

A Study on Transportation Infrastructure Investment Issues in Urban Areas in Ulaanbaatar, Mongolia

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The urban transit infrastructure investment has been facing more critical issues in developing countries, same as in Mongolia. It requires a huge investment cost in order to construct, operate and maintain such a large-scale urban transit systems. For this reason, it is important to conduct an alternative studies due to existing unstable administration and financial constraints. Based on this, the research aims to grasp planning and implementation processes of large-scale projects, such as opening a railbus passenger service on existing railway line inside the city, Metro (MRT), and Bus Semirapid Transit (BST) corridors, and investigation on integration of projects, country's affordability to implement. However, it definitely requires long time to build up appropriate institutional and legislation systems and financial availability; meanwhile, proposition of alternative choices in urban mass transit systems are required. As a result, it is important to consider more deeply about administration and financial capabilities, and requires competitive strategic integration in order to implement large-scale projects.

Key Words : railbus, mass rapid transit (MRT), bus semirapid transit (BST), comparative analysis, cost-benefit analysis approach

1. BACKGROUND

Mongolia is a landlocked country in Central Asia, which bordered by Russia to the north and China to the south, east and west, where total population is estimated to number 2.95 million (National Statistical Office of Mongolia¹). Total area is 1,565,000km² and it is ranked 19th largest country in the world. The capital and largest city is Ulaanbaatar and it is home of about 45% of the total population.

According to Mongolian Regional Development Concept², after the transition from central planned economy to market economy in 1990, the lack of effective local and regional development strategies affects enormously to make a movement to three

biggest cities, Ulaanbaatar, Darkhan and Erdenet. Remaining all provinces, which is the home of 92,1% of total land, 89,6% of total livestock population, 80,7% of total water resource, 73,4% of total forest reserve and mining resources had not been taken into account to be developed following a market economy concept except above mentioned three cities and Tuv Province and Selenge Province. Due to these reason, the movement from rural to an urban area (especially Ulaanbaatar) have been increasing continuously.

Thus, the aforementioned features addresses that centralization is in progress (45% of total population resides in Ulaanbaatar) and needs effective urban planning and policies in order to improve living en-

vironment of urban dwellers and make counter-measures to overcome environmental issues and others.

Japan International Cooperation Agency (JICA³⁾) conducted a study on `The Study on City Master Plan and Urban Development Program of Ulaanbaatar City in Mongolia (UBMPS)` between February 2007 to March 2009. The objectives of the study were; (1) To revise the existing master plan (M/P, launched in 2001) for the target year 2020 and 2030 and to include counter-measures against expanding ger areas¹, (2) To conduct a household-interview survey (HIS) in order to investigate socio-economic and daily activities of residents, (3) Based on the related surveys and studies preparation of action plans and make recommendations to agencies in implementing the revised master plan, and (4) To transfer technology to improve the capacity for city planning of implementing agencies. In order to implement whole suggested action plans in (3) including urban transportation infrastructure projects, the total required monetary capital is estimated US\$9 billion.

According to HIS result (2008), total travel demand in Ulaanbaatar is estimated to 3.4 million trips/day including walking. The demand is composed walking (30.6%), car (24.2%), taxi (9.2%), bus (33.4%), and others (2.6%). When walking is excluded, the total demand is 2.3 million trips/day, comprising car (34.8%), taxi (13.3%), bus (48.1%), and others (3.8%). The walking trip comprises around 30% of total trip/day due to sudden urban sprawl in sub-urban areas (increase of ger area dwellers) with poor transportation network. Moreover, the survey covered also to investigate socio-economic characteristics and people`s assessment regarding current condition of living environment, social infrastructure, and public transportation, etc. According to assessment of public transportation system, 95% of respondents are preferred that installation of MRT system will greatly contribute in their daily life and 55% of respondents are preferred to use it daily. However, it is unrealistic to accept this result due to majority of survey participants were from ger areas, those who has no deep understanding about metro, and how financial constraints will affect this large-scale project. As a result, the agency suggested the installation of new Metro (MRT) system along the main arterial road `Peace Avenue` (35% of the total daily trip is concentrating or crossing) in order to reduce traffic congestion, traffic accidents and improve residents accessibility and mobility.

On the other hand, the BRT project is under process and approved by Government of Mongolia

(GoM) in 2012. The project is financing by Asian Development Bank`s (ADB) multi-tranche financing facility (MFF) for three-tiered sub-projects which will completed in 2020. Moreover, Municipality of Ulaanbaatar (MUB) is requested to Mongolian-Russian Joint Venture `Ulaanbaatar Railway` (UR) to conduct a possibility survey to make a new `Railbus` line on existing railway corridor in parallel line with `Peace Avenue` (all brief framework of aforementioned projects will be explained in Section 3).

Since it is obvious that large-scale projects require huge amount of investment in infrastructure construction, and for sustainable operation and maintenance. The countries, such as Mongolia with no much experience in establishing the urban mass transit system, should consider primarily its proper planning, coordination, affordability and financing systems. In addition, the integration on strategic and operation levels are essential in the long-term sustainable transportation planning.

Halcrow Group Ltd⁴⁾ is warning that without proper integration of urban transit modes, in the consequences the wrong choice can be costly and long lasting. Therefore, this research aims to investigate; (1) Integration strategy of urban transit systems into one unified system and role in future urban transportation, (2) Affordability of government to implement urban mass transit projects, (3) Comparative analysis of alternative transportation systems based on the economic benefits from the perspective of urban dwellers for reducing travel time and vehicle operating costs (VOC) considering cost-benefit analysis approach (CBA).

To achieve aforementioned objectives, the study will utilize following methodologies; literature review examining possible obstacles that can be affected negatively in decision making process in large-scale projects, and application of CBA approach to conduct a comparative analysis between proposed possible scenarios.

2. BRIEF OUTLINE OF ULAANBAATAR

Ulaanbaatar is the center of economic and political power of Mongolia. Generally, 60% of the total country`s GDP and 45% of total population are gathering in Ulaanbaatar. Total area is 4,704.44km² with population density 272 person/km² and total area is similar to Fukuoka Prefecture in Japan (4,971km²). The administration structure is divided into 9 districts (including three satellite districts) and districts are dividing into 152 sub-districts (Figure1).

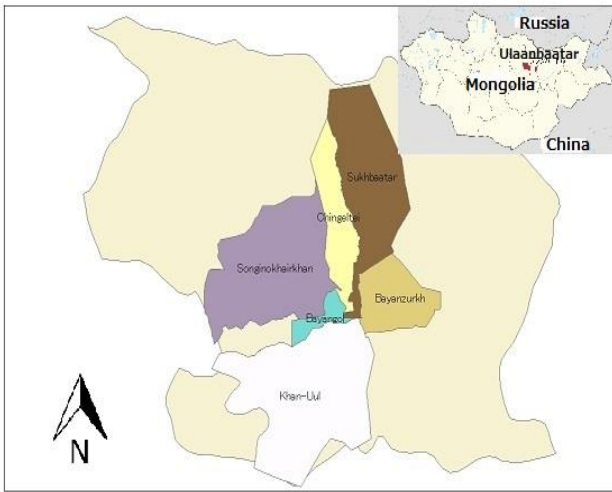


Fig.1 Location of Ulaanbaatar, Mongolia
Source: Municipality of Ulaanbaatar

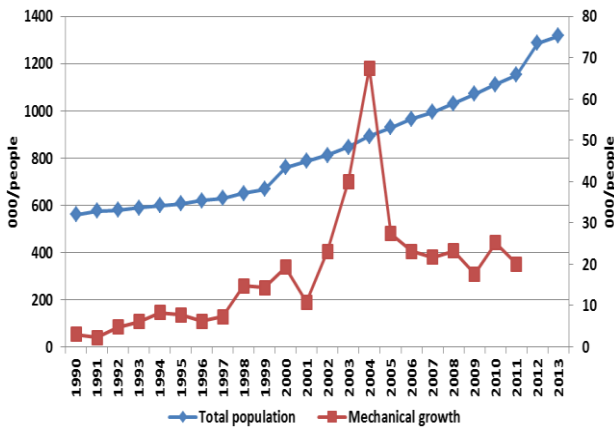


Fig.2 Population Growth of Ulaanbaatar
Source: Statistics Office of Ulaanbaatar, 2014

The living conditions of residential areas vary in each districts due to income level, housing type (apartment and ger area) and etc. Moreover, the mobility and accessibility to major transportation networks are differ in residential areas.

After the shift to market economy system, the mechanical growth of population has been increasing sharply. Such factors that affecting to sharp increase of population were rapid urbanization trend. On the other hand, the great number of livestock was affected by winter storm (dzud²) between 2000 and 2002, and it causes death of 45% of total livestock population. Due to these reason, the mechanical population growth had reached to peak in 2004. Figure 2 shows the population growth of Ulaanbaatar together with mechanical growth.

These pull and push factors lead to current rapid growth of city population and sprawl of suburban areas. On the other hand, the motorization trend have been placed; thus, total number of vehicles reached

to 209,791 units in 2011. According to statistics report of Ulaanbaatar (2012), 79% of the total registered vehicles is 11 years old or above, 17% is 4-10 years old, and 4% is less than 3 years old. This shows that households with lower-income and middle-income cannot afford to buy new vehicles and it greatly affects to the environmental problems, such as air pollution and etc.

The aforementioned phenomenon had brought numerous changes in the city's traffic manner, such as time delay in daily commuting and attending trips, high consumption of energy and etc. Traffic police statistics⁵⁾ report that between 1997 and 2007, average vehicle travel speed is declined from 40km/h to 17-25km/h, with the worst congestion during the peak hours in central areas.

In addition, majority of migrated people are residing in ger area (few of them with no land permissions) and it is estimated about 60% of the city's total population, where area has no connection to social infrastructure, such as heating, electric, disposal, sewerage and drainage systems, and main arterial roads. Therefore, there is a limited public transportation services in ger area due to poor road and traffic conditions. The major representative transportation modes of Ulaanbaatar are vehicle, bus, trolley bus and micro bus. There are some private vehicles (generally five people seat sedan types) are serving for residents in ger area for access trip from or to bus/microbus stations (people living in top or middle of the mountain area are using mostly). The service costs MNT300³ (approx. equivalent to US\$0.17) per person for one-way trip. It can be recognized as quite unique transportation mode for access trips in Ulaanbaatar, especially for ger area residents. Insufficient social facilities in ger area, such as hospitals, schools, kindergartens and recreational places, has also impact on increasing number of central area congestion and traffic accidents. In order to overcome this phenomenon, MUB is implementing redevelopment project in ger areas, which is responsible for rebuilding and replacing all ger area houses into low-price apartments based on the Urban Development Law (adopted in 2008). The MUB is also planning to relocate the campuses of all public universities, construction material retailing markets, and vehicle retailing markets from city center which causes traffic congestion during the peak hours and attracts more than 300,000 people daily. The new location is being considered surrounding areas of the satellite districts, Nalaikh and Baganuur. This will have an affect to avoid centralization of city center and impact on development of satellite districts. Furthermore, GoM is planning to establish new al-

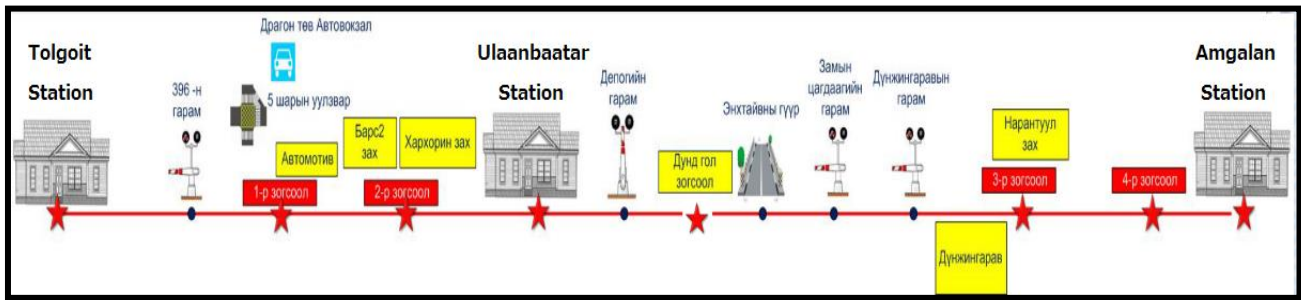


Fig.3 Railbus station planning
Source: Municipality of Ulaanbaatar

alternatives for public urban transit, MRT in east-west corridor and BST for accessing transportation mode with MRT stations. However, current existing institutional capacity, legislation system, and experiences have limitation to implement these large-scale projects. The budget constraints are also one of the major issues for MUB. The total planned budget expenditure is estimated to MNT467 billion (approx. US\$250 million) in fiscal year 2014. The GoM and Development Bank of Mongolia (DBM) are issued `Chinggis` and `Samurai` bonds in the primary market in order to support industrial and infrastructure development projects with estimated amount of US\$1.5 billion and US\$300 million, respectively. The following section 3 will be concentrated on initial frameworks of Railbus line in existing railway line, MRT and BRT projects.

3. OUTLINE OF URBAN TRANSIT PROJECTS

(1) Railbus Project

Historically, in 1948 the first proposal was designed for establishment of Mongolian-Russian Joint Venture `Ulaanbaatar Railway` (UR) and in 1949 the agreement was finally signed between Mongolian and USSR governments. The objective was to establish railway infrastructure in order to support country's strategic development and connect two countries (China and USSR) through railway line. Thus, three-parties, USSR, Mongolia and China, were signed for agreement for establishment of direct lines to connecting USSR and China through the Mongolian territory in 1952. In the result, the first line that connects two countries opened in 1956. Since the opening of new line, additional six line were constructed as a branch lines, and nowadays, the total railway network has 1,815 km length. The main network that connects north and south (passing central part of Ulaanbaatar) is 1,110 km. Moreover, the joint venture has operating

80 stations, with 15,560 employees and 22-23 million freight capacity annually. It also considered that north and south line is main connecting route of Euroasia. Ulaanbaatar central station is the main hub point of the whole network and plays an important role for passenger and freight movement. Based on the request from MUB, UR has conducted a study on how to effectively use current existing railway line with an additional passenger line that connects Tolgoi station and Amgalan station (Figure 3). The UR reports that it is possible to use the existing line for passenger trip connecting east and west during off-peak hours. Therefore, UR has contracted with Russian rolling stock manufacturer `Metrovagonmash` and ordered one rolling-stock with estimated cost US\$3.85 million. The chassis can carry 400-500 passengers for one way trip with 136 available seats. In order to use existing railway line for passenger trip, it is required to construct second parallel line connecting Ulaanbaatar central station and Tolgoi station. Thus, the construction is under process which is planning to complete in June 2014. In addition, the UR is planning to launch first operation between Ulaanbaatar central station and Tolgoi station. In 2015, second line from Ulaanbaatar station to Amgalan station will be finalized. Thus, from 2015 the route will finally be launched. Total trip time between two terminal stations is estimated to be 47 minutes. Moreover, it is required to construct four new station buildings and maintain one station building in order to fully provide service. From the financial perspective, GoM is invested US\$125 million in order to increase equity fund of UR in 2013. Further expansions of service will be granted from equity fund of UR.

(2) Metro (MRT) Project

Ulaanbaatar City is expanding with the remarkable economic development and total population is forecasted to be reached 1.76 million by 2030. However, according to the city M/P, the urban traffic condition will become more worse when taking

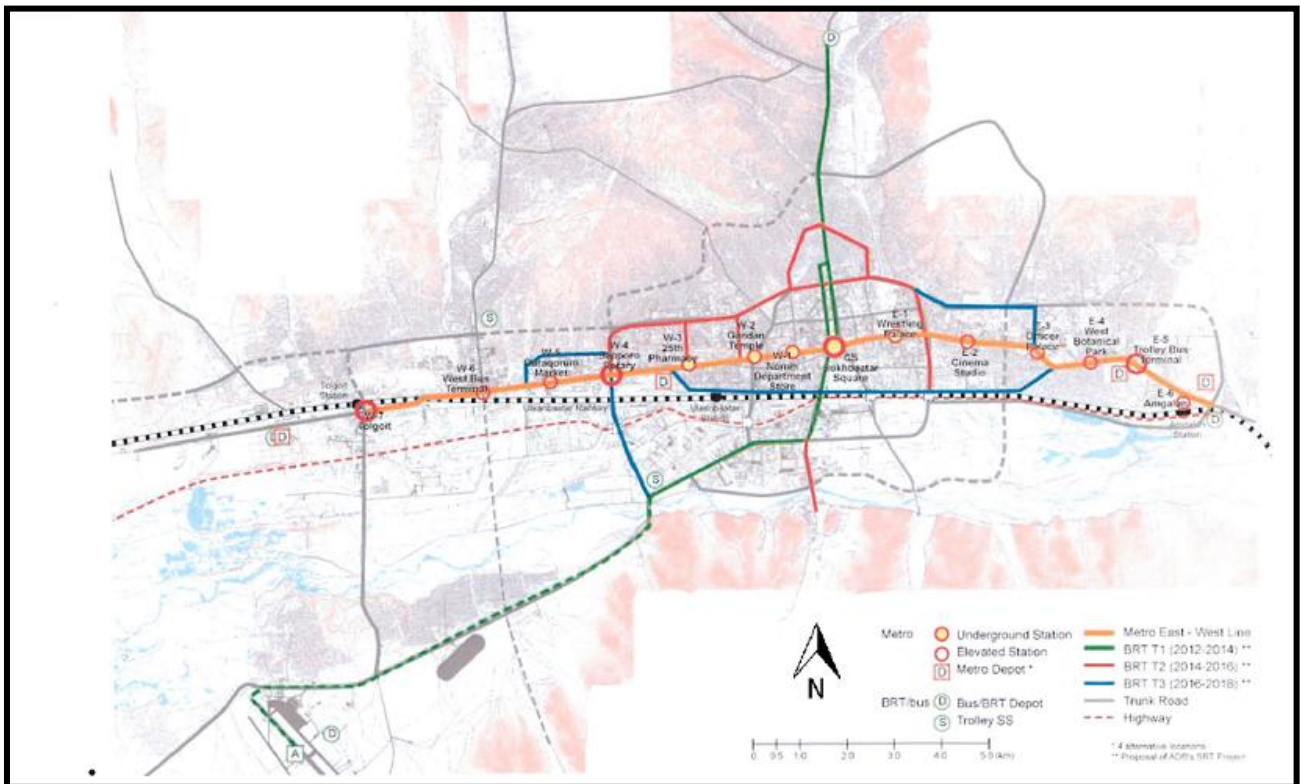


Fig. 4 Public transportation planning map
 Source: JICA study on city master plan of Ulaanbaatar

do-nothing alternative. The predicted average travel speed will fall in approximately 10km/h in 2030. Based on compact city concept and fully considering transit-oriented development (TOD) perspective, theMRT corridor is suggested in order to reduce current traffic congestion, traffic accidents, and negative impacts for environment. Based on the HIS and simulation of STRADA (a traffic demand analysis software developed by JICA), about 700,000 trips (approximately 35% of the 2 million trips, excluding walking) are gathering or crossing through Peace Avenue.

Since `Peace Avenue` is the main arterial road that connects west and east parts of the city; most of the public facilities, company offices, and institutions are located around this road. The MRT system is proposed to be installed along the Peace Avenue, with 14 stations, where 5 stations will be constructed underground in the city center and 9 stations will represent elevated construction. The total construction cost is roughly estimated US\$1.5 billion including US\$1.3 billion of construction cost for a tunnel, elevated bridge, stations and related facilities and US\$200 million of procurement cost for rolling stock and opening expenses. According to the JICA study, the project cost has been estimated based on the full adoption of Japanese firms can enter into main constructions and procurements (Japanese core

case). In this scheme, GoM is responsible for US\$700 million, where US\$200 million comes from state budget, US\$300 million from Human Development Fund, US\$100 million from `Chinggis` bond, and US\$100 million from `Samurai` bond.

In addition, Public-Private Partnership (PPP) scheme is proposed with a special purpose company (SPC) based on the two-tiered system. Here, the SPC (hereinafter UB Metro Corporation) is responsible for the service operation, while national government will own infrastructure facilities. Figure 4 shows the combined urban public transportation network in the future.

(3) Bus Semirapid Transit (BST) Project

According to Vuchic⁶⁾, it can be referred that the name bus rapid transit (BRT) belongs to `sale` name and technically correct name is bus semirapid transit (BST). The Asian Development Bank (ADB) Land Acquisition and Resettlement Framework (LARF) in accordance with the ADB`s Safeguard Policy Statement in 2009 in order to; (1) Improve road infrastructure bottlenecks in Ulaanbaatar to maximize the road network capacity; (2) Apply traffic management measures to increase traffic flow efficiency and safety; (3) Develop and implement parking, traffic, and travel demand management policies; (4) Develop a BST - based public transport

system; and (5) Improve the public transport management and quality of services.

Funding will be provided through a multi-tranche financing facility (MFF) comprising of three tranches and will involve improvement and widening of the existing roads; north-south and west-east roads of Ulaanbaatar and improvement of 21 intersections in the center of city.

The total project cost is estimated US\$274.4 million including basic infrastructure cost, contingencies, and financing charges during project implementation. The GoM has requested an MFF in an amount up to US\$217.4 million from a blend of ADB's Special Funds resource, ordinary capital resources (OCR), and Global Environment Facility (GEF) grant funding to help finance a part of the investment program (ADB⁷). The government will provide counterpart funding to finance civil works, land acquisition, and settlement equivalent to US\$57 million, and responsible for exempt the project from taxes and duties.

The first tranche of the project is planned to be implemented between 2012 and 2014, which covers widening and renovation of the road from north to south with 5.6km long and expansion of Peace Bridge (construction of connection ramps to Peace Bridge in left and right sides).

4. INTEGRATION OF THE PROJECTS

The aforementioned large-scale projects require a huge investment for infrastructure construction and operation, service and maintenance. According to Halcrow Group Ltd., urban mass transit projects will play an important role for future sustainable development of the city; thus, those large-scaled projects needs to be integrated with other transportation systems, and suggests that government action is necessary for integration process.

May et al⁸., note that there are four main types of integration in transportation strategies; (1) Integration between authorities, (2) Between measures involving different modes, (3) Between measures involving infrastructure provision, management and pricing, and (4) Between transport measures and land use planning measures. Since our objective is to determine whether above mentioned projects are effectively integrated in the strategic and operational level or not; therefore, this paper takes into account integration strategy as follows: (1) Integration between authorities with desire to establish unified transportation strategy; (2) Integration between transportation modes with effective accessible

modes and pricing strategy.

(1) Integration between authorities

Mongolia is politically and economically under transition period same as with developing nations, where all public and private institutions are under development process. The country's competitiveness is still weak due to the lack of effective legislation and administration system.

According to Bruijn (2009), it is crucial to describe significant obstacles for decision-making process to the development of infrastructure projects, and determine possible strategies in order to overcome the obstacles to development. Similarly, based on the existing literature regarding implementation cycle of large-scale projects, the findings of the study can be described and divided into following two sections. The first section describes existing obstacles inside country's authorities. Followed by possible methodologies to overcome these obstacles in order to save time and cost during the implementation cycle of the projects.

(2) Obstacles

a) Effect of unstable administration

Mongolia is a parliamentary country. The citizens elect the deputies in the national assembly, the State Great Khural, which chooses the prime minister, who nominates cabinet in consultation with president. The parliamentary election is held once in four year. The national and regional government are responsible for as infrastructure administrator, provider of grants, and legislator for national railway. Together with national and regional government, the transport sector is also main participant in the implementation of public transportation development (Bruijn⁹). In Mongolia, when one political party is holding a political power, starting to reform all sector's in the administration and implementation levels. As a result, it can be considered that human resource capability is already lost facing different administration reforms in the sector. For example, in case of NUBIA project, since the investment scheme is approved in 2008, due to delay of Mongolian side to build up a structure of the newly established government; thus, selection process of consulting company was delayed for one year.

On the other hand, the implementing agencies of MUB, Road Department and Public Transportation Department play an important role that will be responsible for new road construction, road maintenance and public transport service. The administration of each department is always changing due to the interest of higher authorities. The life cycle of

each project requires more time until completion due to unstable administration.

b) Financial constraints

As a developing country, it is definitely difficult to provide enough grants in order to support all priority infrastructure projects. The government is assumed that copper-gold mining sector would greatly contribute the country's affordability in the future. Mongolia is quite rich by their mining resource. The one of the biggest copper-gold mine is located in 550 km distance from Ulaanbaatar in the territory of Umnugobi Province. After the few revision of related laws and regulations, GoM had reached to 'Investment Agreement' and 'Shareholder's Agreement' with mining giant 'Ivanhoe Mines' LLC and 'Rio Tinto International Holdings Ltd' in 2009 and 2010 respectively.

On behalf of GoM, 34% of 'Oyu Tolgoi' LLC was owned by state owned company 'Erdenes MGL' LLC. Followed by GoM's 348th resolution in 2011 and 28th 'Erdenes MGL' LLC Board resolution in 2011, 'Erdenes Oyu Tolgoi' LLC was founded as an affiliate of 'Erdenes MGL' LLC.

'Erdenes Oyu Tolgoi' LLC is in deal after officially obtaining the 34% ownership of 'Oyu Tolgoi' LLC transferred from 'Erdenes MGL' LLC. The main goal of 'Erdenes Oyu Tolgoi' LLC as defined in the company charter is to be 34% shareholder of 'Oyu Tolgoi' LLC, to participate in operations of 'Oyu Tolgoi' LLC, to utilize state participation during the mine production ('Erdenes Oyu Tolgoi' LLC, 2013).

GoM is targeted mining sector as a main granter of the infrastructure development and socio-economic sustainability; unfortunately, the mining sector is in unstable condition. This means, because of unstable legislation and institutional environment, such as high tax system for mining industry, foreign investors are escaping instead of investing for the sector. Majority of mining companies have been reducing number of employees. The reason is that unstable foreign exchange rate, taxation, inflation rate growth, and etc.

On the other hand, as mentioned in section 2, GoM and DBM are issued a bond in the primary market to support industrial and infrastructure projects. the objective was to primarily invest large-scale projects, such as MRT project, 5th electric power station in Ulaanbaatar, new railway construction project which connects China and Mongolia in the southern boundary. However, the expenditure is not targeting such kind of a large-scale projects so far.

Based on these features, it is obvious that inte-

gration in administration level would affect economic stability; thus, aforementioned two obstacles have a relationship with each other and need careful attention in order to be integrated.

(3) Integration between transportation modes

The BST corridors will play an important role in order to connect with MRT corridor. Considering all measures, affordability of government to implement such kind a project (MRT project), and requires advanced technological and financial availability.

Timing is the crucial measure for implementation of the project together with possible risk allocation. Due to instability of government activities and with financial constraints, the priority is that conducting an effective study and research, to make positive legal environment, and integrate all participants in one mission.

Here is arguable that proper consideration of alternative choices of transportation modes and investigate possibility to use existing infrastructure as a basic system. For this purpose, the alternative choice, such as improving and upgrading existing entire railway line as a urban transit mode. As a consequence, it can be assumed that saving a lot of debt for establishing new network. For example, based on the NUBIA report¹⁰⁾, the first monetary investment for establishment of new airport is estimated US\$300 million. Later, deep study by consulting companies concluded that total estimated investment is US\$500 million and it is increased by approximately 1.6 times. According to the loan agreement, the remaining financial gap which arised after consulting companies study has to be covered by GoM. However, since MRT project is drafted to spend US\$1.5 billion for infrastructure construction, operation and maintenance, it is unrealistic and requires quite proper study and research involving different participants in the project. Since the urban area is suffering from wide sprawl in suburban areas and its externalities, in the first stage of study is suggesting to effectively use and improve the existing railway line. In order to get involved for this objective, we will carry out comparative analysis of these transportation analysis based on the cost-benefit analysis approach. In addition, proposition of new entire public transportation system will be supplied. The advantages of the existing railway line can be as follows;

- To use line as a main urban mass transit corridor with possible accessing modes, such as feeder bus services, BST and others.
- To extend line connecting with NUBIA in the southwest, university campuses and markets in

the eastern part.

- To develop a surrounding of Ulaanbaatar station area as a main hub station based on the TOD concept.

Based on the above mentioned features, the initial proposal will be provided in order to supply policy makers to make a effective decision making.

(4) Investigation and forecasting of travel demand

When implementing railbus project, the priority condition is to properly measure and forecast travel demand. There will arise question; Who will use the railbus line since the service has distance from Peace Avenue?

a) Travel demand characteristics

Since the 35% of daily trip is crossing or concentrating on `Peace Avenue`, it is reasonable to analyze and compare each transportation modes from the viewpoint of socio-economic efficiency. However, railbus infrastructure investment might represent efficiency instead of constructing new urban transit infrastructure. On the other hand, railbus system might not cover the travel demand due to farness from `Peace Avenue`. Thus, it is necessary to concentrate on alternative scenarios in order to investigate appropriateness of the systems. For this purpose, with and without scenarios are essential when planning railway based systems in order to construct urban transit modes.

In case of MRT project, in scope of the UBMPS, JICA conducted a HIS from March 2007 to October 2007 in order to investigate current living environment and assessment of urban services, including daily trip characteristics. HIS shows that Peace Avenue is attracting approximately 35% of the total daily trip not including walking trip. Due to insufficient road network, urban facilities, such as hospitals, schools, kindergarten etc., people from the suburban areas are mostly making a trip or crossing across the Peace Avenue. Thus, Peace Avenue is becoming backbone of the entire downtown area in Ulaanbaatar. Based on this, JICA offered the MRT corridor from west to east direction with length of 17.7 km and 14 stations. Totally, four alternative railway systems were compared to select most appropriate system and MRT was chosen prospective railway system based on the technical, environmental, service, and financial categories.

On the other hand, Municipality of Ulaanbaatar was the part of preparation of initial environmental examination (IEE) in collaboration with consultancy and prepared IEE is submitted to Ministry of Nature

and Environment (MNET) in accordance with the Law on Environmental Impact Assessment (1998). In scope of the IEE, alternative analysis is conducted with possible three mass rapid transit systems, including BST, underground metro, and Light Rail Transit (LRT). However, the BST is selected in accordance with affordability for public usage, passenger need and future land use pattern in the short and medium term period. The routes of BST have been selected based on a transport demand analysis. Further, Origin and Destination table (OD table) will be utilized in order to effectively evaluate actual demand of entire city.

5. CONCLUSION

In the first stage of the paper, we have grasped the implementation process of three urban transit projects. It is followed by findings from the existing literature that in order to implement large-scale projects, there exists uncertain obstacles, such as on the administrative and operational level. Moreover, uncertain integration in national, regional and local governments would affect negatively for implementation of those large-scale projects. Further, in the next stage of the research, the supplementary comparative analysis of alternative projects will be provided based on the cost-benefit analysis approach.

APPENDIX

1. Ger area is the residential area where people are living in traditional house that can be referred as `tent`. Generally, the area has no connection to the basic infrastructure networks.
2. Dzud is happening in winter and causes a death of many livestock population. It occurs when cattle loss the ability to reach the grassland for feeding.
3. MNT is Mongolian national currency and can be referred as Mongolian Tugrug.

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