TABLE IV. NUMBER OF BUS REQUIRED IN THE VERY ROUTES (45 SEAT BUS)

Weekday				
Part of day	Hourly Passenger demand		No of bus	
	P-L	L-P	P-L	L-P
Morning peak				
8-9	1262	559	22	10
9-10	1691	947	29	16
off peak	577	754	10	13
Evening peak				
4-5	709	924	12	16
5-6	711	1495	12	26
Weekend				
Morning peak				
8-9	759	970	13	17
9-10				
Off peak	376	388	6	7
Evening peak				
4-5	410	750	7	13
5-6				

TABLE V. EFFECTIVE BUS NUMBER WITH EFFECTIVE BUS TIMING (45)

Vehicles hourly demand	Time Interval(min)		Number of Buses (45)	
	L-P	P-L	L-P	P-L
Week Days				
Morning peak	6	2	8	29
Off peak	4	5	11	10
Evening peak	4	4	13	12
Week End				
Morning peak	3	4	14	13
Off peak	8	8	6	6
Evening peak	4	7	11	7

Based on Table V it shows the maximum number of bus is required at morning peak; which is 37 considering both direction with new 45-seater buses.

TABLE VI. TIMING AND NUMBER OF BUS OF 32 SEAT BUS

Vehicles hourly demand	Time Interval(min)		Number of Buses (32)	
	L-P	P-L	L-P	P-L
Week Days				
Morning peak	2	1	20	42
Off peak	4	2	12	19
Evening peak	1	3	31	18
Week End				
Morning peak	2	2	20	19
Off peak	6	5	8	9
Evening peak	3	5	16	10

Based on table 6 it shows the maximum number of bus is required at morning peak; which is 62 considering both direction with 32-seater buses.

## VI. CONCLUSION:

The route is 8.78 km long with the maximum passenger demand and according to the demand of the passenger, 37 new buses with seat 45 or 62 buses with 32 seats was purposed. 20min was delays time and according our newly purposed schedule the delay time is 45sec in 13 stations and 90sec in Chapagaudobato and 2min intersectional delay, the travel time is restricted to 46min 20 sec and 14 number of stations was purposed according to the passenger flow and according to the demand of 400 respondents to travel 5min to reach the stations 921m was the largest and 340m lowest distance between the stations.

After operating with existing buses existing delay will be reduced from 20min to 13min 15 sec and 6min 45 sec saved in each travel.

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