

Present Conditions of Urban Transport and Recommendations on Cycling Strategies in Ulaanbaatar City

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Abstract: In this paper, we focused on the utilization of bicycle as transport facility, to resolve the social and environmental problem in Ulaanbaatar city, Mongolia. Bicycle is recognized as environmentally-friendly transportation in many countries, but the transportation policy of Ulaanbaatar does not include the utilization of bicycle. In this paper, we introduced current condition of urban transport of Ulaanbaatar city, and made some recommendations on cycling promotion measures. Also we tried to identify target group and target area to promote cycling in first period.

Keywords: Urban Transport, Cycling, Target Group, Target Area

1. INTRODUCTION

1.1 Background and Objective of the Study

Since the transition to a market economy in 1990's, nearly 70% of the increase 500,000 in Ulaanbaatar city's population has been due to internal migration. Number of in-migration from countryside increased six times than the years of socialism. Ulaanbaatar City comprises six districts and three satellite cities. The population increasing in six district, especially Bayanzurkh and Songinokhairkhan districts. In a result, Ulaanbaatar faced many problems, such as unplanned urban sprawl, population growth, air pollution and traffic congestion. Air pollution comes from thermal power plant, coal stoves of ger district households and automobile exhaust gas.

Number of automobile increased rapidly in past 2 decades. In 1990, number of vehicle registered was around 10,000, in 2000 it was 40,000, and in 2011 it reached 210,000 in

Ulaanbaatar city. Especially, number of passenger cars increased rapidly, it increased to 150,000 in 2011, but it was only 3,000 in the beginning of 1990's (Statistical Department of Ulaanbaatar city, 2012). About 80% of passenger cars are private owned automobiles. Motorization has progressed rapidly, it became 144 per 1000 persons in 2010, growth rate is 13.6% in Ulaanbaatar city.

Travel speeds of both public transport bus and private cars have decreased due to traffic congestion, according to travel speed surveys conducted in the past (see Table 1).

Table 1. Travel Speeds, 1998 and 2007

Vehicle Type	Route	Direction	Travel Speed	
			1998	2007
Car	Peace Avenue	East	41.4	25.4
		West	42.4	25.7
	Khuvisgalchid-Ikh Toiruu	East	30.3	21.3
		West	29.0	20.9
	Ikh Toiruu	South	40.9	19.1
		North	42.5	20.3
	Narny Zam	East	42.3	31.7
		West	41.2	19.7
Bus	MUBIS-Yarmag	East	35.7	21.4
		West	31.9	20.1
	MUBIS-Chingeltei	East	24.1	16.8
		West	24.1	18.0

Sources: Ulaanbaatar city Master Plan Study, 2009

According to Ulaanbaatar city Master Plan study by JICA (2009), total transportation demand in the city is composed of walking (31.0%), car (23.7%), taxi (9.4%), bus (33.4%) and others (2.5%). When walking is excluded, the total demand is composed of 34.9% for car, 13.3% for taxi, 48.1% for bus, and 3.8% for other vehicles. Use of transport modes varies by travel purpose. For "to work" purpose, bus (38.9%) and car (31.7%) are mainly used, while for "to school" trips, bus (42.9%) and walking (41.9%), for "business" purpose, car (41.1%), for "private" purpose, walking (36.0%), car (26.5%) and bus (26.2%) are mainly used (Table 2).

Table 2. Transportation Demand by Mode and Purpose, Ulaanbaatar city

Mode	To Work	To School	Business	Private	To Home	Total	
	%					000/day	%
Walking	15.7	41.9	14.3	36.0	31.3	1,031	30.6
Car	31.7	9.6	41.1	26.5	21.5	816	24.2
Taxi	10.1	5.0	10.7	9.0	9.8	311	9.2
Bus	38.9	42.9	22.3	26.2	35.2	1,127	33.4
Others	3.9	0.6	11.6	2.3	2.1	88	2.6
Total	100.0	100.0	100.0	100.0	100.0	3,373	100.0

Sources: Ulaanbaatar city Master Plan Study, 2009

This study focuses on bicycle usage, as one of sustainable method in urban transportation, because of its less social, environmental and transportation impact.

This study aims to evaluate present urban transport system, and to make recommendations on cycling promotion strategies as a traffic congestion method in Ulaanbaatar, the Capital city of Mongolia.

2. CURRENT URBAN TRANSPORT POLICIES IN ULAANBAATAR CITY

In this section, we will introduce current urban transport policies such as public transport policies, Private vehicles policies, pedestrian and cycling policies and also road network policies.

2.1 Public Transport Strengthening and Encouraging Policies

Public Transport Strengthening and Encouraging policies in Ulaanbaatar city can be divided into 3 types: short-term improvement, mid-term and long-term improvement of public transport. Bus service, the only current public transport excluding taxi service in Ulaanbaatar city could be short-term improvement policies. BRT (Bus Rapid Transport) which going to introduce in near future are mid-term, and subway (metro) is as long-term public transport improvement policy.

Ulaanbaatar City Government promotes to introduce the BRT (Bus Rapid Transport) under assistance of ADB loan as of urban public transport project. There are 3 phases of this project, the first phase is planned to complete in 2016. BRT and subway plan are shown in Figure 1. BRT is applicable for Ulaanbaatar city, because of its appropriate transportation range and less

financial impact in comparison with subway.



Figure 1. Proposed BRT routes in Ulaanbaatar city

Source: BRT study report, 2012

The Feasibility study on subway construction has been conducted, which planning to start construction work in 2017. Subway is planned to construct through Peace Avenue, the main street of Ulaanbaatar city, and underground section will construct in very city center. But, there are some criticisms that, subway is too early for current Ulaanbaatar city. Because, subway is appropriate for cities which has over one million population, also both construction and running cost are very expensive.

Ulaanbaatar city Government planning to introduce LRT (Light Rail Transit) as urban public transport method in current railway corridor. Current railway is used as international and inter-city freight and passenger transport, but according to new plan, freight transport station will be transfer to east and west cargo terminal. This plan is new and not conducted related studies yet.

While studies and construction works of BRT and subway takes several years, it is necessary to focus improvement of current Bus service. There are over 60 main bus routes and 40 around-city routes and mini bus routes in Ulaanbaatar city. Public and private bus companies operate public transport service, both public and private companies get subsidies from the government. Many citizens complain that, quality of bus service is not good, manner and attitude of bus drivers and conductors (fee collector) is bad. Condition of bus stops and bus

terminals are not so good, buses come to bus stops irregularly due to traffic congestion. To encourage public transport and to discourage private vehicles, it is indispensable to improve bus service immediately.

From August of 2012, important bus related practical measure started, namely introduction of Bus Priority Lane on Peace Avenue. Peace Avenue is main street of CBD in Ulaanbaatar city, which planned to construct subway in future. Bus Priority Lane implemented 7 AM to 10 PM daily, in the 1st lane of Peace Avenue. As a result, bus travel speed increased, it took 1 hour or more from Sapporo intersection to Eastern intersection, it able to get within 30 minutes after, in same destination. On the other hand, traffic police department had a heavy duty to control violated vehicles and detect noncompliance. However, it is accepted for majority of citizen, City Government is planning to expand Bus Priority Lane into other 6-lane roads.

Transport Department of Ulaanbaatar city is considering on other bus improvement policies: Express/Shuttle bus introduction in north-southward and east-westward route, bus model section on Ard Ayush Avenue and Enebish district, improvement of bus terminal, etc.

2.2 Policies on Discouraging Private Vehicles

Introduction of Bus Priority Lane was implemented with “Car No. Coding”, since August 2012. Number coding implemented Monday to Friday (cars which number plate ended 1 and 6 are restricted to use on Monday, 2 and 7 is on Tuesday, 3 and 8 is on Wednesday, 4 and 9 is on Thursday, and 5 and 0 is on Friday, respectively), from 7 AM to 10 PM. Area of Number Coding can be seen in Figure 2, yellow line is Number Coding implementation area.

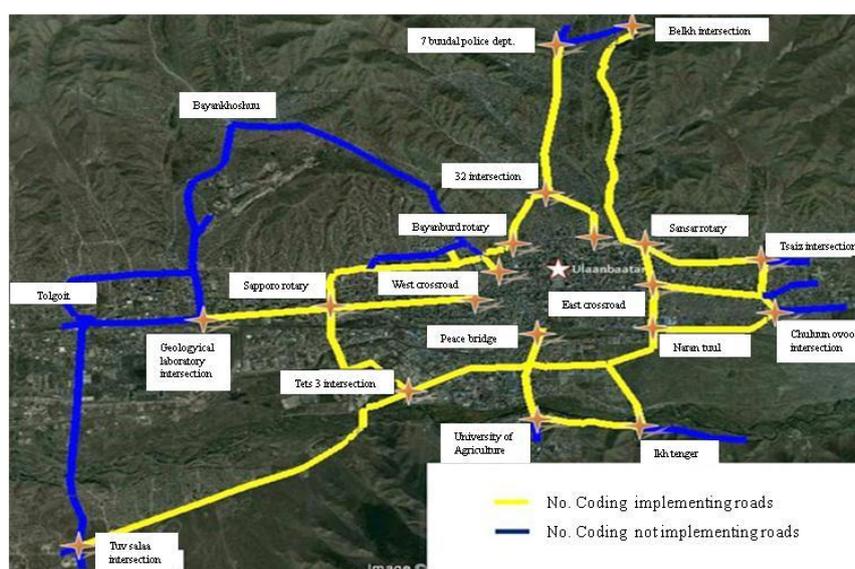


Figure 2. Number coding implementing area
 Source: Traffic Police Department, Ulaanbaatar city

Daily traffic volume on Peace Avenue decreases due to introduction of Number coding. Enforcement of Number coding has perceptible effects to mitigate traffic congestion in the CBD. After 2 month's trial period, City Government decided to implement Number coding in future.

Other TDM measures to be implemented in Ulaanbaatar city is, on-road parking restriction and introduction of pay-parking in CBD. To discourage private vehicle usage, automobile import tax system revised. Traffic Control Center of Ulaanbaatar city is going to implement measures on enforcement of traffic regulation and driver's manner, through road TCC monitor

2.3 Other policies

There are no bicycle lanes or other facilities for bicycles, and few bicycles used in Ulaanbaatar. We will introduce about cycling conditions and policies in chapter 3.

Ulaanbaatar city has about 800 km of roads, and road length increased by 300 km last 2 years. Many projects implemented recent years to increase traffic capacity of road network in Ulaanbaatar. Road construction and widening projects to be implemented in 2012 are shown in Figure 3.

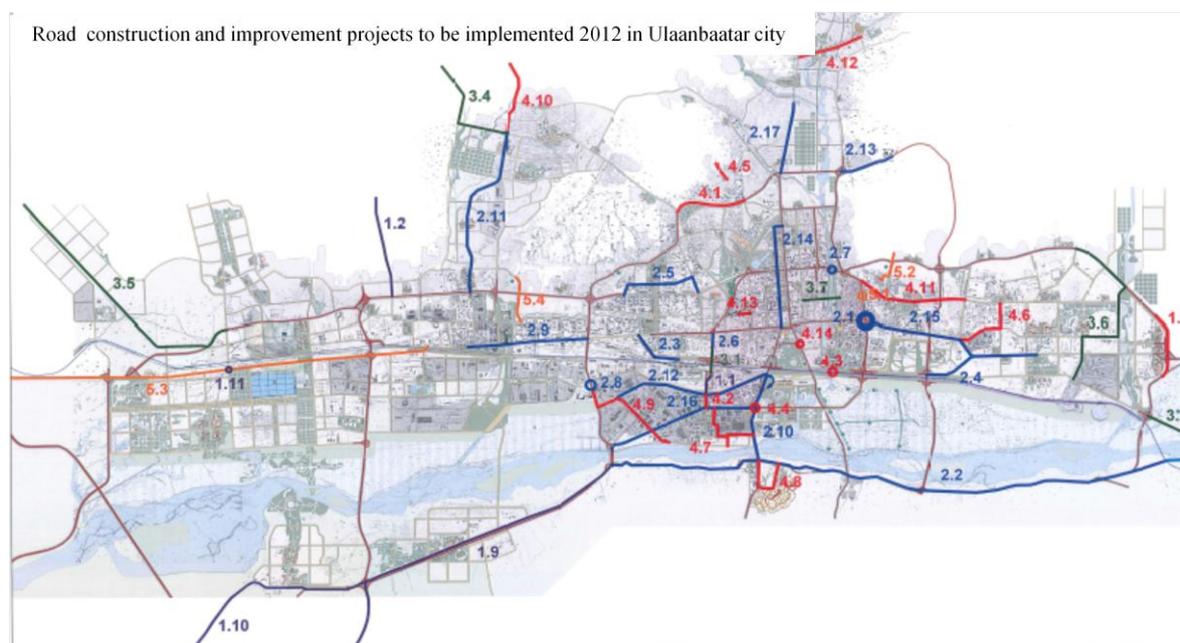


Figure 3. Road Construction and Improvement Projects of 2012

Sources: Road Department, Ulaanbaatar city

There are eight ongoing or under drawing Fly-over construction projects over railway and

some underpass construction projects for pedestrians.

Recent years, Government of Ulaanbaatar city pay attention on public transport improvement and discouraging private vehicle, especially in CBD. But still remaining to solve many problems, it is recommendable to implement TDM policies comprehensively.

3. PRESENT CONDITIONS AND RECENT CYCLING TRENDS IN ULAANBAATAR CITY

3.1 Present Conditions of Cycling in Ulaanbaatar City

One measure to build sustainable urban transport system is bicycle use and cycling promotion policies. With bicycle, cyclists can access door-to-door travel same as automobile, cycling is much economical, need less spaces and environmentally friendly. Cycling is appropriate for short distance travel in urban transport, up to 5 kilometers. Average trip distance of Ulaanbaatar city is 3.9 kilometers, therefore cycling will be good transport method in Ulaanbaatar (Amarjargal and Yamamoto, 2009).

Citizens of Ulaanbaatar used bicycles as daily transport from 1930's to 1970's (Amarjargal and Yamamoto, 2009), cycling can be used as a daily transport meaning in present time, because of history and culture in the past. Herlify (2004) who studied about cycling history says that, recreational cycling changed into utilitarian cycling in the past, it is necessary to build safety cycling environment and improve citizen's awareness on cycling (Amarjargal and Kajishima, 2011).

One negative factor to promote cycling in Ulaanbaatar is a cold winter. Average temperature of winter (from November to February) is -18°C , it is not appropriate for cycling. Therefore, cycling in Ulaanbaatar city concerned as seasonal usage. A way to solve this problem is to promote cycling excluding winter, coordinating with public transport.

But winter time is only decreasing point for cycling, not makes cycling impossible. Many cyclists use bicycle even winter in Ulaanbaatar and in a regional city of Undurkhaan. Cyclists says cycling is good in winter, using winter spike tire, ride with same speed and wear comfortable clothes, except to be cold and be slippery.

Cyclists in Ulaanbaatar increasing this days, but users limited young men and middle aged men. It is because of not solved safety environment for cycling. There is good news on cycling, formation of cycling clubs which have about hundred members. Cycling clubs coordinate cycling tours near Ulaanbaatar city on weekends, teach children how to ride bicycle. Some cycling shops opened recent years, sells high quality bicycle for citizen.

3.2 Recent Cycling Trends and Policies of Cycling in Ulaanbaatar City

Construction, Urban Development and Planning Department of Ulaanbaatar city with the cooperation New Image club created planning for cycling infrastructure. This cycling infrastructure network is total of 143.7 kilometers, and the first cycling network in Ulaanbaatar city. Cycling infrastructure network is shown in below Figure 4.

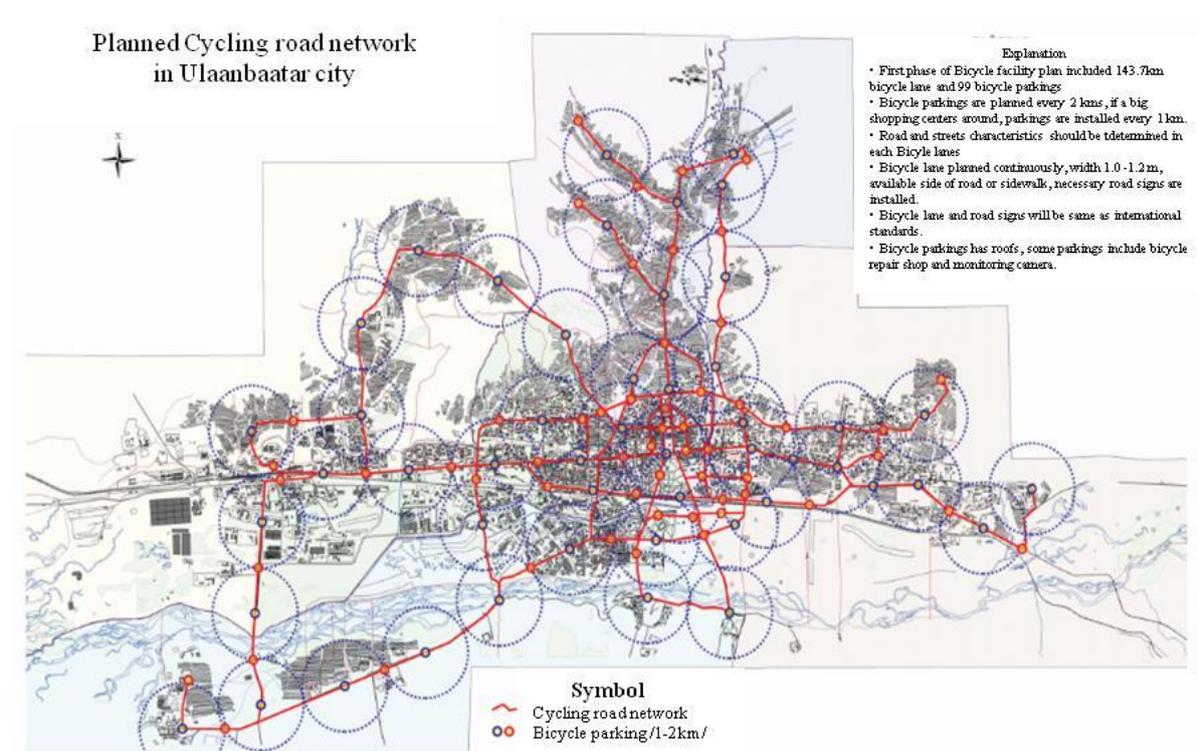


Figure 4. Cycling infrastructure network planned by City Government and New Image club
Sources: Urban Development and Planning Department of Ulaanbaatar city

However, some must improved points have in this planning. For example, cycling lane planned in the road median in section from Sapporo intersection to Eastern intersection, cyclists will face difficulty to go to roadside. And also problems may occur in the intersection with cyclists, automobile and pedestrians. According this plan, width of cycling lane is 1.0-1.2 meter, and cycling lane will be placed in both roadside and pedestrian road, depending on space ability. It will be very dangerous for cyclists and other road user's safety, because there are no standard on location of cycling lane. It is indispensable to have cycling lane and parking standards to build safety and comfort cycling infrastructure network.

Another point of this plan is, bicycle parking which planned to build in every 2 kilometers. For bicycle user's, parking bicycle far from destination point is unnatural. Because, bicycle

used almost in door-to-door travel, small bicycle parking facilities should be placed in many places in CBD. Barkley's cycling in London tried to encourage private sector's participation to build bicycle parking around of cycling lanes (Transport department of London), same method can be used in Ulaanbaatar also.

4. RECOMMENDATIONS ON CYCLING PROMOTION STRATEGIES

To promote cycling effectively, it is necessary to identify the target groups, who easy start to use bicycle as a daily transport, and identify the target area.

In this study we identified several target groups to encourage cycling in first phase.

4.1 Recommendations on cycling promoting target groups

According to previous study (Amarjargal and Kajishima, 2011), major groups of present cyclists in Ulaanbaatar are men age between 16-40 years. In profession, students and workers in private sector intends to use bicycle as a daily transport. Past studies (Yannermann, 2010) tell that young people, especially students were good candidate for cycling promotion, students usually develop utilitarian cycling to society.

Person trip study conducted by JICA results, automobile and taxi usage is higher in "to work" trip, it may easier to promote cycling to government worker. As of student, walking and public transport usage is higher in "to school" trip. As mentioned above, students bring new fashion and trends to society, they are good candidate for cycling promotion. From above, we can identify first cycling target groups as below.

- 1) Men students
- 2) Women students
- 3) Men government worker, age 30's to 40's

Student's daytime concentration is shown in Figure 5. This figure is created by author based on day and nighttime population survey. Because of many universities concentrated in city center, distribution of students in daytime is concentrated in city center.

To consider about student's cycling, it is appropriate to have purpose "20% of 80,000 students will be use bicycle", because there are many women students who can't ride bicycle, and students whose home is far from the city center. According to previous cycling studies (Amarjargal and Kajishima, 2011), about 60% of students who answered the anket, use

bicycle in some purpose.

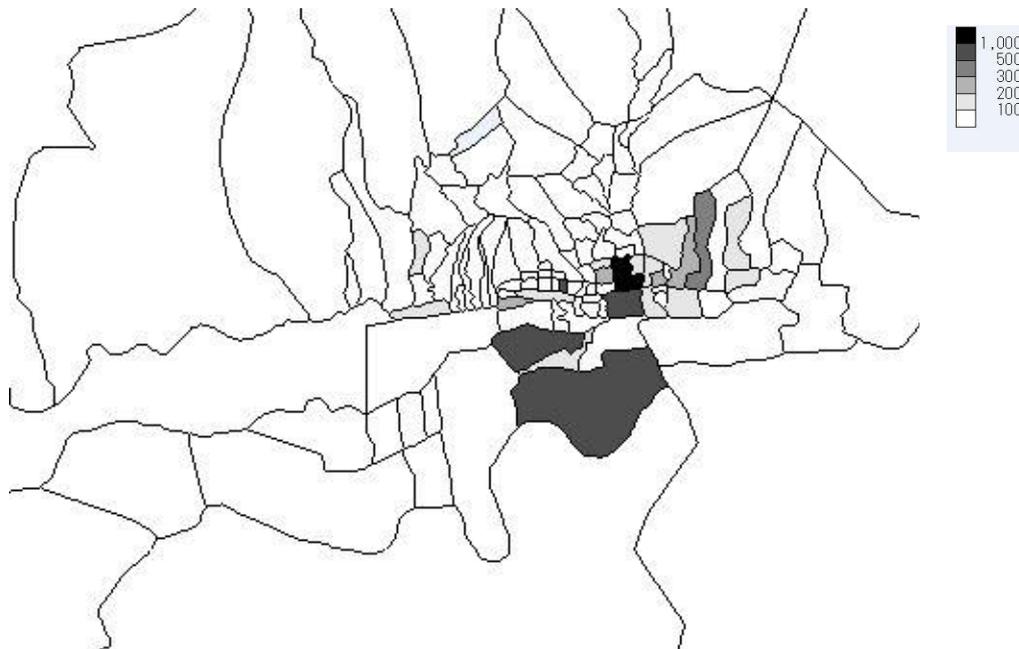


Figure 5. Distribution of students in daytime, by khoroo (administrative unit)

Same distribution map about government worker is as below Figure 6. Using bicycle to work is very effective to calming traffic congestion in peak hours, because “to work” and “to school” trip is stable both in trip time and trip route. In this figure we can see same trends as students.



Figure 6. Distribution of government worker in daytime, by khoroo

In next section, we will introduce about target area, based on target group.

4.2 Recommendations on cycling promoting target area

Business purpose trips have a high percent of automobile usage (40%), compared with work or to school trips. Therefore, we can say business purpose trips are one reason of traffic congestion in CBD. 30% of private companies automobiles in Sukhbaatar districts (city center), 20% is in Bayanzurkh district (eastern side of Sukhbaatar district). To implement policies on business purpose trip, we should concern in this districts.

We can see the direction of trips made by public transport, using the survey data by Public Transport Department of Ulaanbaatar city. According to this data, a big amount of trips are into city center trips. Into city center trips increase, when trips become near the city center. Figure 7 shows us, the direction of trips has made by public transport in Ulaanbaatar city.

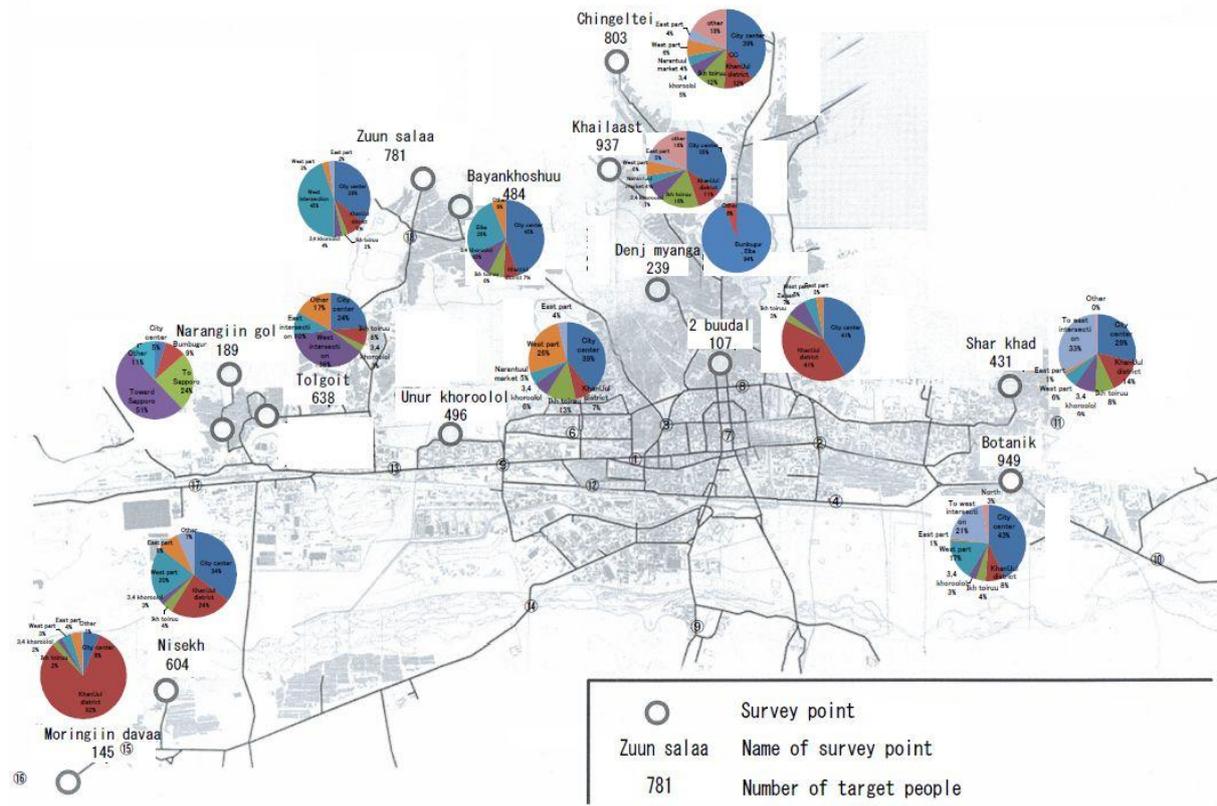


Figure 7. Direction of trips made by public transport passengers

Sources: Based on data of Public Transport Department, 2010

From above information and data, we can identify target area for cycling promotion as City center of Ulaanbaatar, we can say the area near the Sukhbaatar square, where many students and government workers concentrate in daytime. Over 20 universities such as Mongolian University of Science and Technology and Mongolian State University, which have a great

student numbers, and 30 government offices are in this area.

First cycling lane and parking should be constructed in this area, cycling promotion policies targeted for students and government workers should be implemented same time with cooperation of universities and government organizations.

The Bus Priority Lane introduced since 2012 in city center of Ulaanbaatar as mentioned above, bicycles can share Bus priority lane in this sections. It gives a possibility to have cycling environment in short period, with no additional cost. Especially, in city center have additional space problems on road and roadside, with sharing Bus priority lane, cyclists can have safety environment than sharing road. On the other hand, it is necessary to educate bus drivers, cyclists and other road users before implement this kind of measure.

The Master Plan 2030 of Ulaanbaatar city is going to get Parliament Resolution in first half of 2013. In Master Plan 2030 concerns some urban development solutions, building new urban centers and sub centers in downtown, to decentralize of urban population, to improve living standards and also to improve public service in ger districts. Comprehensive planning going to implemented on development of sub centers, such as water supply/sewerage system, heating supply, social service (school, clinic) and road and transport matters.

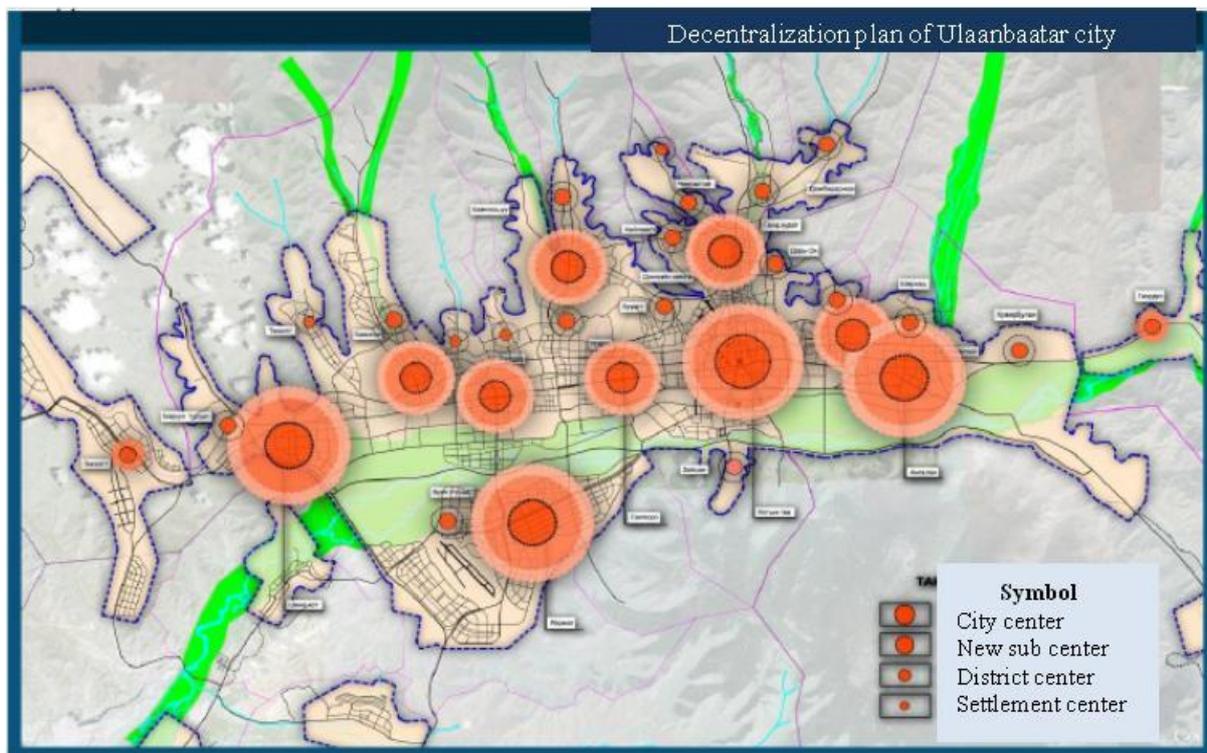


Figure 8. New city center/sub center to decentralize urban centralization, Ulaanbaatar city

Sources: Ulaanbaatar city Master Plan 2030, 2012

When newly constructing or improving road and transport network in new city center/sub center, it is possible to consider about cycling lane and parking same time. Road and public transport service is not good in ger districts, in contrast of city center, living ability of people is lower in ger districts. Therefore, implementing cycling policy within sub center development projects, is important for improving people's livelihood in ger district. Another point is, it is easier to construct cycling lane and other facilities after land readjustment than the city center. Proposed new city center and sub centers are shown in above Figure 8.

5. CONCLUSION

In this paper, we introduced current condition of urban transport of Ulaanbaatar city, and made some recommendations on cycling promotion measures.

Some public transport measures studying and planning in Ulaanbaatar city, while some of them takes several years to complete. Therefore, it is necessary to consider present public transport-bus improvement to encourage public transport and to discourage private vehicles usage.

Cycling is not major daily transport method yet, but it intends to increase cycling this years. In this timing, good policies both on infrastructure and soft measures needed to promote cycling. It is effective that promote cycling with special groups of people and special districts, which easier to use bicycle in first period. Therefore, we tried to identify target group and target area to promote cycling in first period. It is necessary to consider detailed study further. Also, bus priority lane and other possible ways help us to promote cycling in first period, before constructing bicycle infrastructure network.

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