Development of urban infrastructure on the example of Ulan-Ude

Galina Zharkaya¹, Bato Sangin² and Oyuna Ayurova¹

¹ East Siberian State University of Technology and Management, 670013, 40v Klyuchevskaya, Ulan-Ude, Russia
² Buryat State University, 670000, 24f Smolin st., Ulan-Ude, Russia

Abstract. Development of modern cities requires strategic urban infrastructure development planning and assessment of measures aimed at improving the urban environment. The article deals with the issues of engineering, social and transport infrastructure. It presents statistical data that describe urban infrastructure development projects implemented by the municipal authorities.

The infrastructure which contributes to favorable and comfortable conditions for the residents is an important factor in improving urban development management.

The issue of infrastructure development is crucial. The problems of repair, reconstruction and (or) renewal of infrastructure facilities are relevant at all the stages of urban planning, development and expansion.

The infrastructure is a structured mechanism with a huge set of tools for ensuring comfortable working and living conditions. Infrastructure includes a complex of industries (social, engineering, transport, information, innovation, market, etc.).

Of course, each industry experiences problems such as moral, functional and physical depreciation of infrastructure elements, etc.

Under globalization and urbanization of settlements and cities, infrastructure problems are crucial in all areas. Authorities of towns and cities are facing these problems. Since most of the cities were created in the 9th-11th
centuries, available infrastructure elements are not sufficient for modern cities.

The article aims to analyze the following Ulan-Ude infrastructure elements:
- Engineering infrastructure;
- Social infrastructure;
- Transport infrastructure.

Engineering infrastructure is a system of industries and enterprises that provide comfortable living conditions for the population. The engineering infrastructure includes enterprises generating gas, heat and electricity; enterprises providing water supply and water disposal services. The main purpose of this industry is to provide the residents with water, energy, and fuel.

According to the data provided by the Republican Statistics Service, in 2016, the engineering infrastructure included 623 km of illuminated streets, 557 km of water supply networks, 400 km of heat networks and 2107 km of electrical networks.

The wear level for the engineering networks is high. The wear level for the water supply networks is 70%, despite the fact that 7-10 residential buildings are connected to these networks each year. The wear rate for the urban power supply networks is 40%. They are annually renewed at the expense of municipal funds.

The wear level for the heating networks is 64%; there were 455 emergency shutdowns for the heating period of 2016 - 2017.

Social infrastructure is a system of enterprises and industries responsible for development of social living conditions. Social infrastructure can be divided into socio-cultural (development of intellectual, spiritual, and
community qualities of the population) and social and living (provision of conditions for activities of the population). The levels of social infrastructure development and population satisfaction with social policies of federal, regional and municipal authorities is one of the indicators for assessing living conditions at the regional level.

Figure 2. Social infrastructure of Ulan-Ude [2].

The urban social infrastructure provides opportunities for cultural enrichment of the population (international theater events, large-scale celebrations of national holidays, etc.). The administration of Ulan-Ude developed such programs as “Ulan-Ude is a city of good traditions”, “Ulan-Ude is a bright capital of the Baikal region”, etc. which increase the number of Russian and foreign tourists (Fig. 3).

Figure 3. Social programs in Ulan-Ude [3].

The transport infrastructure is a system of enterprises that create conditions for transportation of people and goods. It includes all modes of transport (automobiles, airplanes, railway transport).
According to the data presented in Fig. 4, about 30% of the Ulan-Ude roads do not meet regulatory requirements which causes roads accidents. In 2016, the number of registered accidents was 645 accidents, while the total number of registered vehicles was 92300.

Figure 4. Transport infrastructure of Ulan-Ude [2].

The level of economic stability of market relations and well-being of the region depend on the transport infrastructure which is a key industry maintaining relations of all market participants.

In 2016, 451.3 million rubles of the republican budget funds and 593.3 million rubles of the municipal budget funds were invested in the infrastructure of Ulan-Ude (Fig. 5). In comparison with 2015, the budget investment increased by 15% which characterizes a stable development.

Figure 5. Structure of budget expenditures of Ulan-Ude in 2016 [3].

Infrastructure development involves creation of conditions for favorable and comfortable living of the population. These two factors reflect living standards and satisfaction of individual needs of the population. Under urbanization, one of the factors influencing urban development is the
environment. In the conditions of city growth, personal development, effective utilization of limited resources, one can create a model of equilibrium urban management that will allow for the efficient use of available urban infrastructure facilities and development of modern urban infrastructure facilities taking into account construction and informatization processes (automatic dispatching, systems of continuous energy supply, etc.).

The modern city is a living organism, where all systems are interconnected and have their own aesthetics. For example, the supply networks are underground which is inconvenient when repairing them. Application of trenchless technologies helps avoid these inconveniences.

In general, the wear level for the existing infrastructure is high which may cause local technogenic disasters. Federal budget funds are used for reconstruction and repair of the engineering infrastructure which is only a delay of inevitable events.

Cities should develop new territories, rather than adjust urban development master plans to infill construction deteriorating infrastructure conditions. Integrated development of territories, identification of infrastructure parameters at the design stage will allow for residential development of districts, neighborhoods taking into account such indicators as the number of places in kindergartens and schools, the amount of energy consumed, etc.

Infrastructure problems are due to the high wear level and improper maintenance of infrastructure facilities. Highways and yards need urgent repairs. There are less and less gardens, lawns, and parks. Rivers and soil are polluted [1]

The problems of engineering infrastructure are caused by monopolization of the industry and enterprises which cannot cope with the financial (credit) load on the reconstruction of networks.

The study allows for the following suggestions:
- implementing measures aimed at improving the urban environment (elimination of negative impacts on the urban environment, lighting of communal areas, planting, law enforcement, waste collecting and recycling, etc.);
- improving the quality and reliability of communal and transport services (housing and public utilities, catering, public transport services, road surface improvement, etc.);
- implementing innovative technologies for creating communal areas (parks, gardens, squares, boulevards, embankments, etc. using the "Smart City" technology);
- developing an inclusive environment for people with disabilities and limited mobility.
Modern cities have ecological, transport, health care, demographic problems, etc. Identification of these problems will make it possible to prevent irreversible consequences at the local, regional, and federal levels.

To form a sustainable urban development trend, it is necessary to develop the urban infrastructure, solve problems of the urban environment by implementing and observing rules which will make it possible to create favorable investment conditions.

References

[1] Asnina Y. A., A. V. Borisov, N. and. Borisov. Development of modern city infrastructure: social and economic aspects. Novainfo, №39. 2015. P. 177-183. [Electronic resource]. URL: https://elibrary.ru/item.asp?id=24984719;

[2] Territorial agency of the Federal state statistics service of the Republic of Buryatia [Electronic resource]. URL: http://burstat.gks.ru/. Date of application 29.03.2009;

[3] Official site of local self-government agency Ulan-Ude. [Electronic resource]. URL: http://ulan-ude-eg.ru/mer-goroda/. Accessed on 29.03.2009.