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FEASIBILITY STUDY & CONCEPT DESIGN

"FIRST RING ROAD" project

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OFFICE OF THE GOVERNOR OF THE CAPITAL CITY

SOCIO-ECONOMIC STUDY AND FINANCIAL ANALYSIS OF THE FIRST RING ROAD

Ulaanbaatar city
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SUMMARY

Within the scope of the task of developing the feasibility study for the “First Ring Road” project of Ulaanbaatar city, the project economic analysis (EA) was developed using the “HDM-4 and RED” programs developed by the World Bank within the scope of “Road Network Development, Management Planning and Determining Economic Solutions for Road Projects”. In the economic analysis, three variants of the two highway routes and three construction technology options, namely Route 1.1 (4%), Route 1.2 (6%), and Route (4%), were planned and analysed under the following conditions. Including:

- - Compare the project road alternatives with the “do nothing” scenario of the current road without the project
- The project implementation period is 2 years, or 2026-2027.
- The road is scheduled to be operational in 2028.
- Investment financing schedule to be 50% in the first year and 50% in the second year
- The project road's forward traffic flow is planned to be the same in all variants of the RDW.

Comparison of project route options:

- The Trass-1.1(4%) option has higher investment financial requirements than other options. Still, the net present value (NPV 233.086 million) is the highest and the internal rate of return IRR 14% at a discount rate of 12% compared to Trass-2(6%) and Trass-1.2(6%), which indicates that the project option is more efficient.
- The Trass-1.1(4%) option will provide road users with a higher net benefit (1001.302 million per year) than other options.
- The Trass-1.1(4%) option will provide road users with a net benefit of 74.8 million.$ per year due to improved road safety, which shows the highest results compared to other options.
- If the project is implemented in the Truss-1.1 (4%) scenario, there will be a loss of -$318.8 million to the environment (during the construction period alone), but with its rehabilitation (implementing green economy planning), there is a possibility that this loss will be compensated 16-50 times in the future years.

Also, suppose the project is implemented in this scenario. In that case, road users will benefit from human development and socio-economic growth of $30.40 million per year, as well as environmental restoration, averaging $23.5 million per year.

Therefore, it is considered that the implementation of the “First Ring Road” project of Ulaanbaatar city in the Trass-1.1(4%) scenario is the most optimal option in terms of technology and economy.

The project's total financial investment cost will be 918.83 million. If the project implementation period is extended to 3 years and the investment cost is increased by 25%, the project sensitivity analysis indicates a potential risk to the planned investment efficiency. Therefore, when implementing the project, it is necessary to carefully prepare the execution plan, financing, and preparatory work for the start of construction, organise timely relocation activities, and implement the project within 2 years according to the financial schedule under the basic conditions proposed in this analysis. The project can be implemented efficiently (IRR =14 %).

According to the human resource planning for the project, a total of 3,540 jobs will be created directly in the construction of roads, bridges, and tunnels, of which 85% or 3,000 people can be hired from the local community.

According to the international system, which states that the development of road infrastructure leads to socio-economic (SEO) development and supports the activities of other economic sectors in a ratio of 1:3, the project implementation is expected to create a total of 14,160 jobs directly and indirectly in the local community due to the impact of SEO. This will reduce Figure 44. The labour force in the capital has decreased by 2%. PRODUCER PRICE INDEX OF THE TRANSPORT INDUSTRY, PERCENTAGE 72nd. According to the calculation of the labour and salary of project employees, the total salary of all employees is planned to be 203,153.29 million.₮, which will increase the net income of households. The average monthly salary of one employee is estimated to be 2.9 million. ₮ or $ 803. If the project is implemented, it will become the main source of income for domestic workers and increase the net cash income of households by 1%, amounting to 36.1 thousand. ₮.

Considering the impact of the project on the state and local budgets, a total of 104.4 billion ₮ in tax revenue is expected to be concentrated in the state and local budgets during the 2 years of project implementation. This means that for every 1 km of road and road structure construction, 4.2 billion ₮ or $ 1.178 million is expected to be generated in the state and local budgets.

With the implementation of this road project, the capital city will have a paved road network of 13.679 km, a reinforced concrete bridge capacity of 9.034 m2, and a 2.08 km tunnel structure for the first time in Mongolia. In addition, road users lacking infrastructure in Ulaanbaatar will have access to social and economic services in a more timely manner.

The implementation of the project will significantly reduce vehicle traffic congestion on the main roads of Ulaanbaatar by diverting traffic outside and inside the ring road at a ratio of (2:8), and as a result, road users will be able to save $511.878 million per year in travel time, or 52% of the total net profit of the project.

The construction of the project's road infrastructure will be implemented with comprehensive planning and green development policy planning, which will have a significant impact on the environment and the quality of life of the population, and create a healthy and safe green environment in the project's impact area. For example, in Ulaanbaatar, when the project was not implemented, 35.9 kg of dust was generated per day due to traffic congestion. Still, with the implementation of green economy planning within the project, this amount will be reduced by 239 times. The area of lawns, which was 14.5 thousand m2 before the project was implemented, will be increased by 16.6 times to 256.4 thousand m2 within the project. The impact of green facilities on the project's roads will be increased by 23.3 times, air purification by 1053.9 times, noise reduction by 25.9 times, soil moisture by 10 times, air humidity by 10 times, water over-discharge by 21.5 times, soil erosion by 40.2 times, and waste transportation by 6.7 times.

If the project is implemented, the annual cost of road maintenance work for the project will be financed from the revenue from the road use fee for vehicles concentrated in the Capital Road Fund, in addition to approximately $ 31.0 million. It is planned to provide the capital's road network with the opportunity to maintain it in a state of technical readiness for use and to regularly carry out maintenance according to norms and standards in the future. This will have a significant impact on increasing traffic safety on the capital's roads.

The project is unique in that it paid great attention to ensuring the safety of the capital's road traffic when conducting this research and developing road design solutions and plans to ensure road safety. This will have an impact on reducing the number of road accidents that are a threat to the capital (2946 (65.6%) of people who suffered life and health damage due to road

accidents were registered in the capital). According to the analysis, road users will have the opportunity to receive a net benefit of $74.8 million per year from ensuring road safety.

Товчилсон үгийн жагсаалт

RS	Road sector
ADB	Asian Development Bank
БОҮН	Environmental impact
GDI	Gross domestic product
ADTIPY	Average daily traffic intensity per year
RTDC	Road Transport Development Centre
MRT	Ministry of Road Transport
UCOT	Unit cost of transportation
FS	Feasibility study
ISOTD	Income sensitivity of transportation demand
NSC	National Statistics Committee
PPP	purchasing power parity
UOL	underutilization of labour
HDI	Human Development Index
EA	Economic analysis
HDM-4 HDM-4VOC	Highway Development and Management (HDM) Model- HDM-4 Highway Development and Management (HDM) Model-4 Road Development Management Model-4 Program Transport Operation Cost Submodel
PEDFT	Price elasticity of demand for transportation
OD survey	Original destination/road trip origination point study
REDM	Roads Economic Decision Model
000$/km	thousand US dollars/km

Introduction

Mongolia's long-term development policy "Vision 2050" sets the goal of developing the capital city of Mongolia, Ulaanbaatar, into an internationally competitive metropolitan with "a sound settlement system with rational spatial planning and rapidly developing satellite cities", and the "Action Program of the Government of Mongolia for 2024-2028" sets the goal of "Ulaanbaatar - a "20-minute city" with a multi-modal public transport and road network, a green and smart city." In line with these long-term and medium-term development policies, the Government of Mongolia's Resolution No. 476 dated December 21, 2022, the General Development Plan of Ulaanbaatar City-2040, and the Decree of the Governor of the Capital No. A/720 dated June 19, 2024, decisions were made to develop the feasibility study design for the construction of the "First Ring Road" of the Capital City of Ulaanbaatar by international standards.

Based on these and the prospective development documents for the development of the capital city of Ulaanbaatar, as well as the “Terms of Reference for the Development of the Feasibility Study for the “First Ring Road” Project of Ulaanbaatar City” (hereinafter referred to as the “Terms of Reference”), an economic analysis of the project road was developed. The Terms of Reference stated that the technical classification of the road is “Capital Highway, Main Street Road, Grade 1 and 2, Auxiliary Street Road”, and the location, route, and scope of the project road are “TETS-4 Highway, Enkhtaivan Avenue-Tolgoyt, Ard Ayuushi Highway, Bayankhoshuu Intersection, the territory of 10 khoroos of Songinokhairkhan District, Denji Myangin End, Hailaast Street, Doloon Khulun Highway, Baruun Altan-Ulgiin Street, Daa Ermi Street, Khilchni Street, Police Academy Avenue, and Dunjingarav Street”.

However, to consider the socio-economic impact of the project road in a more detailed and comprehensive manner, the economic analysis included the entire Ulaanbaatar city area (including remote districts, cities and villages that will develop in the future) in the scope of the project and the impact area of the road. In addition, to prepare the economic analysis of the project by international standards, the HDM-4 and RED programs developed by the World Bank were utilised. In this context, the goal was to determine the results and significance of the financial research and analysis of the project by the following principles. These include:

- The project road should serve road users who lack adequate infrastructure in Ulaanbaatar city and provide them with immediate access to social and economic services;
- The project should reduce traffic congestion on the main roads of Ulaanbaatar city, and road users should benefit from the project in a certain way.
- The project road should have contributed to reducing air pollution (dust, greenhouse gases) caused by vehicles in Ulaanbaatar city to a certain extent;
- The project should support the green development policy planning in the construction of the capital's road infrastructure.
- The capital's road investment policy planning should propose environmentally friendly management and environmental protection;

CHAPTER 1. GENERAL

1.1. Research objectives and rationale

The task of developing the feasibility study for the “First Ring Road” project of Ulaanbaatar city defines the goal of this project as “Improving the capacity of the main streets, intersections, and intersections of the capital city of Ulaanbaatar and reducing the traffic load on the streets.”

In line with this goal, the socio-economic impact and investment efficiency of the project road are calculated based on the two Route options proposed in the project road planning. The goal of the economic analysis is to suggest the most efficient planning solution for the construction of the “First Ring Road” of Ulaanbaatar city.

The economic analysis of the project road was based on the following legal acts and policy documents for the long and medium-term development of Ulaanbaatar city. These include:

“Vision 2050” Long-term Development Policy of the Republic of Mongolia, approved by Resolution No. 52 of the State Great Khural of Mongolia on May 13, 2020;

“Mongolia’s Regional Development Concept” approved by Resolution No. 64 of the Mongolian Parliament on June 5, 2024

The Action Program of the Government of Mongolia for 2024-2028 was approved by Resolution No. 21 of the Mongolian Parliament on August 27, 2024.

Ulaanbaatar City Development Master Plan-2040;

Resolution No. 476 of the Mongolian Government of 2022 “On the Construction of the 'First Ring Road' of the Capital Ulaanbaatar City”;

Decree No. A/720 of the Governor of the Capital City dated June 19, 2024, on the Construction of the “First Ring Road” of the Capital Ulaanbaatar City, the Firstization of the Highway Route, and the Development of the Feasibility Study Design by International Standards;

International experience in calculating the economic benefits of road project investments;

The “HDM-4 and RED” programs were developed by the World Bank for the management planning of road network development and determining economic solutions for road projects. The World Bank compiled a 7-volume theoretical and methodological manual for the use of these programs and the financial analysis of roads.

Research needs

The long-term development policy of the Republic of Mongolia, “Vision 2050,” and the “Action Program of the Government of Mongolia for 2024-2028”, include many critical socio-economic measures for the phased development of the capital city of Mongolia, Ulaanbaatar, and its region.

Some of these measures, planned to be implemented within the framework of the project road, are summarised as follows:

Table 1. Future policy and planning for the development of Ulaanbaatar city

№	Goal	Implementation activities
A	“Mongolia's long-term development policy, "Vision 2050", states:	
1	**Goal 9.3.** Develop into an internationally competitive metropolitan area with a sound settlement system	9.3.1. A general development plan will be developed, taking into account the necessary planning requirements such as the concentration of Ulaanbaatar city, expansion and restriction of the settled territory, land organisation, road network, public transportation, underground space, etc., and urban development activities will be implemented by connecting it to an integrated information system.

	and intensively developing satellite cities, with optimal spatial planning.	9.3.2. The city's first centre, sub-centre, specialised centre, and community centre with cultural, educational, commercial, service, housing, and social infrastructure facilities will be established first, reducing concentration within the city. 9.3.8. Make optimal use of underground space for roads, transportation, and engineering networks. 9.3.12. Introduce multimodal and intelligent public transportation. 9.3.13. Implement the construction of the city's horizontal, vertical, and circular road network, as well as the satellite and peripheral city road network, in phases. 9.3.14. Introduce high-capacity "Electromagnetic Transportation" along major corridors with high passenger traffic. 9.3.15. Introduce "Air Suspension Transportation" and build dedicated parking and infrastructure. 9.3.16. Establish a special road bus network. 9.3.17. Relocate households and businesses within the protection zone of highways and road facilities, carry out land use and organisational management, and construct the street and road network of the general development plan. 9.3.18. Fully introduce intelligent systems into the road network. 9.3.20. Establish distribution centres based on urban sub-centres and create conditions for transportation by heavy-duty, large-scale transport on main suburban roads. 9.3.21. Introduce large-capacity transport connecting satellite and peripheral cities, depending on the passenger flow. 9.3.22. Build terminals and stops for passenger transport services in an integrated manner. 9.3.23. Develop transport services for school children. 9.3.24. Establish a network for charging vehicles with electricity and gas sources. 9.3.25. Public transport management, information and control centre. First, fully introduce an intelligent system into the road network. 9.3.26. Build and expand pedestrian and bicycle paths, increase tunnels and overpasses, and create a control system. 9.3.27. Create a sophisticated parking management system. 9.3.28. Establish road zoning in Ulaanbaatar city and regulate vehicle traffic. 9.3.29. Introduce car sharing and car rental services in Ulaanbaatar city. 9.3.30. Implement projects and programs to develop city taxi services. 9.3.31. Establish a passenger transport network around Bogdhan Mountain. 9.3.32. Construct the Bogdhan Railway for freight transport. 9.3.33. Construct highways connecting cities and villages. 9.3.34. Introduce high-speed transport on special roads connecting the region with Ulaanbaatar city.
B	The Mongolian Government's Action Plan for 2024-2028 includes:	
1	1.1. Ulaanbaatar city - "20-minute city" standard	1.1.1. Urban Planning and Governance Initiative 1.1.1.1. Develop a policy document to achieve the "20-minute city" or an adequate level of social infrastructure accessibility, and develop and approve the "Capital City Development Master Plan 2040" and other city and town development master plans based on it.

2	1.1.4.Ногоон - ухаалаг хот	1.1.4.2. Enforce and improve standards for vehicle age and pollution, create public transport and pedestrian-friendly infrastructure to ensure safe and comfortable walking and cycling, reduce car use, and reduce vehicle pollution by half. 1.1.4.3. Make arrangements to prevent the transportation of dangerous goods through the centre of Ulaanbaatar city and densely populated areas. 1.1.4.4. Introduce artificial intelligence and advanced technology into the Ulaanbaatar traffic control centre system to intelligently regulate traffic lights based on traffic flow.
3	1.1.5 Multi-modal public transport and roads	1.1.5.1. The excessive concentration of state power concentrated in the Great and Small Roundabouts of the capital, or 770 hectares, will be dismantled, and the "Go Mongolia" steel cable-stayed bridge project and the Khushi Valley Tunnel project will be implemented. 1.1.5.2. The Tuul highway will be connected to the Nisekh Highway, and a bridge structure will be built over the Naadamchin Highway. 1.1.5.3. From Tolgoit to Amgalan, a 17.7 km "Large-capacity public transport Metro Line-1" will be built along Enkhtaivan Avenue, an 11.9 km long special road bus "BRT Line-1" along Ard Ayushi Avenue-Ikh Toiruu-Namyanju Street-Niislel Hure Avenue, and a 4.2 km long "Pendulum Transport Line-1" over the Tuul River from Yarma to Kharkhorin, ensuring the coordination of multi-modal large-capacity public transport systems, and a passenger transport logistics centre will be built in stages. 1.1.5.4. An international-quality 88 km "First Ring Road" and Tuul Expressway will be built to bypass freight traffic outside the city. 1.1.5.5. Organise a ring road in Ulaanbaatar, increase traffic intensity by 30 per cent, optimise the bus network and routes based on big data, simplify the payment system, and redesign public transportation to make it accessible to residents, adjusting it to population density.

The main issue to be addressed in the implementation of any country's development policy is the development of infrastructure. Among the types of infrastructure, the kind that provides door-to-door transportation at the lowest cost is the correct transportation policy based on an optimal road network and its implementation. In terms of population density in the world, Mongolia has a vast territory, with two people per 1 km², and is considered the most sparsely populated country in the world (ranked 195th).

However, in Ulaanbaatar, more than half of Mongolia's total population, or 357 people per 1 km2, is concentrated and engaged in social and economic relations. This has reached the same level as the population density per 1 km² of India. The MMCG research organisation has identified overpopulation and the current road network system as the primary causes of road congestion in the capital. This results in citizens spending an average of 2.5 hours a day and 35 days a year in road congestion, with a total cost of 3,815.4 billion tugriks. The study also found that the average density of paved roads in the 35,206.0 ha area of Ulaanbaatar city is 2.1 km/sq km. The road network density is unevenly distributed throughout the territory. It is relatively high in the city centre (10.59 km/sq km), which is one of the factors that increases traffic load and causes congestion.

Table 2. Population density of countries in the world

	Улс	Талбай (км²)	Хүн ам	Нег км²-т
1	Монако	2	30,586	15,293
2	Сингапур	693	4,701,069	6,783
3	Ватикан	0.44	829	1,864
4	Мальдив	298	395,650	1,328
5	Мальта	316	406,771	1,287
6	Бахрейн	665	738,004	1,110
7	Бангладеш	143,998	156,118,464	1,084
8	Барбадос	431	285,653	663
9	Тайвань	35,980	23,024,956	640
10	Маврики	2,040	1,294,104	634
11	Сан-Марино	61	31,477	516
12	Өмнөд Солонгос	98,480	48,636,068	494
13	Науру	21	9,267	441
14	Руанда	26,338	11,055,976	420
15	Нидерланд	41,526	16,783,092	404
16	Тувалу	26	10,472	403
17	Ливан	10,400	4,125,247	397
18	Маршалл	181	65,859	364
19	Энэтхэг	3,287,590	1,173,108,018	357
195	Монгол	1,564,116	3,086,918	2.0

Table 3. POPULATION DENSITY OF ULAANBAATAR CITY, people per square kilometre

Indicator	Unit	2024 I			2025 I		
		City Average	- Highest	Lowest	City Average	Highest	Lowest
Population density (persons per sq km)	Number	349	Bayangol - 8,578	Nalaikh - 59	357	Bayangol - 8,797	Nalaikh - 59
			Chingeltei - 1,526	Baganuur - 47		Chingeltei - 1,490	Baganuur - 47
			Sukhbaatar - 679	Bagakhangai - 32		Sukhbaatar - 688	Bagakhangai - 32

The above-mentioned conditions in the capital city of Ulaanbaatar create the need to develop a detailed feasibility study for the Ulaanbaatar First Ring Road project, calculate the socio-economic impact of the project road and the economic efficiency of the investment, and, based on this, develop a planning solution for implementing the Ulaanbaatar First Ring Road project.

CHAPTER 2. INTERNATIONAL EXPERIENCE, THEORETICAL METHODOLOGY

2.1. International experience

When examining the experience and theoretical methodology of road network development policy planning and economic research on road projects in countries with different levels of development (such as England, America, Spain, Indonesia, Thailand, Taiwan, India, Kazakhstan, Russia, Chile, South Africa), the HDM-4 and RED programs developed by the World Bank are used to build road networks and develop their management plans, and to align investment needs for road infrastructure construction and maintenance with the characteristics of the road and transport sectors, and to plan and manage them economically.

These programs were developed jointly by major world-renowned academic institutions and universities, members of the World Road Association (PIARC), with the support of the World Bank.

These programs have been developed through many years of experimental research in many countries. Even today, great attention is being paid to further improving it, creating conditions for its adaptation to the road networks of various countries around the world, adapting the software to the latest vehicle technologies, and incorporating the effects of the environment, roads, and climate.

About the HDM-4 program: Historically, the World Bank took the first steps towards developing a highway project evaluation program in 1968. The World Bank worked with the UK's Transport and Road Research Laboratory (TRRL) and the Laboratoire Central des Ponts et Chaussées (LCPC). The World Bank then conducted a second study with the Massachusetts Institute of Technology (MIT). It commissioned the development of a program based on the information obtained, resulting in the Highway Cost Model (HCM) (Moavenzaden 1971, 1972).

At that time, the Highway Cost Model (HCM) was superior to previous programs in terms of studying the following two issues:

Cost of road work: The consensus among scholars was that further research was needed to develop a more specific program for road construction in developing countries, and TRRL, in collaboration with the World Bank, conducted a large-scale study in Kenya to examine the factors affecting the deterioration of paved and unpaved roads and the cost of transportation in developing countries. Based on this study, TRRL developed the first version of the Road Transport Investment Model (RTIM) for developing countries (Abaynayaka< 1977).

The World Bank funded further development of the HCM in 1976, and the MTI produced the first version of the Highway Design and Maintenance Standards (HDM) model (Harral, 1979).

At that time, many countries around the world were using various versions of several road design programs, which were the basis for optimising the initial and optimal use of road network maintenance funds.

In the 1980s, HDM models were used in more than 100 countries to study the economic benefits of road projects and to compare possible investment options to maximise the benefits to road users. At the same time, these programs have become a high-level research tool for highway investment, and have been widely extended to adapt to different climatic and road conditions. By the 1990s, HDM-3 had become the main program used for the technical and economic evaluation of road projects, the development of road investment programs, and the analysis of the entire road network policy for more than 20 years.

However, there was already a need to integrate the latest advances in computer technology, reflecting a wider range of pavement and road conditions in different countries. This is because the technical interrelationships between RTIM3 and HDM-3 programs were approximately 10 years behind in 1995. Although most of the road damage models used in the program were still accurate, it was necessary to integrate the results of a large number of studies conducted in many countries around the world since the program was first created. In addition, in terms of transportation costs, since 1980, there have been significant changes in vehicle technology, and the actual transportation costs are estimated to be lower than those estimated by RTIM3 and HDM-3 programs.

Also, at that time, the program was mainly used by developing countries, but later it was widely used by industrialised countries with developed road networks. Therefore, it was necessary to update the technical interrelationships of the program, reflecting the developments and achievements that have been made. Due to all these requirements, the computational capabilities of the program were expanded, and the following models were added. These include:

- Impact of traffic congestion
- Impact of cold weather
- Inclusion of more types of pavements and structures
- Road safety
- Environmental impact (fuel consumption, traffic noise, vehicle emissions)

As a result of all these factors, in January 2000, the HDM-III program was expanded and named the Highway Development and Management (HDM) Model- HDM-4.

The HDM-4 program is characterised by developing a detailed analysis of the road network by considering the basis of the analysis of highway projects at a broader level than the traditional project level, i.e. at the policy and program levels. The results of these analyses are the main advantages of the program, which have become a decisive factor in highway management and investment planning.HDM-4 программыг хэрэглэхэд 7 боть эмхэтгэл гарын авлага дагалддаг бөгөөд эдгээр нь англи, франц, испани хэл дээр хэвлэгдсэн байдаг. Үүнд :

- Volume 1: Overview of HDM-4 Software Introduction
- Volume 2: Applications Guide – Application Usage Guide
- Volume 3: Software User Guide – Web Application Software Guide

- Volume 4: Analytical Framework and Model Descriptions – Analytical Framework and Model Descriptions.

The volume consists of the following eight parts:

- Part 1-Modelling Description
- Part 2-Traffic Dynamics Modelling
- Part 3-Road Network Data Entry
- Part 4-Road Construction Price and Cost Entry
- Part 5-Road User Cost Calculation
- Part 6-Fuel Consumption Calculation
- Part 7-Integrated Cost Analysis
- Part 8-Software Guide

- Volume 5: A Guide to Calibration and Adaptation [Version 1 documentation only] – Configuration and adaptation (instructions for configuring the program to match the geographical location, road and climatic zones, and road network characteristics of a given country, locality, and road network)

- Volume 6: Modelling Road Deterioration and Works Effects - Determining the effectiveness of road works

- Volume 7: Modelling Road User and Environmental Effects in HDM-4- Calculating environmental impacts and modelling greenhouse gas emissions

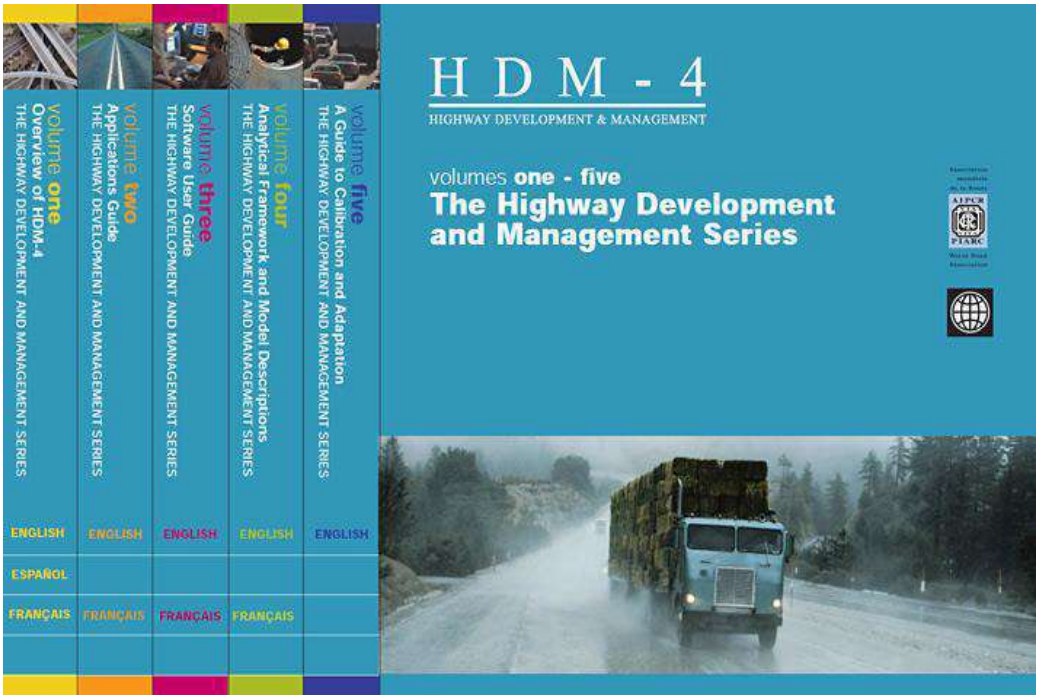

Figure 1. Hdm-4 program manual

PIARC[1] Since June 2005, the company has held the exclusive rights to distribute the software, which is now developed to version HDM-4.2.17 and successfully distributed worldwide by the international consortium HDMGlobal.

[1] PIARC (Дэлхийн Замын Ассоциаци) нь 1909 онд байгуулагдсан, дэлхийн өнцөг булан бүрээс 125 гишүүн орны засгийн газрыг нэгтгэдэг бөгөөд зам, замын тээврийн бодлого, туршлагын талаар мэдлэг, туршлага солилцдог дэлхийн форум юм. Нэгдсэн Үндэстний Байгууллагын Эдийн засаг, Нийгмийн Зөвлөлийн зөвлөлдөх статустай тус

Under the leadership of the World Bank Group, PIARC continues to carry out major expansion and integration work on HDM-4.2 under its current concession, which is aimed at improving the capacity of the transport sector in countries, restoring their economies, and creating transport networks that support the transition to low-carbon transport. In other words, PIARC (HDMGlobal) is also organising activities to assess investments in road networks, use HDM-4.2 in highway design and maintenance, and provide technical support for software training and sales implementation worldwide.

About the RED program. In developing countries, the decision-making process for implementing the Primary Construction and Primary Rehabilitation of low-traffic, unpaved, rural and local roads is inadequate, and there is a lack of a specific, adaptable economic evaluation model for such roads. To address this, the World Bank developed the Roads Economic Decision Model (RED) program in 2004. The RED program is a model used to conduct economic evaluations of all types of road network development projects, based on the trend of increasing the benefits to road users and reducing transportation costs. The advantages and disadvantages of the RED and HDM-4 programs are discussed. The HDM-3 and HDM-4 programs generally perform an economic analysis of road investments comprehensively. However, for low-traffic and unpaved roads (such as those in Mongolia's road network, where traffic is relatively low), efficiency is calculated at a specific level of investment.

HDM-4 also requires the user to collect a large amount of data and information, such as road pavement material properties and detailed traffic intensity information, from a large number of minor roads with low traffic intensity.

The RED program differs from the HDM-4 program in that it simplifies and specifically adjusts the following additional dependencies for modelling low-traffic roads. These include:

- Reduce data requirements for low-traffic roads;
- reflect the planned assumptions, especially road condition assessment and economic development assumptions (primary traffic, etc.);
- By determining the elasticity of transport demand and demand, it is possible to calculate the primary traffic increase due to reduced transport costs;
- It is possible to calculate and determine the economic costs even when vehicle movement is further interrupted due to the condition of significantly damaged roads.
- For planned roads, it is advantageous to use vehicle speed and accessibility indicators, road smoothness indicators as analysis options and criteria;

холбоо PIARC (Дэлхийн Замын Ассоциаци) нь 1909 онд байгуулагдсан, дэлхийн өнцөг булан бүрээс 125 гишүүн орны засгийн газрыг нэгтгэдэг бөгөөд зам, замын тээврийн бодлого, туршлагын талаар мэдлэг, туршлага солилцдог дэлхийн форум юм. Нэгдсэн Үндэстний Байгууллагын Эдийн засаг, Нийгмийн Зөвлөлийн зөвлөлдөх статустай тус холбоо нь зам, тээврийн салбарын тогтвортой, тогтвортой хөгжилд хувь нэмрээ оруулж байдаг.

[1] Сахарын Африкийн Тээврийн бодлогын хөтөлбөрийн ажлын баримт бичгийн цуврал; SSATP дугаар. 78 . © Дэлхийн банк, Вашингтон, ДС.

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- It is possible to reflect and pay attention to the assumption of improving road safety in the analysis.
- The availability of non-motorised traffic and social services can be considered as other benefits (or lost opportunity costs) that will be created by the project implementation and be considered in the project analysis.
- Additional project benefits, such as environmental and other social impacts, can be calculated by combining them with the investment benefits.
- Sensitivity analysis and project risk probabilities can be considered together in the study, and the results can be expressed.
- The results of the analysis and evaluation modelling can be combined with the main model of the HDM-4 program, VOC, or the transportation operating cost model. They can be used to expand and apply it.
- The RED program analyses the case of implementing or not implementing the project, considering the similarity of the level of damage to the road.

Then, when modelling the similarity of the level of road damage, the HDM-4 program shows some errors in the case of changing road surface roughness indicators due to road conditions, traffic, environmental conditions, and maintenance characteristics. In other words, it requires high accuracy in road pavement damage. However, this error does not occur in the “RED” program. In addition, the following difficulties that arise in the use of the HDM-4 program do not appear in the “RED” program. These include:

- There are no difficulties in measuring and calculating the current level of unpaved roads;

- There are no errors in temporary changes in road conditions, conditions and accessibility;

- There are no difficulties in determining the current and future traffic frequency when classifying traffic types.

- There are no repetitive characteristics of road conditions and conditions that arise in the context of determining maintenance and repair policies;

- There are no errors in determining the service level of low-traffic roads by indicators such as the annual average level of road surface and gravel thickness.

- All this provides the User with the opportunity to evaluate and analyse proposed road projects selectively.

- The “RED” program creates a large number of data tables containing all the data and presents the results and work reports that simulate their interrelationships to the User.

Table 4. “RED” Program Work Report

Job report file name	“RED” model	Purpose
RED”- Highlight (extension 3.2)	Basic modelling of economic valuation	Perform an economic evaluation of one highway.
“RED”- HDM-3: vehicle operating costs (extension 3.2)	HDM-3: Vehicle Operating Cost Model	Using the HDM-3 program, determine the relationship between motor vehicle operating costs and speed, depending on the terrain and road surface characteristics of the area.

“RED”- HDM-4: vehicle operating costs (extension 3.2)	HDM-4: Vehicle Operating Cost Model	Using the HDM-4 program, determine the relationship between the operating costs and speed of motorised and non-motorised vehicles, depending on the terrain and road surface characteristics of the area.
“RED”- Risk: (extension 3.2)	Risk analysis model	Perform a risk analysis of a highway project using a ternary distribution of underlying data.
“RED”- Program: (extension 3.2)	Program Evaluation Modelling	Perform economic evaluations by classifying specific road sections and road networks.

2.2. Theory and methodology

Using the RED program with the HDM-4VOC extension, the theoretical and methodological approach to conducting an economic analysis of a project road focuses on determining the following four main impacts at the road user level by the characteristics of the road and the transportation sector. These include:

- Socio-economic impact of a road project (SEI)
- Environmental impact of a road project (EEI)
- Total benefits to road users from a road project
- Return on investment of a road projectIn other words, the use of HDM-4 and RED programs is essential in conducting a detailed socio-economic analysis of any road project, comparing all the alternative plans of the planned road design with the period when the project was not implemented, and selecting the most efficient option in terms of investment and socio-economic aspects for the implementation of the project, and providing a solution for implementing the project.“To develop the socio-economic research and analysis of the Ulaanbaatar “First Ring Road” project in line with international standards, the following key indicators will be studied, taking into account the socio-economic characteristics of the capital Ulaanbaatar and the region and localities, and their effects on the project road will be combined with the investment efficiency of the project road. These include:

2.2.1. In the social and economic context

- The impact of human development on regional and local development;
- The impact of the project road on reducing the underutilization of labour in the region and locality;
- The impact of the project road on reducing unemployment in the region and locality;
- The impact of the project road on increasing household income in the region and locality;
- The impact of the project road on the capital and local budgets will be studied.

2.2.2. In the context of nature and the environment

Based on the “Environmental Impact Assessment” of the project route, the potential negative impacts of the project on the environment will be identified by the characteristics of Mongolia, and the effects of reducing them will be determined. For example:

- Reduction of arable land shortage;
- Reduction of soil damage;
- Reduction of air pollution:
- Reduction of dust pollution;
- Reduction of toxic gas pollution;

2.2.3. Within the scope of investment analysis

- To conduct an economic analysis of the project, taking into account the requirements of the task, the characteristics of the project road, and the results of the research and analysis, the RED program will be used with the HDM-4 program VOC (transport operation cost calculation) model extension (hereinafter referred to as the program);
- To create a database for the program, determine the geographical location and characteristics of the project road, the unit cost of construction and repair work, as well as the interrelationships of the leading technical operation indicators of the project road, and make adjustments to the program to suit local characteristics;
- To calculate other benefits arising from the social, economic and environmental impacts of the project and integrate them into the financial analysis of the project road investment and model them;
- To calculate the total social and economic benefits to the road users from the project road, and the economic efficiency and return rate of the total investment of the project;
- To calculate the benefits to the road users, the following calculation and analysis will be performed for each proposed version of the project road route and road section for the next 20 years of the project implementation. Including:
- Project road traffic intensity forecast for regular and first-time traffic types (over 20 years);
- Calculate the unit and total costs of vehicle operation and travel time, as well as the cost of road accident damage on the project road;
- Determine the unit costs of construction and maintenance work planned for the project road;
- Calculate the total investment cost requirements for the project road by type of construction and maintenance work;
- Plan the project implementation period and investment financing schedule;
- Calculate the total investment benefit of the project road or the total net benefit to road users from the project road as follows. Including:
- Savings in transportation operation costs during regular and first-time traffic;
- Savings in travel time during regular and first-time traffic;
- Savings from reduction in road accident damage;
- Other benefits to the road user from the positive social, economic and environmental impacts of the project;
- Calculate the net economic value (NPV) of the project investment;
- Calculate the internal rate of return (IRR) of the project investment.
- Төслийн хөрөнгө оруулалтын өгөөжийн дотоод хувь хэмжээ (IRR)-г тооцох.

CHAPTER 3. SOCIO-ECONOMIC SITUATION

3.1. Scope of economic analysis

When planning any road network, it is crucial to develop a design and feasibility study that accurately determines the scope of the project's implementation region and assesses its current and future socio-economic development trends. The terms of reference indicate that the scope and location of the project road will be "TETS-4 highway, Enkhtaivan Avenue-Tolgoyt, Ard Ayuushi Highway, Bayankhoshuu intersection, Songinokhairkhan District 10 Khoroo Territory, Denjiin Myanga End, Khailaast Street8 Doloon buudal Highway, Baruun Altan-Ulgiin Street, Daa Khuree Street, Hilchin Street, Police Academy Avenue, Dunjingarav Street", and the technical classification of the project road will be "capital highway, main street road, 1st and 2nd grade, auxiliary street road". Ulaanbaatar is located in the central part of Mongolia. All aimags and soums of Mongolia are directly or indirectly connected to Ulaanbaatar, entering into socio-economic

relations with it. More than half of Mongolia's total population is concentrated in the capital city. These circumstances create the conditions for the project road to include Ulaanbaatar as a whole, and to compare current and future socio-economic development trends across Mongolia.

3.2. Public feedback on the project

In the implementation of any infrastructure project, including road projects, it is essential to obtain the opinions of the local people and the public and ensure their participation. In international road projects, specialized consultants work in this field to conduct detailed local research on relevant issues, meet with the people and the public to listen to their opinions, prepare a questionnaire about the project, present the project route planning, goals and importance to the public, and also collect and analyze news, information, programs, and comments and criticisms from citizens and the public in this context related to the implementation of the project. The results are evaluated using several criteria shown in Table 3.1. This serves as the data for determining the current status of the project's NEF in the program and for conducting a technical and economic analysis of the project's road.

By this international standard, the Consulting Company conducted a survey among 53 khoroos in 5 districts of the capital city and collected opinions from the public. During the survey, opinions were exchanged and discussed on the project's objectives, the direction of the road route, the livelihoods of the people living in the project's impact area, the business characteristics of the enterprises, issues related to land ownership and use, and the risks and conflicts of interest that may arise during the implementation of the project. Based on the results of the meetings, interviews, and surveys, the socio-economic indicators of the project road were evaluated as follows:

Table 5. Multi-criteria indicator evaluation

№	Indicator	Evaluation criteria
1	Poverty level in the affected area	(0- Middle)
2	Economic development potential in the affected area	(10-High)
3	Importance of the road provided during the local consultation process	(10-High)
4	Potential for road access to social services	(-10-Little)
5	Road mobility issues in severe weather conditions	(0- Middle)
6	Level of functionality of the Project Road	(-10-Little)

3.3. Demographics

The population and its changes are closely related to a country's socio-economic development, including the level of living standards, the quality and accessibility of health services, and other factors.

According to the dynamic growth of the population, the population of Mongolia increased from 1 million in 1962 to 2 million in 1988 and 3 million in 2015. It will reach 3.5448 million in 2024, an increase of 40.1 thousand (1.1%) from the previous year. As of 2024, 50 per cent of the country's total population, or 1,768.1 thousand people, lives in Ulaanbaatar, which is an increase of 2% from the previous year. In other words, 50 per cent of the total population of Mongolia lives in the impact area of the project road.

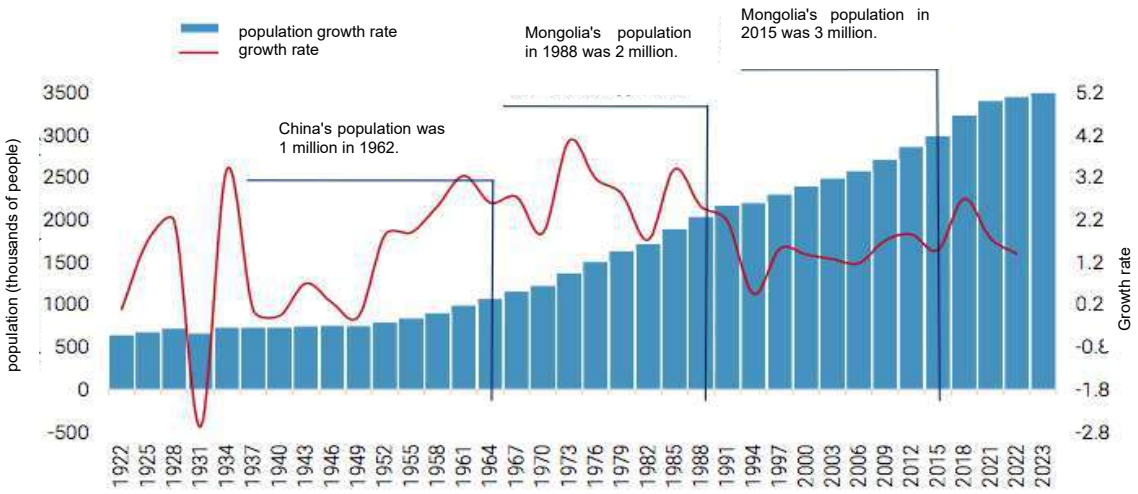


Figure 2. Population, average annual growth rate, 1922-2023

Table 6. Population by region, province/capital, city/rural

Location	Province	2020	2021	2022	2023	2024	Perecent age	Grow th
All	State results	3,357,542	3,409,939	3,457,548	3,504,741	3,544,835	100%	101%
	Central region	515,880	518,344	515,771	518,227	521,667	15%	101%
	Ulaanba atar	1,597,290	1,639,172	1,691,766	1,734,848	1,768,151	50%	102%
City	State results	2,316,499	2,367,635	2,424,756	2,479,930	0	100%	102%
	Central region	236,571	239,477	240,734	244,742	0	10%	102%
	Ulaanba atar	1,597,290	1,639,172	1,691,766	1,734,848	1,768,151	70%	103%
Rural	State results	1,041,043	1,042,304	1,032,792	1,024,811	0	100%	99%
	Central region	279,309	278,867	275,037	273,485	0	27%	99%
	Ulaanba atar	0	0	0	0	0	0%	0%

Source: 1212.mn

3.4. Population growth

Population projections are, on the one hand, estimates of the future status of the population in terms of births, deaths, migration, and population size, age, gender structure, and location. Therefore, the National Population and Housing Administration prepares population projections for the development of national economic, social, and demographic policies, planning, research, and analysis. On the other hand, determining the future trend of the population is a fundamental condition for planning policies and activities by considering social needs dependent on the reproductive status of the population, creating economic resources aimed at meeting them, considering development policies coherently, and calculating the formation and use of human resources, labor needs, the amount of capital required for centralized drinking and sewage networks, education, and social welfare services, and the future demand, needs, capacity, and design solutions of sectors such as housing, hospitals, schools, communications, roads, transportation, and construction.

When developing population projections, countries around the world use multiple scenarios for fertility and one scenario for mortality and migration. This is because mortality has become relatively stable, and fertility has become the primary influence on population change. Since this trend is also the same in Mongolia, the NSO has developed three scenarios for fertility and one scenario for mortality and migration when preparing population projections for 2020-2050. In other words, the predictions have been created using three scenarios depending on the fertility level and two scenarios depending on the base population. Of these, the most suitable for use in policy, planning, research and analysis are:

“1B” scenario: Estimated based on the number of people residing in Mongolia for 6 months or more.

“2B” scenario: Estimated based on the number of Mongolian citizens residing in Mongolia or abroad for 6 months or more.

Considering the “1B” scenario of the population estimate in Mongolia calculated by the National Population and Housing Administration, it is expected to reach 5.0 million in 2050, while the “2B” scenario, which is calculated based on the Mongolian population, is expected to reach 5.0 million in 2048 and 5.2 million in 2050.

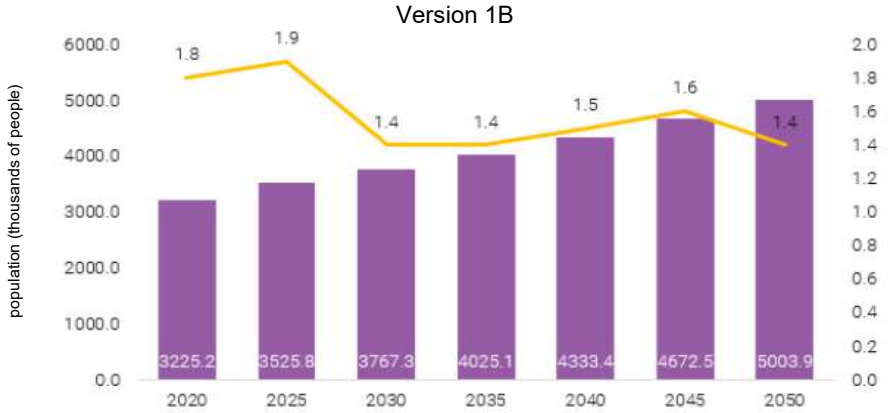


Figure 3. Population size, average annual growth rate, average decline scenario, 2020-2050

Version 2B

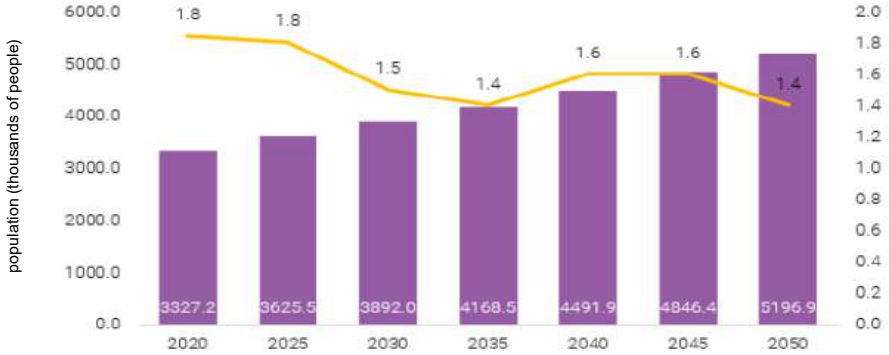


Figure 4. Population size, average annual growth rate, average decline scenario, 2020-2050

According to the calculations, under the average downward projection scenario, the average annual population growth rate will decrease until 2035, then increase until 2045, and then continue to decline.

Table 7. Population, medium-decline scenario, 2020-2050

Он	"1Б" хувилбар		"2Б" хувилбар	
	Хүн амын тоо	Өсөлтийн хувь	Хүн амын тоо	Өсөлтийн хувь
2020	3 225 152	-	3 327 204	-
2021	3 292 729	2.1	3 390 096	1.9
2022	3 356 551	1.9	3 451 405	1.8
2023	3 416 610	1.8	3 511 045	1.7
2024	3 472 976	1.6	3 569 042	1.7
2025	3 525 834	1.5	3 625 539	1.6
2026	3 575 422	1.4	3 680 721	1.5
2027	3 624 040	1.4	3 734 645	1.5
2028	3 671 988	1.3	3 787 558	1.4
2029	3 719 613	1.3	3 839 861	1.4
2030	3 767 314	1.3	3 891 962	1.4
2031	3 815 556	1.3	3 944 347	1.3
2032	3 865 138	1.3	3 997 860	1.4
2033	3 916 428	1.3	4 052 870	1.4
2034	3 969 704	1.4	4 109 693	1.4
2035	4 025 138	1.4	4 168 504	1.4
2036	4 082 888	1.4	4 229 486	1.5
2037	4 142 741	1.5	4 292 478	1.5
2038	4 204 623	1.5	4 357 385	1.5
2039	4 268 330	1.5	4 424 002	1.5
2040	4 333 430	1.5	4 491 875	1.5
2041	4 399 748	1.5	4 560 976	1.5
2042	4 467 194	1.5	4 631 368	1.5
2043	4 535 429	1.5	4 702 700	1.5
2044	4 604 014	1.5	4 774 516	1.5
2045	4 672 515	1.5	4 846 357	1.5
2046	4 740 636	1.5	4 917 938	1.5
2047	4 808 057	1.4	4 989 030	1.4
2048	4 874 534	1.4	5 059 354	1.4
2049	4 939 866	1.3	5 128 686	1.4
2050	5 003 938	1.3	5 196 917	1.3

The age and gender structure of the population changes due to births, deaths, and migration, and this is influenced by the trend of social and economic development of the generation, depending on what percentage of the population is children, young people, or the elderly. On the other hand, the trend of births, deaths, and migration of the population also depends on the age structure. For example, as the age structure of the population tends to age (the process of increasing the proportion of the working-age population in the total population), it becomes necessary to adjust what types of jobs are more needed, taking into account the characteristics of men and women of working age. In demographic studies, if the proportion of children aged 0-14 in the total population is more than 35 per cent, the age structure is considered “young”, and if it is less than

25 per cent, the age structure is considered “old”. According to the results of the “2B” scenario of the extreme estimate, i.e. the population of Mongolia, the proportion of children aged 0-14 in the total population of our country was 31.7% in 2020, and it is expected to be 27.4% in 2050. In the calculation, if the proportion of the population aged 65 and over in the total population is more than 10 per cent, it is considered to have an “Old” age structure, and if it is less than 5 per cent, it is deemed to have a “young” age structure. According to the extreme estimate, the proportion of people aged 65 and over in the total population of our country was 4.2 per cent in 2020, but this figure is expected to increase threefold to 12.0 per cent in 2050.

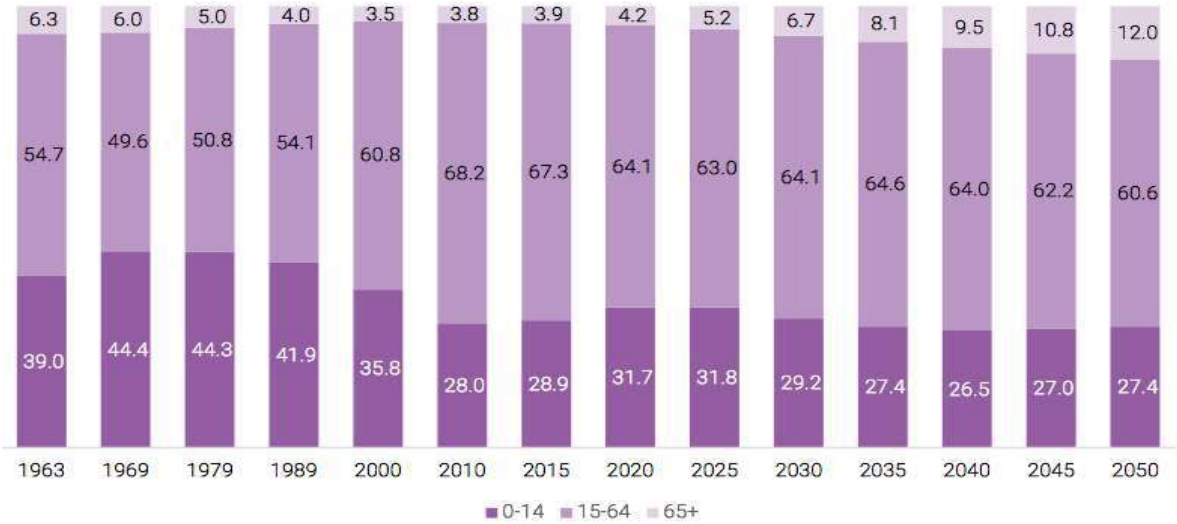


Figure 5. Percentage of population by age group, 1963-2050

The sex ratio of the population is expressed as the number of males per 100 females. According to the latest estimates, the sex ratio is expected to remain stable from 96.5 per cent in 2020 to 96.9 per cent in 2050. The number of people entering the working age group was 43,721 in 2020, while the number of people leaving the working age group was 27,837, a difference of 15,884 people. The proportion of the working age population to the total population was 1.36 per cent in 2020, reaching a maximum of 2.07 per cent in 2030, and is expected to decrease to 1.53 per cent in 2050. The number of the retirement age population was about 317.6 thousand in 2020, and is expected to increase threefold in 2050. Thus, it is estimated that 19.42 per cent of our country's population will be of retirement age in 30 years, which indicates the need to take policy measures to regulate the burden of pensions and social welfare services for older people.

Although the number of women aged 15-49, who are of reproductive age, is increasing, their share in the total population is decreasing. For example, from 25.41 per cent in 2020, it is expected to decline to 22.77 per cent in 2050, a decrease of 2.64 percentage points.

Although the number of births is 70,930 in 2020, it will gradually increase to 96,548 in 2050; the general fertility rate (the number of births per 1,000 population) is expected to decrease to 19.29 in 2050.

However, according to the results of the population projections of the aimags and the capital city, the population of all aimags is expected to increase gradually. In contrast, that of the capital city is expected to decrease. This is because the population projections of the aimags and the capital city were made by dividing them into groups based on birth and death rates.

According to the projections, the average annual population growth rate for the capital city of Ulaanbaatar will be 2.28% in 2020-2030, 1.79% in 2030-2040, and 1.77% in 2040-2050, respectively.

Table 8. Population of the aimag and the capital city, 2020-2050

Аймаг, нийслэл	Хүн амын тоо				Жилийн дундаж өсөлтийн хувь		
	2020	2030	2040	2050	2020-2030	2030-2040	2040-2050
Улсын түвшин	3 327 204	3 891 962	4 491 875	5 196 917	1.70	1.54	1.57
Баруун бүс	413 565	475 478	546 944	632 530	1.50	1.50	1.56
Баян-Өлгий	109 564	127 504	148 604	173 810	1.64	1.65	1.70
Говь-Алтай	57 711	64 738	72 444	81 505	1.22	1.19	1.25
Завхан	72 793	81 243	91 773	103 803	1.16	1.30	1.31
Увс	83 374	95 071	109 438	127 595	1.40	1.51	1.66
Ховд	90 123	106 922	124 685	145 817	1.86	1.66	1.69
Хангайн бүс	604 704	669 987	749 582	843 028	1.08	1.19	1.25
Архангай	94 541	106 845	120 804	136 636	1.30	1.31	1.31
Баянхонгор	88 814	97 694	109 276	122 969	1.00	1.19	1.25
Булган	62 022	69 308	76 575	85 408	1.17	1.05	1.15
Өвөрхангай	116 232	130 017	146 961	166 231	1.19	1.30	1.31
Хөвсгөл	135 400	148 631	166 231	187 054	0.98	1.18	1.25
Орхон	107 695	117 492	129 735	144 730	0.91	1.04	1.16
Төвийн бүс	516 248	572 571	642 474	725 701	1.09	1.22	1.30
Дорноговь	71 111	77 591	85 621	95 509	0.91	1.03	1.15
Дундговь	47 043	51 820	58 295	66 272	1.02	1.25	1.37
Өмнөговь	69 781	75 959	85 546	96 752	0.89	1.26	1.31
Сэлэнгэ	109 698	123 842	139 952	158 281	1.29	1.30	1.31
Төв	93 703	106 132	119 445	135 765	1.33	1.25	1.37
Дархан-Уул	106 965	117 589	131 529	148 011	0.99	1.19	1.25
Говьсүмбэр	17 947	19 638	22 086	25 111	0.94	1.25	1.37
Зүүн бүс	224 138	248 106	281 575	322 744	1.07	1.35	1.46
Дорнод	82 571	92 472	106 312	123 951	1.20	1.50	1.66
Сүхбаатар	63 502	69 396	78 340	88 619	0.93	1.29	1.31
Хэнтий	78 065	86 238	96 923	110 174	1.05	1.24	1.37
Улаанбаатар	1 568 549	1 925 820	2 271 300	2 672 914	2.28	1.79	1.77

Looking at the age and gender structure of the population of the aimag and the capital city in 2020 and 2050, the age and gender structure of the population varies. Still, in 2050, it is expected that all regions will have a population of 97-101, and the demographic burden will decrease evenly in all aimags and the capital city. The burden of children will decrease, while the burden of older people will increase in all aimags.

Table 9. Gender ratio of the population of the province and the capital city, 2020-2050

Аймаг, нийслэл	2020	2025	2030	2035	2040	2045	2050
Улсын түвшин	96.5	96.3	96.2	96.3	96.7	96.9	96.9
Баруун бүс	100.1	99.8	99.9	100.3	100.7	100.8	100.7
Баян-Өлгий	99.8	99.9	100.3	101.1	101.9	102.4	102.5
Говь-Алтай	99.5	98.8	98.5	98.2	97.8	97.4	96.8
Завхан	100.0	99.6	99.4	99.4	99.5	99.4	99.0
Увс	101.1	100.2	100.1	100.3	100.4	100.3	100.0
Ховд	100.1	100.0	100.3	101.1	102.0	102.4	102.5
Хангайн бүс	98.9	98.6	98.3	98.3	98.2	98.0	97.7
Архангай	101.0	100.0	99.7	99.7	99.8	99.7	99.4
Баянхонгор	96.9	97.0	96.7	96.4	96.1	95.6	95.1
Булган	103.1	102.8	102.6	102.7	102.9	102.9	102.8
Өвөрхангай	99.6	99.1	98.9	98.9	99.0	98.9	98.5
Хөвсгөл	98.4	98.3	98.0	97.7	97.4	96.9	96.4
Орхон	96.5	95.9	95.8	95.9	96.1	96.1	96.0
Төвийн бүс	101.2	101.0	100.9	101.0	101.1	101.1	100.9
Дорноговь	100.4	100.0	100.0	100.1	100.3	100.3	100.2
Дундговь	101.0	101.1	101.2	101.6	102.2	102.6	102.6
Өмнөговь	100.2	101.2	101.0	101.0	101.1	101.0	100.6
Сэлэнгэ	103.2	102.4	102.2	102.1	102.3	102.2	101.8
Төв	105.6	105.5	105.5	105.9	106.5	106.9	106.9
Дархан-Уул	96.7	96.2	96.0	95.7	95.3	94.9	94.4
Говьсүмбэр	101.7	100.4	100.6	101.0	101.5	101.9	101.9
Зүүн бүс	101.1	101.1	101.0	101.2	101.4	101.5	101.3
Дорнод	100.0	100.1	100.1	100.3	100.4	100.2	99.9
Сүхбаатар	101.0	101.3	101.0	101.0	101.2	101.1	100.7
Хэнтий	102.3	101.8	101.8	102.3	102.8	103.2	103.3
Улаанбаатар	92.6	92.6	92.6	92.9	93.4	93.9	94.2

3.5. Employment

Based on the data released by the National Labour Office, the employment status of the population in the country and Ulaanbaatar city for 2020-2024 was studied and analysed. According to the results of 2024, a total of 1,355.7 thousand people aged 15 and over were registered in Mongolia, of which 61.3% were in the labour force and 38.7% were outside the labour force. Compared to the same indicator in 2020, the total labour force registered in the country increased by 8% in 2024. The labour force participation rate was 61.3 per cent in 2024, an increase of 0.2 percentage points from 2020 and 1.8 percentage points from the previous year,

while the employment rate was 57.6 per cent, a rise of 0.7 percentage points from 2020 and 1.3 percentage points from the prior year.
The study shows that the composite labour underutilization rate is 7.8 per cent as of 2024, which is a decrease of 3.9 percentage points from 2020 and 0.7 percentage points from the previous year.
However, at the end of 2024, the number of civil servants reached 226.9 thousand, an increase of 0.4 (0.2%) thousand people from the same period of the previous year. When considering civil servants by civil service category, in 2024, civil service employees decreased by 661 (0.4%), civil administrative employees by 289 (1.3%), and civil political employees by 75 (1.9%) compared to the previous year, while special civil servants increased by 1.4 (3.0%) thousand people. Of the civil servants, 152.6 thousand (67.3%) work in the civil service, 49.1 thousand (21.6%) in special state services, 21.4 thousand (9.4%) in state administrative services, and 3.8 thousand (1.7%) in political service.

Figure 6. Population employment indicators

In terms of employment in Ulaanbaatar, 46% of Mongolia's total workforce is concentrated in the capital city in 2024, an increase of 13% from the previous year. In addition, 45% of the unemployed population nationwide was registered in the capital city in 2024, an increase of 10% from 2020 and 32% from the previous year.

However, the study found that 54% of the country's working-age population resides in Ulaanbaatar.

The labor force participation rate in the capital city in 2024 was 58.3%, an increase of 2.8 percentage points from 2020 and 4.5 percentage points from the previous year, while the employment rate was 55.0%, an increase of 3.0 percentage points from 2020 and 1.3 percentage points from the prior year. The study shows that the composite labour underutilization rate is 7.8 per cent as of 2024, an increase of 3.9 percentage points from 2020 and 3.9 percentage points from the previous year. In conclusion, under the conditions of the project road implementation, there is a resource opportunity to invite high-level specialised consultants and operators (for tunnel construction) from abroad, and to employ professional ITA and support workers from within the country for road construction.

Table 10. Population employment statistics, by country and capital city

№	Unit of measurement	Location	2020	2021	2022	2023	2024	2024/2020	2024/2023
Workforce		State results	1,340,014	1,317,425	1,370,594	1,367,319	1,441,091	8%	5%
	Person	Ulaanbaatar	558,594	539,294	602,691	591,729	666,135	19%	13%
Total labour underutilization		State results	164,779	189,610	141,180	118,919	113,957	-31%	-4%
	Person	Ulaanbaatar	73,766	89,847	63,227	55,352	53,547	-27%	-3%
Unemployed person		State results	90,371	109,434	87,466	72,573	85,424	-5%	18%
	Person	Ulaanbaatar	35,213	43,915	35,125	29,365	38,620	10%	32%
Part-time worker		State results	4,897	6,754	8,376	6,505	4,315	-12%	-34%
	Person	Ulaanbaatar	1,444	1,253	2,620	1,207	1,776	23%	47%
Potential workforce		State results	69,511	73,422	45,338	39,841	24,219	-65%	-39%
	Person	Ulaanbaatar	37,109	44,678	25,482	24,779	13,151	-65%	-47%
Labour force participation rate		State results	61.1	59.1	60.3	59.5	61.3	0.2	1.8
	%	Ulaanbaatar	55.5	52.3	55.9	53.8	58.3	2.8	4.5
Employment rate		State results	56.9	54.2	56.5	56.3	57.6	0.7	1.3
	%	Ulaanbaatar	52	48.1	52.7	51.1	55	3	3.9
Composite labour underutilization rate		State results	11.7	13.6	10	8.5	7.8	-3.9	-0.7
	%	Ulaanbaatar	12.4	15.4	10.1	9	7.9	-4.5	-1.1
Unemployment rate		State results	6.7	8.3	6.4	5.3	5.9	-0.8	0.6
	%	Ulaanbaatar	6.3	8.1	5.8	5	5.8	-0.5	0.8
Time-dependent aggregate underemployment and unemployment rates		State results	7.1	8.8	7	5.8	6.2	-0.9	0.4
	%	Ulaanbaatar	6.6	8.4	6.3	5.2	6.1	-0.5	0.9
The combined rate of unemployment and the potential labour force	%	State results	11.3	13.1	9.4	8	7.5	-3.8	-0.5
	%	Ulaanbaatar	12.1	15.2	9.6	8.8	7.6	-4.5	-1.2

3.6. Average salary

To study the average salary of employees in Mongolia, we used data from the General Department of Social Insurance and the National Social Security Administration. The average monthly nominal wage of employees of enterprises and organisations included in the Social Security Administration's contribution payment report was 2.3 million tugriks in 2024, an increase of 1.1 (91.1%) million tugriks from 2020 and 450.6 (23.9%) thousand tugriks from the previous year. The average salary is 1.9 million tugriks. The total number of employees included in the Social Security Contribution Payment Report in 202491.3 (9.8%) мянга нь 660.0 мянган төгрөг хүртэлх,

- 69.7 (7.5%) thousand have a salary of 660.0-900.0 thousand tugriks,
- 123.2 (13.2%) thousand have a salary of 900.0 thousand to 1.3 million tugriks,
- 65.7 (7.1%) thousand have a salary of 1.3-1.5 million tugriks,
- 142.7 (15.3%) thousand have a salary of 1.5-2.0 million tugriks,

- 136.0 (14.6%) thousand have a salary of 2.0-2.5 million tugriks,
- 164.7 (17.7%) thousand have a salary of 2.5-3.5 million tugriks,
- 136.7 (14.7%) thousand have a salary of more than 3.5 million tugriks.

Figure 7. Employees, by salary group, and percentage

In the capital city of Ulaanbaatar, the average monthly nominal salary of employees is 2.4 million tugriks in 2024, an increase of 1.8 times from 2020 and 21% from the previous year.

Table 11. information about employed citizens

Location	Unit of measurement	2020	2021	2022	2023	2024	2024/2020	2024/2023
State results	мян.₮	1,220.60	1,279.40	1,503.80	1,881.80	2,332.40	1.9 д	24%
Ulaanbaatar	мян.₮	1,312.60	1,370.70	1,608.80	1,970.70	2,390.70	1.8 д	21%

3.7. Labour productivity

Labour productivity, or GDP per worker, reached 22.5 million tugriks in Mongolia in 2024 (at 2015 constant prices). Labour productivity growth increased by 0.8% compared to the previous year, while labour productivity in the business sector increased by 1.4 per cent.

Labour productivity by sector at 2015 constant prices:

Table 12. Gross domestic product per employee, by sector, at 2015 constant prices, thousand ton

Industry	2020	2021	2022	2023	2024	2024/2020	2024/2023
Labor productivity level - at the national level	20,081.20	21,166.80	20,984.30	22,403.20	22,571.60	12.4%	0.8%
Agriculture, forestry, fishing, hunting	11,416.10	10,964.70	12,125.30	10,703.50	8,357.70	-26.8%	-21.9%
Mining and extraction	65,825.20	58,479.30	46,487.00	52,844.70	56,709.10	-13.8%	7.3%
Manufacturing	23,739.90	24,655.10	19,549.30	22,614.40	23,198.80	-2.3%	2.6%
Electricity, gas, steam, and ventilation supply	40,173.10	31,658.60	27,789.90	33,589.10	31,545.80	-21.5%	-6.1%
Water supply; wastewater, waste and garbage management and cleaning operations	13,931.70	14,814.20	17,001.50	11,614.60	17,717.20	27.2%	52.5%
Construction	13,307.20	9,401.00	10,818.60	11,221.20	10,969.10	-17.6%	-2.2%
Wholesale and retail trade, car and motorcycle repair services	16,904.60	19,504.80	21,608.40	21,680.40	19,535.10	15.6%	-9.9%
Transportation and warehousing activities	19,558.80	20,081.10	18,449.50	26,785.20	28,542.00	45.9%	6.6%
Hotels, lodgings, apartments and catering services	9,028.90	7,420.30	10,630.30	12,626.00	11,547.70	27.9%	-8.5%
Information and contact	34,766.10	41,398.80	39,044.60	46,089.40	51,207.50	47.3%	11.1%

Financial and insurance activities	43,070.30	52,334.70	57,268.80	73,058.30	64,806.60	50.5%	-11.3%
Other services	12,862.70	15,076.60	14,506.70	15,083.60	14,936.00	16.1%	-1.0%

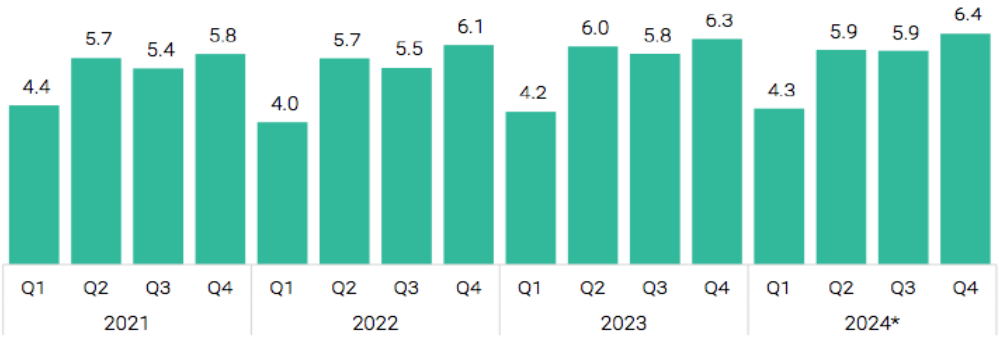


Figure 8. GDP per employee, quarterly, in million tugriks

Aggregated by economic sector, labor productivity per worker increased in 2024 from the previous year in the mining and quarrying sector, while it decreased in the services and agriculture sectors.

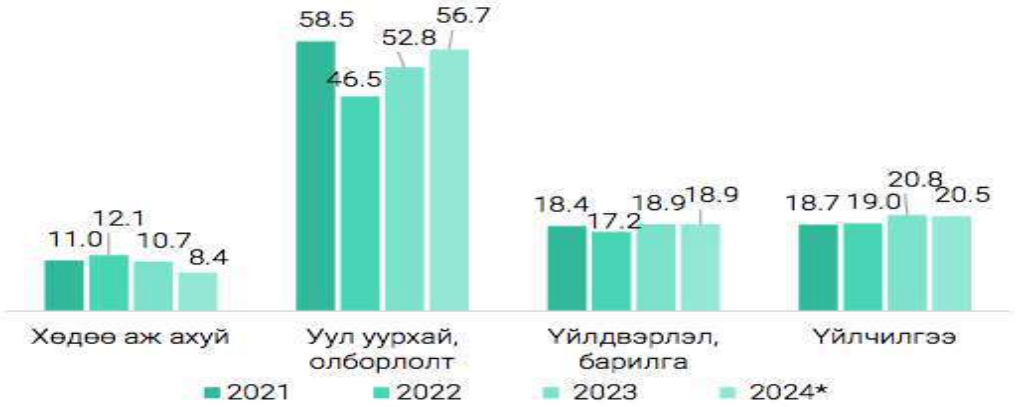


Figure 9. GDP per employee, by sector, in million tugriks

The study shows that the added value per worker in the mining and quarrying sector increased by 3.9 (7.3%) million tugriks in 2024, while the service sector decreased by 303.3 (1.5%) thousand tugriks to 20.5 million tugriks, and the agricultural sector decreased by 2.3 (21.9%) million tugriks to 8.4 million tugriks. Since the official statistical data on labor productivity in the capital city is limited, the source of information included in the "Future Goals for the Development of the Capital City" was used in this study. The "Future Goals for the Development of the Capital City" was approved by Resolution No. 32/04 of the Capital City Assembly of Citizens dated February 20, 2020, and the document was developed by the Project to Support the Implementation of the United Nations Development Program's 2030 Agenda for Sustainable Development in cooperation with the Office of the Governor of the Capital City.

The policy document was developed based on the principle of "Leaving No One Behind" of the Sustainable Development Goals, implemented within the framework of 4 priority areas: People-Centred Policy, Environment-Centred Solutions, Planning-Centred Development, and Good Urban Governance. Here, the baseline level of the long-term development goal of the capital is taken as 2018, and a total of 17 goals, 83 targets, and 169 indicators are set to be met. The achievement level is determined annually from 2021 to 2030. For example, the goals are to double the GDP per capita of Ulaanbaatar by 2030, halve the poverty rate, halve the total unemployment rate, halve the youth unemployment rate, eliminate the number of children exposed to violence, increase the amount of green facilities per capita by 9 times, increase the amount of local green purchases to 30 %, and reduce the proportion of households living in ger districts by 20 percent.

From these criteria, some of the indicators that are considered for this study of the project route and their impact are selected and summarised:

Table 13. Long-term goals for the development of the capital

д/д	Indicators	Baseline 2018	Reach level										Source of information
			2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
GOAL SIX. PROMOTE FULL, PRODUCTIVE AND DECENT WORK FOR ALL													
6.1.1	Labor force participation rate	53.4	55	55.6	56.1	56.7	57.2	57.7	58.3	58.8	59.4	60	НСГ
6.2.1	Unemployment rate (percentage)	7.6	6.5	6.1	5.8	5.4	5	4.7	4.3	3.9	3.6	3.2	НСГ
GOAL SEVEN. REDUCING INEQUALITY													
7.1.2	Human Development Index	0.822	0.84	0.846	0.852	0.859	0.865	0.871	0.878	0.884	0.89	0.897	УСХ
GOAL TEN. REDUCE THE IMPACTS OF CLIMATE CHANGE													
10.2.2.	Greenhouse gas emissions reductions and increases (thousand tons of CO2 eq./year)	-	1,524	1,671	1,818	1,966	2,113	2,406	2,700	2,993	3,287	3,580	НБОГ
GOAL THIRTEEN. ENSURING INCLUSIVE AND SUSTAINABLE ECONOMIC GROWTH													
13.1.1.	GDP per capita (thousands of dollars)	14,957	18,457	20,082	21,850	23,773	25,866	28,143	30,620	33,316	36,249	39,440	УСХ
13.1.2.	GDP, at annual prices (billions of roubles)	21,404	28,445	31,280	34,419	37,860	41,646	45,811	50,392	55,431	60,974	67,071	УСХ
GOAL FIFTEEN. TO BECOME A CITY THAT SUPPORTS CITIZEN PARTICIPATION AND IS STANDARDIZED FOR ALL													
15.1.1.	Percentage of households living in ger areas	54.7	51.9	48.9	47.3	45.7	44	42.3	40.6	38.9	37.1	35.3	НСГ
15.2.1.	Average waiting time for public transport (average minutes for buses within the city)	8.1	7.8	7.4	7.1	6.7	6.5	6.1	7.3	7.2	7.1	4.6	НТУГ
15.2.2.	Average waiting time for public transport (average minutes for city buses)	29.7	28.5	27.1	26.4	25.4	24	23.6	22.8	21.9	21	20	НТУГ
15.2.3.	Rolling stock (number of buses)	1,161	1,369	1,451	1,534	1,617	1,699	1,782	1,884	1,947	2,029	2,112	НТУГ
15.2.4.	Number of taxis per 1,000 population	0.4	0.8	1.2	1.5	1.8	2	2.3	2.7	3	3.6	4	НСГ
15.3.1.	Urban Development Index (score)	0.4397	0.4949	0.5097	0.525	0.5408	0.557	0.5737	0.5909	0.6086	0.6269	0.6457	ХБТХ
15.3.2.	Green space per capita (m2)	2.6	8	9.7	11.5	13.3	15.1	16.9	18.7	20.4	22.2	24	НСГ
15.3.3.	Length of road widened and improved in the given year (km)	43.3	45	45	45	45	45	45	45	45	45	45	НАЗХГ

15.3.4	Length of the bypass network built in the first year (km)	9.43	4.9	8.9	11	11.3	25.3	15.3	11.3	25.2	8.9	26	НАЗХ Г
15.3.6	Length of pedestrian paths built in the given year (km)	52.7	38.2	42.2	44.3	44.6	58.6	48.6	44.6	58.5	42.2	58.5	НАЗХ Г
15.4.1.	Road traffic accident mortality rate (per 10,000 population)	1.2	1.05	1	0.95	0.9	0.85	0.8	0.75	0.7	0.65	0.6	ҮСХ ЦЕГ
15.8.2.	Percentage of total waste generated that is recycled	21.4 -2016	34	38	42	46	50	52	54	56	58	60	УБ хотын ЗАА
15.8.3.	Percentage reduction in the number of soil-polluting pit latrines, by the amount increased	-	4.4	6.6	9.6	11.9	14.2	16.8	19.7	23.3	26.6	30.5	УБ хотын ЗАА
15.8.4	Air quality indicators of the capital (average value for December of the current year)												НАБТ Г
	- Sulphur dioxide, µg/m3	80 2017	63	60	57	53	50	48	46	44	42	40	
	- Dust (PM10), µg/m3	251	173	155	137	118	100	96	91	86	83	80	
	- Dust (PM2.5), µg/m3	230	150	130	110	90	70	65	60	55	50	40	

According to the indicators outlined in the “Long-term Goals for the Development of the Capital”, the GDP per capita target performance relative to the national level is approximately 103-115% in all years except 2024. However, the Ministry of Family, Labour and Social Protection, the Asian Productivity Organisation, and the Mongolian Productivity Association jointly organised the conference. At the conference, Arsyoni Bueno, Head of the Program Department of the Asian Productivity Organisation’s Member Countries, said, “Currently, Mongolia’s average labour productivity is 3.6 times lower than the world average and 5.4 times lower than that of the Republic of Korea.” “Mongolia needs to focus on improving the quality of education. University graduates need to have skills that can be used directly in the workplace. This is related to the labour market. Mongolia also needs to establish a labour market information system. This is important for regulating the supply and demand of the labour market.

Table 14. "Perspective goals for the development of the capital", by GDP per capita"

According to the monitoring and evaluation criteria and target levels of the Mongolian

№	Indicators	Reach level			
		2021	2022	2023	2024
13.1.1.	GDP per capita (in US dollars)	18,457.0	20,082.0	21,850.0	23,773.0
		Performance			
		21,166.80	20,984.30	22,403.20	22,571.60
	Completion rate	115%	104%	103%	95%

Government's Action Program, approved by Appendix 2 of Resolution No. 21 of the Mongolian State Great Khural of 2024, it is planned to reach the gross domestic product per capita of 10 thousand US dollars in 2028.

Table 15. Indicators and targets for monitoring and evaluating the results of the Mongolian government's action program

No	Policy Reference	Outcome	Indicator	Unit of Measure	Base Year	Base Level	Target 2025	Target 2026	Target 2027	Target 2028	Source of Information	Data Collection Method	Frequency

1	AX-2	Achieve top 10 in Human Development Index.	Human Development Index	rank	2022	96/193	95	93	90	86	UNDP Human Development Program	Internationally comparable study	Once a year
2	AX-3	Reduce poverty rate by 2 times.	Poverty rate	percent	2022	27.1	25	22	18	14	NSO	Statistical data	Twice a year
3	AX-3	Increase GDP per capita to USD 10,000.	GDP per capita	USD	2023	5875	6520	8090	9120	10400	NSO	Statistical data	Once a year
4	AX-4	Maintain economic growth above 6 per cent.	Economic growth	percent	2024	6	6.2	6.5	6.8	7	NSO	Statistical data	Once a year
5	AX-4	Maintain inflation below 5 percent.	Inflation	percent	2024	8	7	5	5	4	NSO	Statistical data	Once a year

Source : info@legalinstitute.mn

If the Ulaanbaatar 1st Ring Road project is implemented, it will be a major development with a comprehensive infrastructure solution that has never been done before not only in Ulaanbaatar but also in Mongolia. It is believed that this will increase the participation of the workforce in the project road impact area and thus greatly support the achievement of the “Capital Development Vision”. The estimate of the workforce that will be directly and indirectly created in the project road impact area under the condition of project implementation will be presented in Chapter 9 of this report.

3.8. Human Development Index

The impact of human development on the local economy and society of the project road was determined by the Human Development Index (HDI). The HDI shows the development of human

potential, which reflects the three main dimensions of human life: healthy and long life, knowledge acquisition, and living in decent living conditions.

The HDI is defined by the following indicators. These include:

The indicator of human life expectancy is the average life expectancy calculated from birth;

Educational status is expressed as the level of adult literacy and enrollment in all levels of education;

The standard of living is expressed as GDP per capita (purchasing power parity (PPP)). (US dollars)

In this study, the relevant analysis was conducted using the Human Development Report issued by the National Human Development Organization to assess the human development impact of the project road on the socio-economic status of the affected areas and localities.

Table 16. Human Development Index, by country and capital city

Statistical indicators	Location	2020	2021	2022	2023	2024	2024/2020	2024/2023
Life expectancy index	State results	0.780	0.785	0.789	0.792	0.796	0.016	0.004
	Ulaanbaatar	0.801	0.805	0.801	0.804	0.807	0.006	0.003
Population education level index	State results	0.761	0.761	0.754	0.755	0.755	-0.006	0
	Ulaanbaatar	0.891	0.891	0.891	0.802	0.807	-0.084	0.005
Per capita GDP index (expressed in purchasing power parity)	State results	0.702	0.693	0.707	0.714	0.718	0.016	0.004
	Ulaanbaatar	0.773	0.769	0.771	0.796	0.796	0.023	0
Human Development Index	State results	0.747	0.745	0.749	0.753	0.756	0.009	0.003
	Ulaanbaatar	0.820	0.820	0.819	0.802	0.802	-0.018	0

Source: 1212mn

In 2024, the HDI increased by 0.003 points nationwide compared to the previous year, but there was no change in Ulaanbaatar city. Considering the human development component indices, the life expectancy index increased by 0.004 points nationwide and by 0.003 points in the capital city compared to the previous year. While the education level index did not change significantly in 2024 compared to last year, the capital city increased by 0.005, which was the highest indicator. The GDP per capita index increased by 0.003 points nationwide in 2024

compared to the previous year, but there was no change in Ulaanbaatar city. The Mongolian Government Action Program, approved by Appendix 2 of Resolution No. 21 of the Mongolian Parliament in 2024, sets a goal to improve the Human Development Index by 10 places in 2028, or to increase the index from 96th place out of 193 countries in the world to 86th place in 2024. Within the framework of the project, a total of 24.8 km of roads and 20 bridges are planned to be built in the northern districts of Ulaanbaatar, in addition to the construction of a tunnel that has not been implemented in Mongolia before. This will not only bring technical and technological advances to the Mongolian road sector, but will also create a need to improve the knowledge and skills of engineers, technical personnel (ITA), operators, and road construction workers in the sector, as well as ITA and employees in other sectors (such as water, heat, electricity, energy, transport, and communications). This need is expected to create the conditions for the HDI indicator to reach and improve the target level of the Government of Mongolia in 2028.

3.9. Household income

One of the main factors affecting household livelihoods is household income. In Mongolia, total household income is defined as the sum of household cash income, household consumption from its farm, and free goods and services received from others. Household cash income consists of wages, pensions, benefits, agricultural production income, non-agricultural production income, service income, and other income. According to the "2nd Quarter Report on Household Socio-Economic Survey 2024" released by the National Statistics Office, the average monthly total household income was 2.5 million tugriks at annual prices, an increase of 485.7 (24.0%) thousand tugriks from the same period of the previous year and 86.0 (3.5%) thousand tugriks of the prior quarter.

Table 17. Average monthly gross income per household, in annual prices

Income Type	2022		2023		2024		2024 IV-VI
	I-III	IV-VI	I-III	IV-VI	I-III	IV-VI	2023 IV-VI
	thousand tugriks						%
Total Income	1785.8	1787.5	1923.5	2023.6	2423.3	2509.3	24
1. Monetary income	1646.4	1651.5	1793.7	1865.4	2282.1	2355.7	26.3
Salary and wages	784.6	829.4	952.5	958.8	1309.4	1329.9	38.7
Pension, allowance	487.2	432.6	437.8	468.2	506.3	538.6	15
Agricultural production income	136.3	137.3	191.3	195.3	175.4	182.2	-6.7
Non-agricultural production & service income	83.6	93.3	89.2	115.1	131.9	135.6	17.8
Other income	154.7	158.9	122.9	128	159.2	169.2	32.3
2. Value of food and non-food received free of charge	59.4	53.9	52.7	55.6	56.1	55.2	-0.7
3. Value of food from own production	80.1	82.1	77.1	102.6	85.1	98.5	-4

Excluding price effects, the average monthly real gross income of a household expressed in 2020 prices was 1.7 million tugriks, an increase of 255.3 (17.3%) thousand tugriks from the same period last year and 22.6 (1.3%) thousand tugriks from the previous quarter. The 17.3% increase in real gross income from the same period last year was mainly due to the rise in real wage income of 218.3 thousand tugriks (31.2%).

Figure 10. Average monthly household income, national average, in thousand tugriks

The share of cash income in the average monthly total household income increased by 1.7 percentage points from the same period last year, the share of food and non-food products received free of charge from others decreased by 0.5 percentage points, and the share of food products consumed from one's household decreased by 1.2 percentage points.

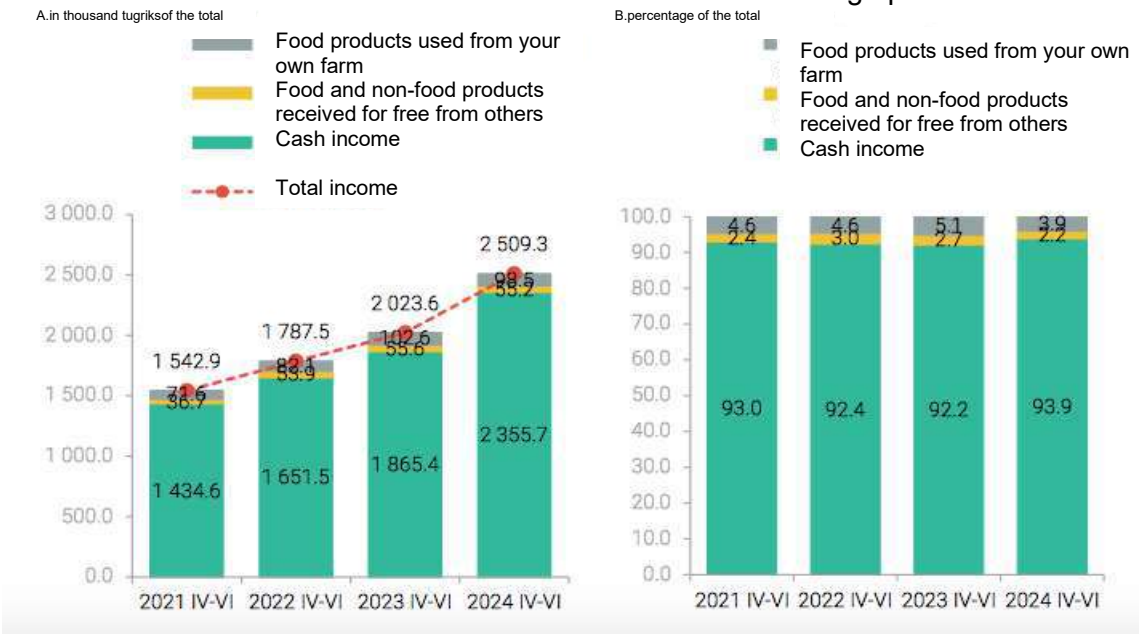


Figure 11. Structure of average monthly household income, national average, in annual prices

Considering the average monthly household income by urban and rural areas, the average monthly total income of urban households is 2.7 million tugriks, and that of rural households is 2.1 million tugriks. The average monthly total income of urban households is 647.7 (31.4%) thousand tugriks higher than that of rural households. By region, the average monthly total income of households is 2.1-2.3 million tugriks.

Table 18. Long-term goals for the development of the capital

Income Type	Location		Region			
	City	Countryside	West	Khangai	Central	East
	Tugrugs					
Total Income	2709911	2062222	2255303	2190237	2121003	2132174
1. Monetary income	2647367	1705409	1951469	1924238	1933451	1882581
Salary and wages	1687739	532311	846356	799784	1064153	675408
Pension, allowance	561017	488703	527983	581818	443753	519792
Agricultural production income	16238	552256	390652	318821	293680	407433
Non-agricultural production & service income	180490	35676	71047	76162	61061	139898
Other income	201883	96463	115431	147653	70788	140050
2. Value of food and non-food received free of charge	51014	64426	51041	67357	64360	79481
3. Value of food from own production	11530	292387	252793	198642	123192	170112

In terms of the basis, as of the second quarter of 2024, agricultural production income accounted for 37.3 %of the average monthly household income in rural areas, and pension and benefit income accounted for 23.2 %, while in the capital city, wage income alone accounted for the majority, or 63.8 %, of the average monthly household income.

Table 19. AVERAGE MONTHLY INCOME PER HOUSEHOLD, by settlement, 2nd quarter of 2024, in annual prices

Income Type	settlement			
	Capital	Province Center	Soum Center	Countryside
	Tugruks			
Total Income	2881576	2336597	2111491	2038371
1. Monetary income	2833261	2243108	1858630	1631225
Salary and wages	1839476	1357762	1039317	286833
Pension, allowance	559375	564588	520477	393139
Agricultural production income	7729	34741	122164	760495
Non-agricultural production & service income	198576	141157	86504	11067
Other income	228105	144860	90168	99511
2. Value of food and non-food received free of charge	44667	64817	88238	52898
3. Value of food from own production	3648	28672	164623	354248

The average monthly household income in the country, at annual prices, amounted to 2.4 million tugriks in the second quarter of 2024, an increase of 490.2 (26.3%) thousand tugriks compared to the same period of the previous year. This was due to an increase in wage income of 371.1 thousand tugriks (38.7%). The average monthly household income increased by 73.5 (3.2%) thousand tugriks compared to the previous quarter, due to an increase in pension and benefit income of 32.4 (6.4%) thousand tugriks.

Considering the structure of monetary income, as of the second quarter of 2024, 56.4 (1.3 million) %of monetary income was wage income, 22.9 (538.6 thousand) %was pension and benefit income, 7.7 (182.2 thousand) %was agricultural production income, 5.8 (135.6 thousand)

%was non-agricultural production and service income, and 7.2 (169.2 thousand) %was other income. The share of wage income in the average monthly household cash income increased by 5.0 percentage points from the same period of the previous year, the share of other income increased by 0.4 percentage points, the share of agricultural production income decreased by 2.8 percentage points, the share of pension and benefit income decreased by 2.2 percentage points, and the share of non-agricultural production and service income decreased by 0.4 percentage points.

The minimum subsistence level of the population is understood as the minimum amount of food and non-food consumption expressed in monetary terms to meet the primary and essential needs of a person, according to the appendix to the order of the Chairman of the National Assembly of the Republic of Kazakhstan No. A/09 dated January 15, 2025, established the "Minimum Living Standard of the Population" by region.

Table 20. LOWEST LIFESTYLE LEVEL, by region, 2025

Region	Included Provinces	Minimum Living Standard (MNT)
West	Bayan-Ölgii	490000
	Govi-Altai	
	Zavkhan	
	Uvs	
	Khovd	
Khangai	Arkhangai	488900
	Bayankhongor	
	Bulgan	
	Övörkhangai	
	Khuvsgul	
	Orkhon	
Central	Govisümber	483000
	Dornogovi	
	Dundgovi	
	Ömnögovi	
	Selenge	
	Töv	
	Darkhan-Uul	
East	Dornod	482900
	Sukhbaatar	
	Khentii	
Ulaanbaatar	Ulaanbaatar	495400

The monthly per capita living standards of the population calculated by the National Statistics Office for 2020-2025 are as follows, by region:

Table 21. MINIMUM STANDARD OF LIVING, per capita per month, by region, tugriks

Region	2020	2021	2022	2023	2024	2025
Western region	*203,400*	*212,600*	*238,800*	*274,400*	*447,100*	*490,000*
Khangai region	*206,000*	*213,800*	*240,400*	*282,500*	*447,300*	*488,900*
Central region	*198,300*	*207,400*	*239,200*	*272,300*	*446,700*	*483,000*
Eastern region	*201,700*	*210,300*	*236,400*	*271,800*	*446,400*	*482,900*
Ulaanbaatar	*230,000*	*238,700*	*277,800*	*313,400*	*454,200*	*495,400*

Since the report on the leading poverty indicators, which was initially calculated, is not publicly available, this report uses the poverty report prepared by the National Poverty Statistics Office in 2022 as a source of information. The leading poverty indicators (measures) in statistics consider three main indicators: the poverty coverage index, the poverty depth index, and the poverty sensitivity index.

The poverty coverage index, or poverty rate, shows the proportion of the total population with consumption below the poverty line, and this index is the simplest and most widely used indicator for measuring poverty.

The poverty depth index indicates how many per cent below the poverty line the average consumption level of each person is, assuming that the non-poor population is 0 per cent below the poverty line.

The poverty sensitivity index shows the distribution of consumption among the poor population. It is believed that if the consumption of a given household increases but remains below the poverty line, the scope and depth of poverty will not change, but the feeling of poverty will increase.

According to the “Methodology for Calculating Basic Poverty Indicators”, the consumption-based poverty line is the minimum consumption expenditure that meets the calorie-rich nutritional needs and the minimum non-food necessities of life for a healthy and active life. However, if the consumption expenditure per adult is below the poverty line, the person is statistically defined as poor.

According to the 2022 NSO poverty baseline report, the poverty line was 418,090 tugriks, which represented 27.1% of the population. At that time, the NSO estimated that if the poverty line were increased by 15%, 10.3% of the population would be close to poverty.

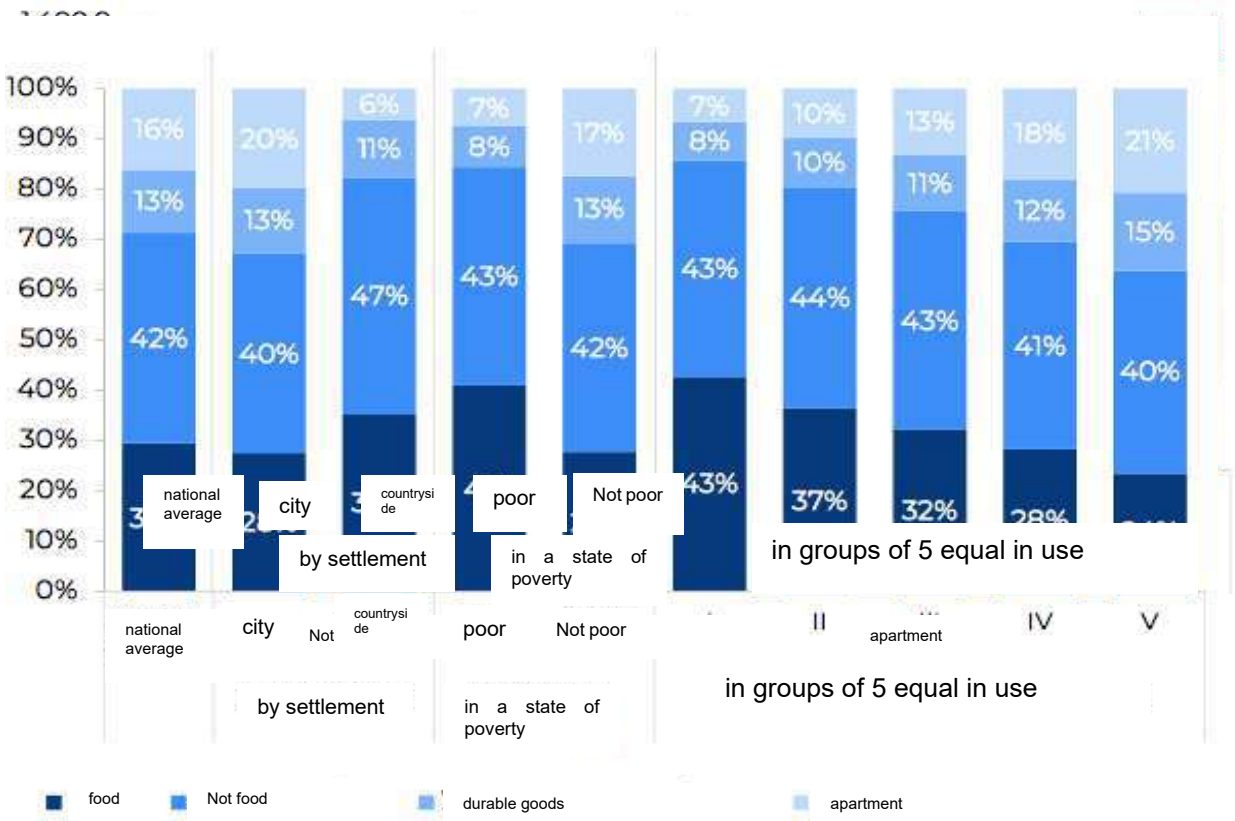


Figure 12. CONSUMPTION STRUCTURE, by consumption component as a percentage of total, 2022

Figure 13. POVERTY LEVEL, poverty line

Figure 14. POVERTY LEVELS, by country and region, 2022

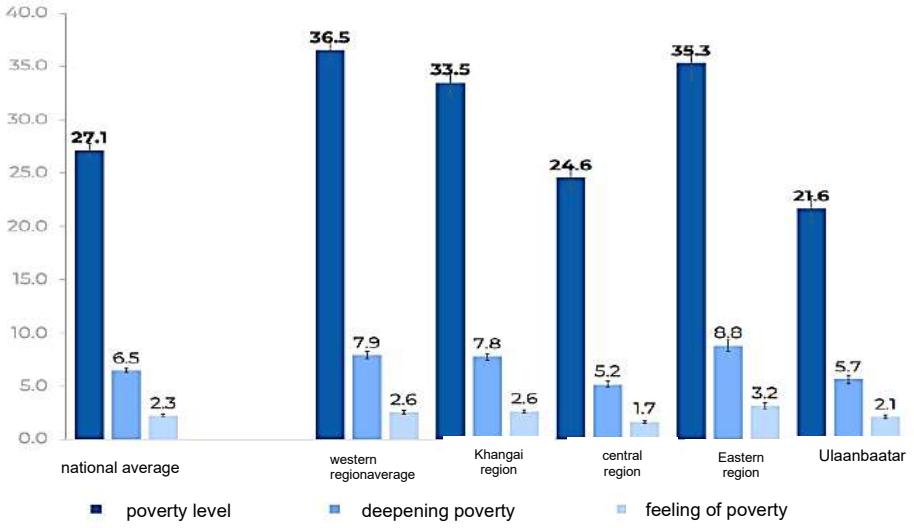
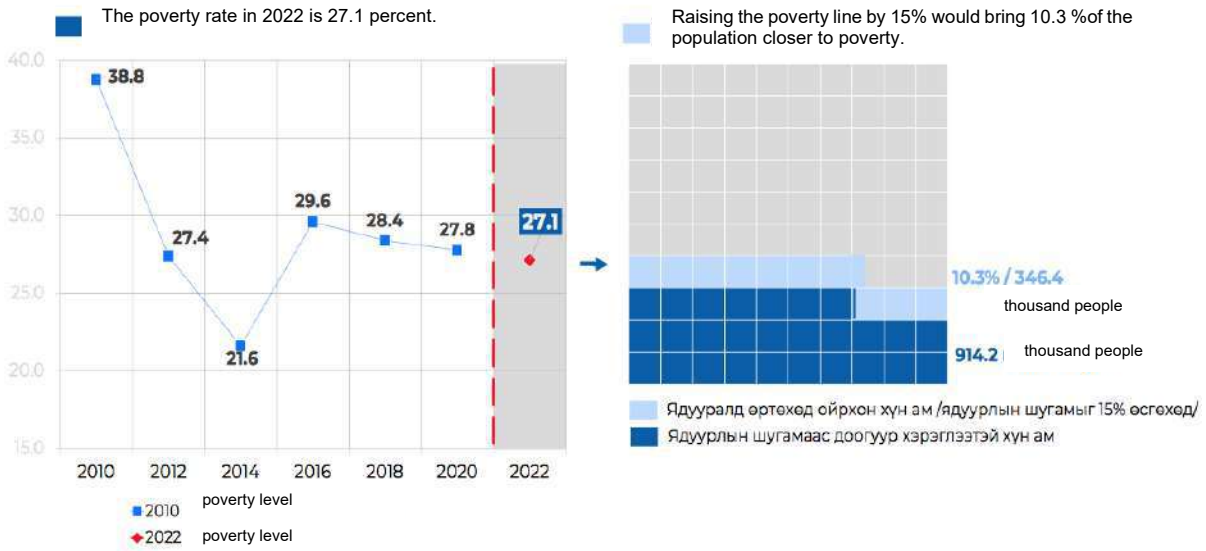


Figure 15. POVERTY LEVELS, by country and region, 2022

The distribution of the population with consumption below the poverty line by region as of 2022 is Ulaanbaatar -37%, Khangai region - 22%, Western region - 18%, Central region - 13%, Eastern region - 9%. However, when classified by settlement, 43% of the population is rural, of which 23% is in rural areas and 20% is in the centre of the soum. However, 57% of the population is considered to have consumption below the poverty line in the city, of which 37% is in Ulaanbaatar



and 19% is in the centre of the aimag.

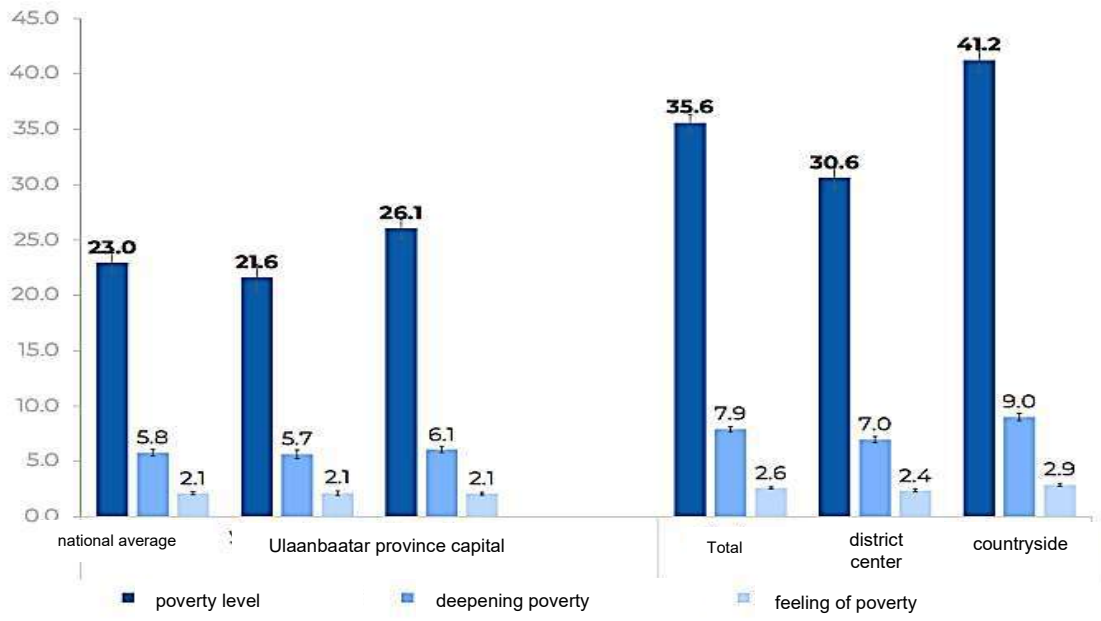


Figure 16. POVERTY LEVEL, by country of residence, 2022

The poverty line based on the monthly consumption of one adult person in 2024, as measured by the National Statistics Office, is 495,400 tugriks, which has increased by 77,310 tugriks from 418,090 tugriks in 2022. The Action Program of the Government of Mongolia sets a target to reduce the poverty rate by 2 times from the 2022 baseline of 27.1% to 14% by 2028. The implementation of the project route will increase direct and indirect jobs in the project area, which will have a significant impact on increasing household income and improving the livelihoods of the capital city population. (Relevant calculations and analysis will be provided in Chapter 9).

General concept. Investment is a key factor in supporting the country's economic growth and development, and creating a financing mechanism. Investment in the financial sector plays a vital role in increasing production capacity, creating jobs, and supporting long-term economic growth. This report uses the relevant information from the National Statistics Office to research the following general concepts of investment:

Investment is defined as financial expenditure for the primary construction, acquisition or improvement of assets to generate future economic benefits and efficiency. This includes activities aimed at the construction or improvement of assets, equipment, buildings, intellectual property and other tangible and intangible assets.

Gross fixed capital formation represents the net addition to fixed assets and is calculated by deducting depreciation and disposals from assets added during the reporting period. Financial assets, working capital reserves and operating expenses are not included in the formation, so they are a different concept from total investment.

Investment is classified as domestic and foreign by source of financing. Domestic investment consists of the state budget, equity and bank loans, while foreign investment consists of foreign direct investment, concessional loans and grants.

Budgetary investment is understood as the expenditure of assets financed from the state and local budgets and transferred to the ownership of legal entities belonging to the budget of that level.

The state budget is understood as the budget approved by the State Great Khural and prepared and allocated by the budget governor-general subordinate to the Government and the state budget, and the local budget is understood as the budget approved by the Khural of Citizens'

Representatives of the aimag, capital city, soum, and district and prepared and allocated by the budget governor-general subordinate to the budget of that level.

Foreign investment is understood as the capital and intellectual property brought into Mongolia by a foreign investor to establish a business entity in the territory of Mongolia or cooperate with a Mongolian business entity.

Foreign aid is understood as the source of capital provided to Mongolia through the government, in the form of humanitarian or non-repayable technical assistance. Foreign loans are understood as the source of the capital supplied by any person not registered in Mongolia and not permanently residing in Mongolia to create debt.

Investments are classified by technological structure into construction, machinery, equipment and other costs (picture budget, other intangible assets). Here:

Construction and construction work encompass activities that create fixed assets, including building construction and the construction of engineering structures such as roads, bridges, and dams.

Machinery and equipment include all types of vehicles, mechanical equipment, electrical equipment, and their spare parts and components.

Other costs include picture budget, software, databases, and intangible assets.

Information on investments financed by the state budget, foreign loans, and grants is collected from the Ministry of Finance, and foreign direct investment is calculated from the balance of payments statistics of the Bank of Mongolia by relevant policy ministries and authorised specialists of the National Bank of Mongolia.

A total of 31.0 trillion ₮ of investment was concentrated in the Mongolian economy in 2024, an increase of 19% from the previous year. The structure of total investment is as follows:
52% or 16.3 trillion tugriks in the mining sector, 10% or 3.0 trillion tugriks in public administration and defense activities, compulsory social security (1.5 trillion tugriks) and electricity, gas, steam, ventilation, water supply (1.5 trillion tugriks), 9% or 2.7 trillion tugriks in wholesale and retail trade, repair and servicing of cars and motorcycles, 6% or 1.7 trillion tugriks in transport and warehousing activities (0.9 trillion tugriks) and financial and insurance activities (0.7 trillion tugriks), 4% or 1.3 trillion tugriks in manufacturing (0.6 trillion tugriks) and information and communication (0.5 trillion tugriks), 3% or 0.9 trillion tugriks in human health and social activities, 1% or 0.2 trillion tugriks in Agriculture, forestry, fishing, and hunting activities accounted for 6%, or the remaining 1.8 trillion tugriks. In contrast, other service activities accounted for the remaining 1.8 trillion tugriks.
The sectors and activities with the highest investment compared to the previous year are:

- - Public administration and defence activities, compulsory social security – 56%
- - Financial and insurance activities – 55%
- - Mining sector – 40%
- - Construction-28%
- - Education-15%
- - Human health and social activities -13%
- - Real estate activities-13%
- - Information and communication -8%
- However, the sectors with the highest investment decrease compared to the previous year are the following:
- - Hotels, accommodation, food and beverage services (-53%)
- - Transport and storage activities (-36%)
- - Agriculture, forestry, fishing, hunting (-23%)
- - Manufacturing (-16%)

Table 22. INVESTMENT, by sector

Investment sector	2020	2021	2022	2023	2024	2024/2023	2024бүтэц
Total	17,162,333.00	15,869,024.80	21,232,834.44	26,007,395.80	31,040,249.60	19%	100%
Agriculture, forestry, fishing, hunting	67,788.40	68,038.20	126,366.60	287,868.90	220,465.30	-23%	1%
Mining and extraction	7,285,173.50	8,667,780.50	12,319,729.62	11,636,273.30	16,284,231.20	40%	52%
Manufacturing	395,441.30	368,582.50	250,311.29	821,617.80	689,167.10	-16%	2%
Electricity, gas, steam, ventilation, water supply	1,096,366.30	488,573.30	957,002.83	1,777,437.10	1,492,034.70	-16%	5%
Construction	989,182.10	928,829.50	1,456,018.60	1,484,051.50	1,905,535.80	28%	6%
Wholesale and retail trade, car and motorcycle repair and service	1,001,382.90	1,228,795.20	1,714,846.35	2,784,193.20	2,744,489.50	-1%	9%
Transportation and warehousing activities	316,502.60	337,368.20	312,432.63	1,565,808.30	995,154.60	-36%	3%
Hotels, lodgings, apartments and catering services	30,825.50	12,116.50	20,905.73	246,524.60	116,164.50	-53%	0%
Information and contact	249,851.10	269,821.50	386,830.26	534,543.90	577,090.60	8%	2%
Financial and insurance activities	460,072.70	454,027.00	586,538.45	504,024.20	782,370.10	55%	3%
Real estate activities	39,748.70	93,690.00	61,092.23	123,523.80	139,999.40	13%	0%
State administration and defence activities, mandatory social security	1,634,844.40	780,351.20	1,329,029.04	999,085.50	1,553,906.30	56%	5%
Education	409,562.80	408,703.20	473,015.24	665,106.40	761,583.40	15%	2%
Human health and social functioning	1,518,386.50	748,040.60	248,618.41	826,279.60	937,607.00	13%	3%
Other service activities	1,667,204.40	1,014,307.70	990,097.19	1,751,057.50	1,840,450.30	5%	6%

Unit of measurement: million.token

Considering the total investment concentrated in the Mongolian economy in 2024 by financing source, 45.1% is domestic, of which 10.9% is state budget financing, 54.9% is from external sources, of which 43.7% is foreign direct investment. Considering the technological structure of investment, the majority of total investment, namely 55.7% is spent on vehicles and equipment, and 29.5% on construction, accounting for 85.2% of total investment.

Table 23. INVESTMENT, by funding source, technology structure, and annual prices

Эх үүсвэр	Sources	2020	2021	2022	2023	2024*
		тэрбум төгрөг / *billion togrogs*				
Бүгд	***Total***	**17 162.3**	**15 869.0**	**21 232.8**	**26 007.4**	**31 040.2**
Санхүүжилтийн эх үүсвэрээр / *By financing sources*						
Дотоод	*Domestic*	6 323.1	6 636.4	8 477.0	10 624.0	14 003.2
Улсын төсөв	*Central Government budget*	1 961.4	2 016.4	2 578.9	2 529.3	3 384.4
Бусад	*Others*	4 361.7	4 620.1	5 898.1	8 094.6	10 618.8
Гадаад	*Foreign*	10 839.2	9 232.6	12 755.9	15 383.4	17 037.1
Гадаадын шууд хөрөнгө оруулалт[1]	*Foreign direct investment[1]*	7 320.5	7 731.9	10 748.5	12 245.7	13 576.2
Хөнгөлөлттэй зээл[2]	*Foreign loan[2]*	3 368.4	1 344.9	1 712.3	1 939.0	2 029.6
Буцалтгүй тусламж[2]	*Foreign aid[2]*	150.3	155.8	295.1	1 198.7	1 431.3
Технологийн бүтцээр / *By technological composition*						
Барилга угсралт	*Construction*	5 208.8	4 513.2	8 306.5	7 493.2	9 158.4
Орон сууцны барилга	*Residential building*	1 743.7	1 590.6	2 430.5	3 013.0	3 266.7
Орон сууцны бус барилга	*Non residential building*	1 778.4	1 471.9	5 513.8	2 539.7	3 031.6
Инженерийн барилга, байгууламж	*General engineering construction*	1 540.3	1 325.9	99.9	1 656.5	2 538.1
Их засварын ажил	*Capital repair and maintenance*	146.4	124.8	262.3	284.1	322.0
Тоног төхөөрөмж	*Machinery and equipment*	5 744.9	7 399.5	9 699.6	17 539.1	17 289.4
Тээврийн хэрэгсэл	*Transport equipment*	1 985.1	2 752.0	4 367.3	8 158.2	7 610.9
Бусад машин, тоног төхөөрөмж	*Other machinery and equipment*	3 759.8	4 647.5	5 332.4	9 380.9	9 678.5
Геологи хайгуулын ажил	*Mineral exploration*	51.2	158.5	86.5	93.0	349.3
Бусад	*Others*	6 157.4	3 797.8	3 140.1	882.1	4 243.1

Looking at the foreign direct investment inflows and investors in Mongolia in 2024 by country, the following countries contributed:

- 42% to the Netherlands,
- 16% to China,
- 9% to Singapore, and
- 7% to the United Kingdom, accounting for 74% of the total foreign direct investment inflows.

Table 24. INVESTMENT, by source, technology structure, and share

Эх үүсвэр	Sources	2020	2021	2022	2023	2024*
		дүнд эзлэх хувь / share to total				
Бүгд	***Total***	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Санхүүжилтийн эх үүсвэрээр / *By financing sources*						
Дотоод	*Domestic*	36.8	41.8	39.9	40.8	45.1
Улсын төсөв	*Central Government budget*	11.4	12.7	12.1	9.7	10.9
Бусад	*Others*	25.4	29.1	27.8	31.1	34.2
Гадаад	*Foreign*	63.2	58.2	60.1	59.2	54.9
Гадаадын шууд хөрөнгө оруулалт[1]	*Foreign direct investment[1]*	42.7	48.7	50.6	47.1	43.7
Хөнгөлөлттэй зээл[2]	*Foreign loan[2]*	19.6	8.5	8.1	7.5	6.5
Буцалтгүй тусламж[2]	*Foreign aid[2]*	0.9	1.0	1.4	4.6	4.6
Технологийн бүтцээр / *By technological composition*						
Барилга угсралт	*Construction*	30.4	28.4	39.1	28.8	29.5
Орон сууцны барилга	*Residential building*	10.2	10.0	11.4	11.6	10.5
Орон сууцны бус барилга	*Non residential building*	10.4	9.3	26.0	9.8	9.8
Инженерийн барилга, байгууламж	*General engineering construction*	9.0	8.4	0.5	6.4	8.2
Их засварын ажил	*Capital repair and maintenance*	0.9	0.8	1.2	1.1	1.0
Тоног төхөөрөмж	*Machinery and equipment*	33.5	46.6	45.7	67.4	55.7
Тээврийн хэрэгсэл	*Transport equipment*	11.6	17.3	20.6	31.4	24.5
Бусад машин, тоног төхөөрөмж	*Other machinery and equipment*	21.9	29.3	25.1	36.1	31.2
Геологи хайгуулын ажил	*Mineral exploration*	0.3	1.0	0.4	0.4	1.1
Бусад	*Others*	35.9	23.9	14.8	3.4	13.7

Table 25. FOREIGN DIRECT INVESTMENT INFLOWS INTO MONGOLIA, by investor country

Country	2020	2021	2022	2023	2024	2024 2023	2024 structure
Total	24,206.70	26,281.80	28,521.45	30,696.59	33,481.90	9%	100%
Canada	9,024.60	633.4	550.11	568.11	620.1	9%	2%
China	6,358.40	5,185.20	5,326.53	5,338.80	5,443.34	2%	16%
Singapore	1,526.90	1,898.30	2,197.70	2,506.60	2,955.59	18%	9%
Luxembourg	1,506.80	1,089.80	1,234.31	1,211.47	1,230.62	2%	4%
Japan	981.8	1,022.20	963.19	965.23	967.46	0%	3%
USA	651.3	671.4	680.36	724.08	933.07	29%	3%
Netherlands	689.2	10,525.20	12,693.86	13,505.24	14,226.67	5%	42%
Australia	826.3	649.3	620.19	643.29	656.95	2%	2%
UK	484.4	618.4	701.96	1,462.44	2,351.22	61%	7%
South Korea	461.1	423.5	449.62	502.34	524.07	4%	2%
Cayman Islands	253.9	237.4	226.39	228.52	256.39	12%	1%
Germany	176.3	181.3	144.43	216.37	218.44	1%	1%
France	173.7	180.7	137.49	134.91	159.2	18%	0%
Virginia Island	152	203.3	151.11	151.11	160.41	6%	0%
Switzerland	135.6	132.5	123.3	124.58	127.76	3%	0%
Russia	136	162.7	130.13	156.34	206.43	32%	1%
Belgium	158.4	190.6	254.65	289.15	294.91	2%	1%
Italy	69.3	55.5	53.14	43	43.48	1%	0%
Bulgaria	42.5	37	32.28	32.36	32.55	1%	0%
Tailand	34.9	51.8	50.12	51.13	54.13	6%	0%
United Arab Emirates	33.5	33.4	33.45	34.04	34.53	1%	0%

Bermuda	32.1	32.1	32.13	32.13	32.13	0%	0%
Malaysia	42.3	44.1	40.12	43.06	60.16	40%	0%
Kazakhstan	20.8	21.5	21.83	22.45	25.77	15%	0%
Vietnam	20.9	19.9	19.47	19.48	19.51	0%	0%
First Zealand	29.2	24.1	24.44	24.07	23.85	-1%	0%
Austria	17.8	6.3	5.18	6.7	7.2	7%	0%
Turkey	15.8	16	16.83	17.46	34.18	96%	0%
Cyprus	15.8	15.7	15.74	15.86	15.86	0%	0%
Portugal	13.5	13.4	13.02	13.02	13.02	0%	0%
Hungary	10.9	10.9	10.89	10.78	79.52	638%	0%
Philippines	6.6	9.7	9.33	9.51	9.93	4%	0%
Qatar	11.6	14	13.99	14.26	14.47	1%	0%
Poland	10	10.2	10.48	10.54	13.67	30%	0%
Other	82.9	1,861	1,533.68	1,568.18	1,635.33	4%	5%

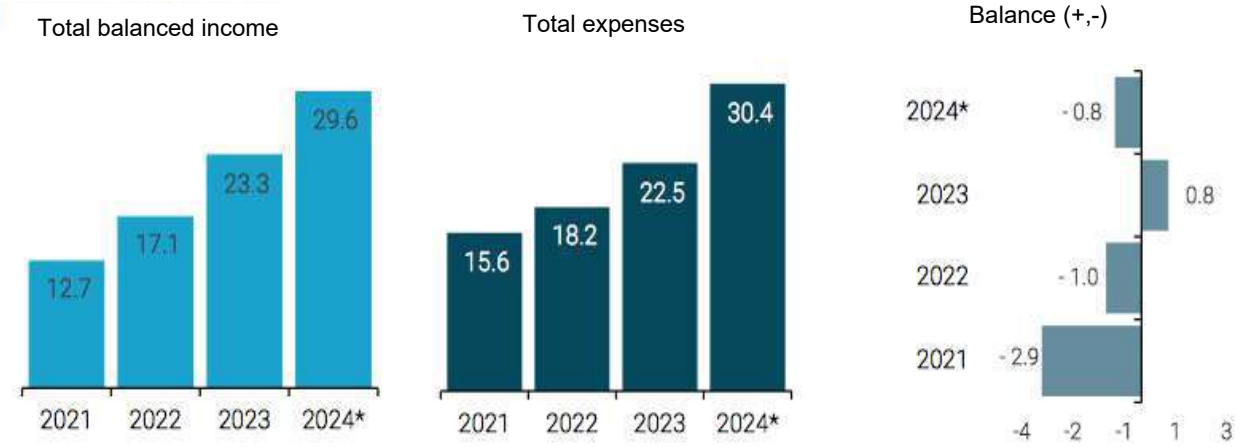
Unit of measurement: million US dollars

State and local budgets: State budget. The total revenue and support of the state consolidated budget reached 31.4 trillion tugriks in the preliminary execution for 2024, an increase of 7.0 (28.7%) trillion tugriks from the previous year, and the balanced revenue and support reached 29.6 trillion tugriks, an increase of 6.3 (27.0%) trillion tugriks from the previous year.

REVENUE, EXPENDITURE, BALANCE OF THE STATE UNITED BUDGET, billions of tugrug

Indicator	2022	2023	2024*	Change	
				Amount	(%)
Total Revenue	18521.6	24387.1	31375.1	6988	28.7
Balanced Revenue	17126.9	23294.9	29589.3	6294.4	27
Expenditure, Net Loan	18159.7	22509	30365.5	7856.5	34.9
Balance	-1032.7	785.9	-776.2		

Total expenditures and net loans to be repaid will reach 30.4 trillion tugriks in 2024, resulting in a balanced balance of 766.2 billion tugriks in surplus.



BALANCED REVENUE, EXPENDITURE, BALANCE OF THE UNITED STATE BUDGET, at the end of each year, trillion tugriks

Total tax revenue reached 27.4 trillion tugriks in 2024, an increase of 5.9 trillion tugriks (27.4%) from the previous year. This was mainly due to an increase in income tax revenue of 3.3 (57.5%) trillion tugriks, value-added tax of 1.1 (22.8%) trillion tugriks, social insurance revenue of 749.2

(19.0%) billion tugriks, foreign operations revenue of 327.0 (22.3%) billion tugriks, and excise tax of 308.1 (39.0%) billion tugriks, respectively.

Table 26. BALANCED REVENUE OF THE UNITED STATE BUDGET, billions of tugrug.

Indicator	2022	2023	2024*	Change	
				Amount	(%)
Total Balanced Revenue	**17126.9**	**23294.9**	**29589.3**	**6294.4**	**27**
Tax Revenue	**15459**	**21484.2**	**27377.5**	**5893.3**	**27.4**
CIT (Corporate Income Tax)	3826.5	5702.6	8980.6	3278	57.5
Social Insurance Contributions	3038.3	3950.8	4700.1	749.2	19
VAT (Value Added Tax)	3946.2	4777	5864.3	1087.4	22.8
Excise	847.8	790.1	1098.2	308.1	39
Foreign Operations	1255.5	1465.3	1792.4	327.2	22.3
Others	2544.7	4798.3	4941.9	143.6	3
Non-Tax Revenue	**1668**	**1810.7**	**2211.8**	**401.1**	**22.1**

In 2024, the total tax revenue structure is estimated to be 32.8 %income tax, 21.4 %value-added tax, 17.2 %social insurance revenue, 6.5 %foreign activity revenue, 4.0 %excise tax revenue, and 18.1 %other taxes, fees, and charges. CIT accounts for 71.4 %of income tax revenue, and PIT revenue accounts for 28.6 %(excluding refunds).

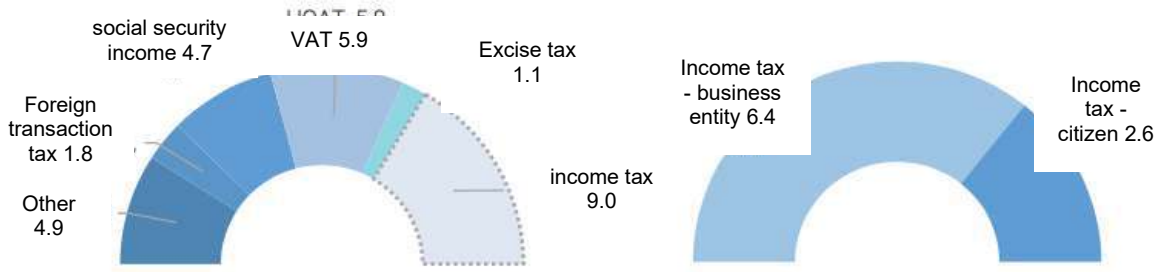


Figure 17. STRUCTURE OF TAX REVENUES OF THE STATE UNITED BUDGET, trillion tugriks

The total state budget expenditure and net loan repayments reached 30.4 trillion tugriks in 2024, an increase of 7.9 (34.9%) trillion tugriks from the previous year. An increase in goods drove the increase in expenditure, works, and services expenditure of 4.4 trillion tugriks (85.7%) and capital expenditure of 2.7 trillion tugriks (52.7%), respectively, compared to the previous year. In 2019, current transfers accounted for 34.9 %of total spending, goods and services expenditure for 31.5 %, capital expenditure for 26.4 %, interest expenditure for 4.0 %, and subsidies for 3.2 percent.

Capital expenditures reached 7.9 trillion tugriks in 2024, an increase of 2.7 (52.7%) trillion tugriks from the previous year. This was mainly due to the rise in construction costs by 1.7 trillion tugriks (44.3%) of the prior year, equipment costs by 288.3 billion tugriks (58.7%), and other capital costs by 661.1 billion tugriks (84.1%).

Local budget. Local budget revenues reached 7.1 trillion tugriks in 2024, an increase of 2.2 (45.8%) trillion tugriks from the previous year, and total expenditures reached 7.3 trillion tugriks, an increase of 2.9 (67.3%) trillion tugriks. The local budget had a deficit of 120.8 billion tugriks.

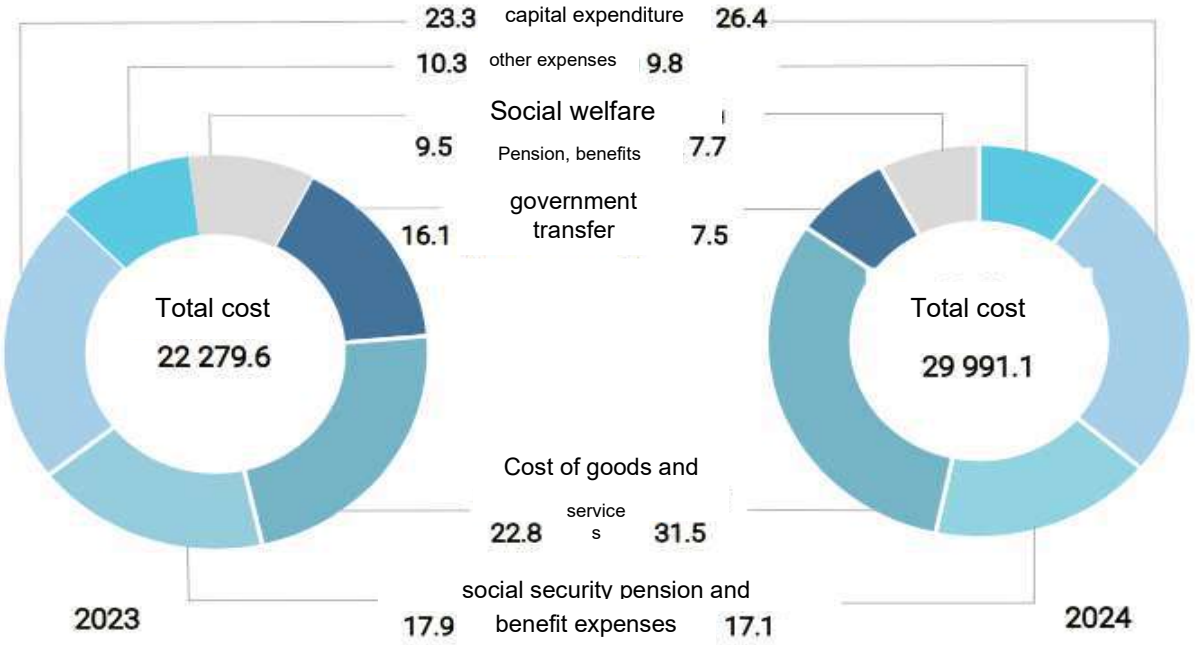


Figure 18. STRUCTURE OF THE STATE UNITED BUDGET EXPENDITURE, BY MAIN EXPENDITURE, at the end of each year, as a percentage of the total

Although the capital city approved a budget revenue of 3.2 trillion tugriks in 2024, the capital city's budget revenue was cut by 226 billion tugriks. This was mainly due to the interruption of personal income tax, land auctions, interest income on loans, and interest penalty income, while the capital city's Land Management Department cut budget revenue by 77.9 billion tugriks, the Property Relations Department by 1.9 billion tugriks, and the Road Development Department by 1.9 billion tugriks.

However, in 2025, the capital city's budget is planned to collect 3.8 trillion tugriks in revenue. This is expected to increase by 648.9 billion tugriks from 2024. This increase is mainly due to the increase in corporate income tax by 210.9 billion tugriks, personal income tax by 251.9 billion tugriks, property tax by 107.7 billion tugriks, and non-tax revenue by 351.1 billion tugriks.

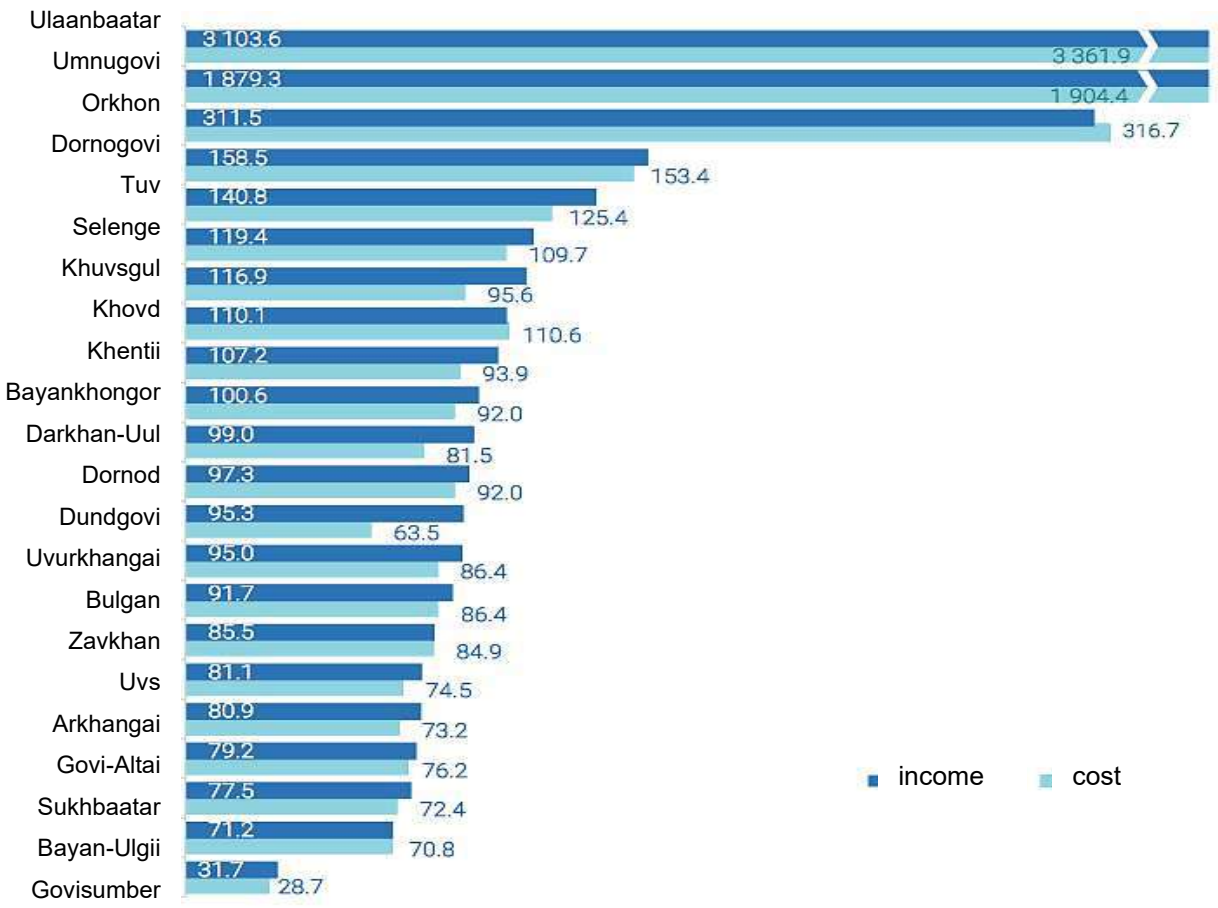


Figure 19. LOCAL BUDGET REVENUES AND EXPENDITURES, by capital city and province, billion tugriks

In 2025, the capital city plans to allocate a total of 1.3 trillion tugriks for current expenses, 1.7 trillion tugriks for capital expenses, 78.3 billion tugriks for loan repayment, 327.2 billion tugriks for bond repayment, and 14.1 billion tugriks for financial support for three remote districts. In the field of urban development and infrastructure, the budget draft includes spending 6 billion tugriks on expanding the North-Eastern Region Reservoir, 5.9 billion tugriks on the Selbe and Dambadarjaa substations, 10.6 billion tugriks on the Selbe-Dund River flood protection structures, 14.49 km of road drainage network, 24.8 billion tugriks on 7 locations, 15.1 billion tugriks on the engineering network, 10 billion on the infrastructure plan of the First Century City, 23.4 billion tugriks on the 2040 Ulaanbaatar City General Plan, 2.3 billion tugriks on the development of the Agro-City Special Economic Zone, 21.9 billion tugriks on the ger development program, and 2.1 billion tugriks on the green housing project.

The capital's 2025 budget base revenue and expenditure are estimated at 3.2 trillion tugriks, and it has been approved that the capital's budget will not contribute revenue to the state budget, but that 60.3 billion tugriks will be allocated to the capital from the Unified Local Development Fund.

The budget framework statement for the 2025 unified state budget assumes GDP growth of 8 %and consumer price growth of 6 percent. About 70 %of the budget base revenue of the capital's Bayangol, Bayanzurkh, Sukhbaatar, Chingeltei, Khan-Uul, and Songinokhairkhan districts, which is a total of 288.4 billion tugriks, is left for spending in the budget, and a total of 1.4 trillion tugriks is expected to be allocated to the capital's budget. In accordance with Article 56.56.1.1 of the Budget Law, 14.1 billion tugriks have been allocated to provide financial support to the budgets of Baganuur, Nalaikh, and Bagahangai districts. Of these:

- 301.6 million tugriks for Khan-Uul district,

- 1 billion tugriks for Chingeltei district,
- 4.7 billion tugriks for Songinokhairkhan district,
- 97.4 billion tugriks for Sukhbaatar district,
- 610 million tugriks for Baganuur district,
- 909 million tugriks for Bayangol district,
- 1.5 billion tugriks for Bayanzurkh district,
- 57 million tugriks for Nalaikh district.

In addition, to ensure continuous energy reliability, it is planned to expand the Dulany 2 and 3 power plants, put the Boorolzhut power plant and the Baganuur power plants into operation with a total capacity of 750 MW, establish independent distributed heat sources in 10 locations, and build the Nalaikh district heat plant to increase its capacity by a total of 1,545 MW. Several projects are being implemented in the capital to reduce air pollution. For example, within the framework of the policy of developing from a single-center city to a multi-center city, six sub-centers have been created, and a housing project for a total of 202,626 families is being implemented to create conditions for citizens to live in a healthy and safe environment in ger areas. It is planned to build 41,584 apartments within the framework of the construction of sub-centers, 148,323 apartments within the framework of redevelopment, and 12,719 apartments within the framework of foreign loan assistance. The total revenue performance of the capital city budget as of January 2025 was 223.9 billion tugriks, which was 56.3 (20.1%) billion tugriks less than planned.

Of the total budget revenue, 201.2 (89.9%) billion tugriks were tax revenue (income tax, property tax, other taxes, fees, and charges), and 22.7 (10.1%) billion tugriks were non-tax revenue. As of January 2025, the capital city's tax revenue was 201.2 billion tugriks, which was 58.2 (22.4%) billion tugriks less than planned, and non-tax revenue was 22.7 billion tugriks, which was 1.9 (9.1%) billion tugriks more than planned. Income tax was under-executed by 49.6 (22.0%) billion tugriks, property tax by 6.9 (40.7%) billion tugriks, and other taxes, fees, and charges by 1.8 (10.0%) billion tugriks.

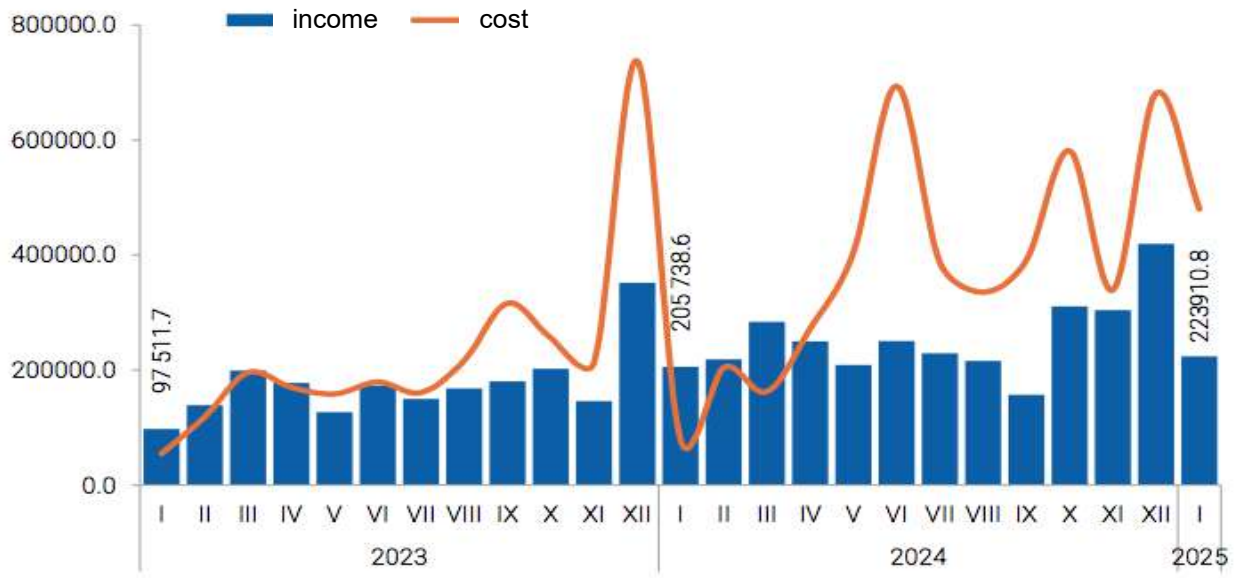


Figure 20. CAPITAL BUDGET REVENUE AND EXPENDITURE, million tugriks

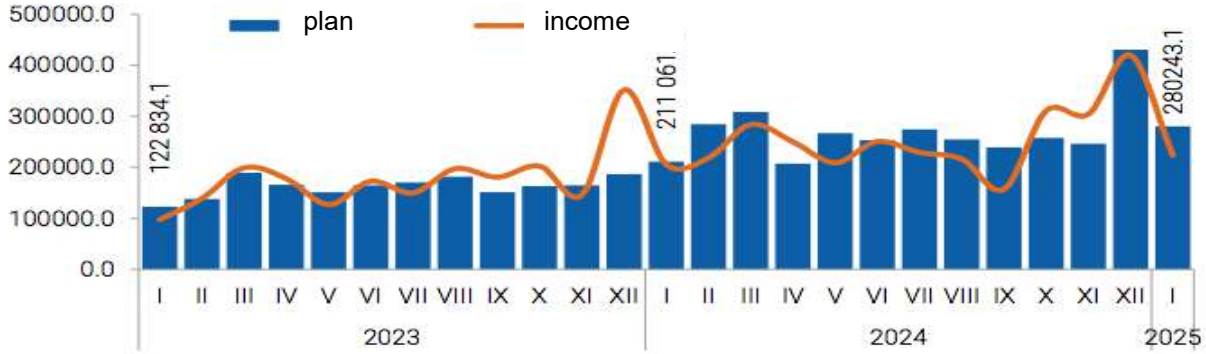
Table 27. CAPITAL BUDGET REVENUE, January 2025, by district

District	Budget Revenue			Tax Revenue			Non-Tax Revenue -		
	Planned	**Actual**	**%**	**Planned**	**Actual**	**%**	**Planned**	**Actual**	**%**
	million tugrugs								
Total (Capital)	280243.1	223911	-20	259445	201221	-22	20797.7	22690	9.1

Baganuur	1690.3	1881.2	11.3	1377.8	1361.7	-1.2	312.5	519.5	66.2
Bagakhangai	132.8	314.8	2.4	107.7	115.2	7	25	199.7	7.9**
Bayangol	28329.3	15789.8	-44	28102.1	15505.1	-45	311.5	284.7	-8.6
Bayanzurkh	23022.2	16402.5	-29	22747.2	16200.6	-29	294.8	182	-38.3
Nalaikh	2043.5	1601.5	-22	1763.5	1113.7	-37	280	496.9	77.6
Songinokhairkhan	14551.3	7952.6	-45	13428.2	7839.1	-45	266.6	113.5	-57.4
Sukhbaatar	48510.2	40083.9	-17	44215.5	39879.1	-9.3	294.8	204.5	-30.6
Khan-Uul	56852.7	22540.5	-61	5175.9	2015	-61	367.6	875.4	138
Chingeltei	20089.1	13923.3	-31	18766	13266.9	-29	413.8	156.2	-62.2
Khotin Shuud	85021.7	103801	22.1	83317.3	81387.1	-2.3	1862.1	1968	5.7

Table 28. CAPITAL BUDGET REVENUE, million tugriks

Indicator	Planned	Actual	Change	
	(mil. MNT)	(mil. MNT)	(mil. MNT)	(%)
Total Revenue	**280243.1**	**223910.8**	**-56332.3**	**-20.1**
Tax Revenue	**259445.4**	**201220.7**	**-58224.7**	**-22.4**
Income Tax	224926.3	175332.9	-49393.4	-22
Individual Income Tax	170144.2	103226.4	-66917.8	-39.3
Salary and similar income	119599.5	69254.3	-50345.2	-42.1
Business income	11458	3106.1	-8351.9	-72.9
Property income	14615.6	15543.2	927.6	6.3
Asset sale income	20381.3	18167.2	-2214.1	-10.9
Other income	16259.4	8019	-8240.4	-50.7
Refund of individual income tax	0.1	0.1	0	0
Corporate Income Tax	54782	72106.5	17324.5	31.6
Property Tax	16895.9	10023	-6872.9	-40.7
Immovable Property Tax	7293.9	3732.8	-3561.1	-48.8
Gun Tax	234.5	41.4	-193.1	-82.3
Vehicle Tax	9556.1	6234	-3322.1	-34.8
Animal Head Tax	10.4	14.8	4.4	42.3
Other taxes, fees, charges	17623.2	15864.7	-1758.5	-10
Land Fee	7800.6	6672.3	-1128.3	-14.5
Natural Resource Use Fee	7393.2	7080.3	-312.9	-4.2
Other Fees	267.4	259.4	-8	-3
Non-Tax Revenue	**20797.7**	**22690.1**	**1892.4**	**9.1**
Total Non-Tax Revenue	**20797.7**	**22690.1**	**1892.4**	**9.1**
Dividend Income				
Revenue of Budget Entities				
Capital Income				
Rental Income	11885.3	18326.6	6441.3	54.2
Other Income		57.7	57.7	
Undefined	8912.4	4305.8	-4606.6	-51.7



As of January 2025, the capital budget has financed 480.0 (57.7%) billion tugriks for the planned operating expenses of the capital and district organizations. In other words, the capital and district organizations have not spent 352.1 (42.3%) billion tugriks of their approved budget.

Table 29. CAPITAL BUDGET EXPENDITURE, January 2025, million tugriks

	expenses		change	
District	**Planned**	**performance**	**Amount**	**Percent**
Capital city total	832093.3	479962.7	-352130.6	-42.3
Baganuur	6663.6	1233.4	-5430.2	-81.5
Bagakhangai	1276.2	825.8	-450.4	-35.3
Bayangol	28375.7	21228.9	-7146.8	-25.2
Bayanzurkh	25015	5427.7	-19587.3	-78.3
Nalaikh	3871.7	1886.8	-1984.9	-51.3
Songinokhairkhan	27338.7	15931.4	-9407.3	-34.5
Sukhbaatar	56337.6	17620.2	-38717.6	-68.7
Khan-Uul	64654.3	4850.7	-59803.6	-92.5
Chingeltei	25255	16295.8	-8959.2	-35.5
City total	593305.3	405262	-188043.3	-31.7

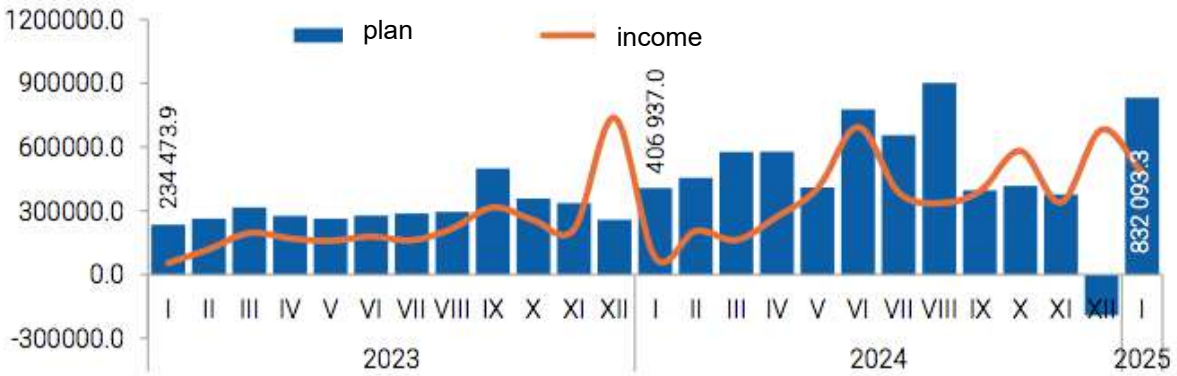


Figure 21. CAPITAL BUDGET EXPENDITURE, million tugriks

In the road sector, 34.8 km of auxiliary roads in three locations in the capital, 1713 bridges, 5.2 km of main roads in eight locations, and 18.5 km of auxiliary roads in 12 locations are planned to be financed with 345.3 billion tugriks in the 2025 budget.

Foreign trade: Mongolia traded with a total of 163 countries in 2024, and the total foreign trade turnover reached 27.4 billion US dollars. Of this, exports reached 15.8 billion US dollars and imports reached 11.6 billion US dollars, resulting in a balance of 4.2 billion US dollars in surplus.

Table 30. EXPORT, IMPORT, BALANCE

Төрөл	2022	2023	2024*	2024*/2023	
	сая ам.доллар			Дүн	Хувь
Эргэлт	**21 243.0**	**24 437.1**	**27 395.9**	**2 958.7**	**12.1**
Экспорт	12 538.6	15 186.9	15 783.4	596.5	3.9
Импорт	8 704.4	9 250.2	11 612.5	2 362.2	25.5
Тэнцэл	**3 834.2**	**5 936.6**	**4 170.9**	**- 1 765.7**	**- 29.7**

Total trade turnover increased by 3.0 (12.1%) billion USD compared to the previous year, with exports rising by 596.5 (3.9%) million USD and imports increasing by 2.4 (25.5%) billion USD. In comparison, the balance decreased by 1.8 (29.7%) billion USD.

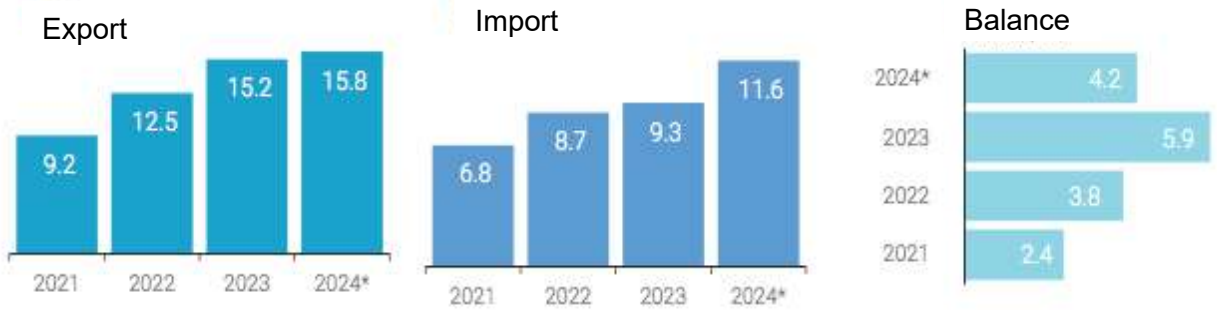


Figure 22. EXPORTS, IMPORTS, BALANCE by year, billion US dollars

Exports increased by $596.5 million in 2024 from the previous year, mainly due to increases in copper ore and concentrate by $693.4 million, gold by $161.4 million, and iron ore and concentrate by $152.8 million. However, coal decreased by $200.5 million and canned meat products decreased by $46.0 million.

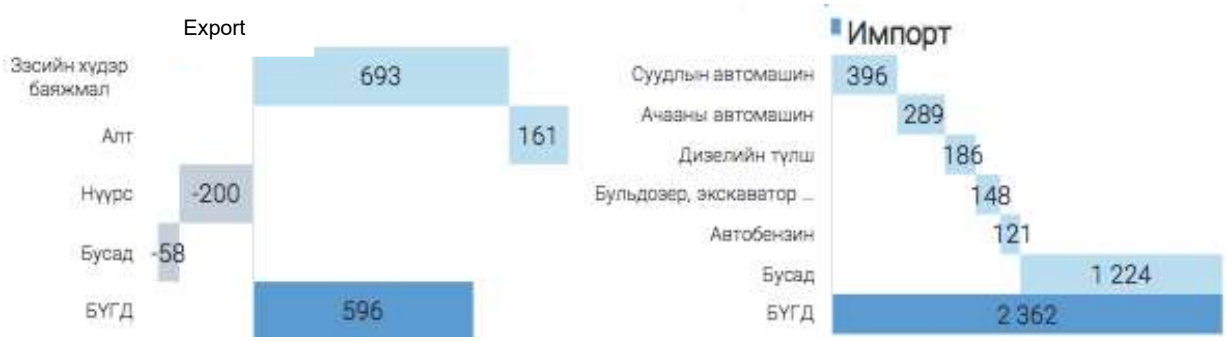


Figure 23. GROWTH IN EXPORTS AND IMPORTS, 2024, USD million

- - Imports increased by $2.4 billion from the previous year, mainly due to increases in:
- - passenger cars by $395.6 million,
- - trucks by $288.6 million,
- - diesel fuel by $186.0 million,
- - bulldozers, scrapers, screeds, graders, and excavators by $147.7 million,
- - gasoline by $120.7 million

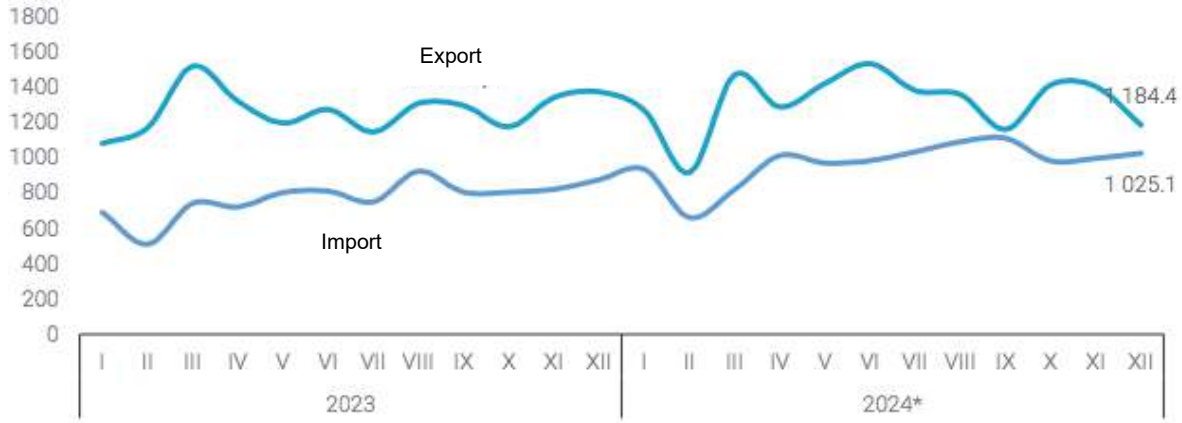


Figure 24. EXPORTS, IMPORTS, million USD per month

Exports decreased by 217.4 (15.5%) million USD in December 2024 compared to the previous month, while imports increased by 29.2 (2.9%) million USD. Considering the average border price indicators for 2024:

- The price of gold increased by $423.5 per ounce from the previous year,
- the price of copper ore and concentrate increased by $218.1 per ton,
- the price of iron ore and concentrate increased by $2.5 per ton,

and the price of coal decreased by $25.4 per ton.

Table 31. MAIN EXPORT PRODUCTS, per year, million US dollars

Төрөл	2023		2024*		2024*/2023	
	Тоо хэмжээ	Үнийн дүн	Тоо хэмжээ	Үнийн дүн	Дүн	Хувь
Нийт		**15 186.9**		**15 783.4**	**596.5**	**3.9**
Эрдэс бүтээгдэхүүн		**13 146.5**		**13 769.8**	**623.4**	**4.7**
Чулуун нүүрс, сая.тн	66.7	8 764.3	79.5	8 534.9	- 229.4	- 2.6
Зэсийн хүдэр, баяжмал, мян.тн	1 525.0	2 625.7	1 695.4	3 319.1	693.4	26.4
Төмрийн хүдэр, баяжмал, мян.тн	5 713.0	444.7	7 510.5	597.6	152.8	34.4
Боловсруулаагүй газрын тос, мян.барр	4 730.4	364.7	4 074.1	322.1	- 42.6	- 11.7
Жоншны хүдэр, баяжмал, мян.тн	1 087.8	272.4	1 369.1	318.5	46.2	16.9
Цайрын хүдэр, баяжмал, мян.тн	150.5	220.0	126.2	183.3	- 36.7	- 16.7
Молибдены хүдэр, баяжмал, мян.тн	6.4	120.5	6.0	96.1	- 24.5	- 20.3
Хүрэн нүүрс, мян.тн	2 907.0	134.2	4 237.1	163.0	28.9	21.5
Сувд, үнэт ба хагас үнэт чулуу		**762.0**		**912.5**	**150.5**	**19.7**
Алт, тн	11.7	738.0	11.6	899.4	161.4	21.9
Мөнгө, тн	3.9	3.0	3.4	3.1	0.1	3.0
Нэхмэл эдлэл		**451.2**		**404.1**	**- 47.1**	**- 10.4**
Самнасан ноолуур, тн	1 001.1	95.9	707.3	69.8	- 26.0	- 27.2
Угаасан ноолуур, мян.тн	5.4	264.0	4.8	256.7	- 7.2	- 2.7
Хонины ноос, мян.тн	13.3	14.0	8.2	8.9	- 5.0	- 35.9
Амьд мал, амьтад		**200.1**		**197.6**	**- 2.5**	**- 1.3**
Хонь, ямааны мах, мян.тн	12.7	44.2	23.6	89.7	45.5	2.0[1]
Адууны мах, мян.тн	32.9	125.5	23.9	84.2	- 41.3	- 32.9
Богийн өлөн гэдэс, тн	517.3	11.2	593.6	13.1	1.9	17.0
Бусад мал, амьтад, тол	356.0	2.1	410.0	2.5	0.4	16.7
Ургамлын гаралтай		**160.7**		**73.0**	**- 87.7**	**- 54.6**
Рапс, мян.тн	73.5	44.8	76.1	44.8	0.0	0.0
Самар, мян.тн	8.5	115.4	1.9	27.3	- 88.1	- 76.3
Хүнсний бэлэн бүтээгдэхүүн		**157.7**		**103.3**	**- 54.4**	**- 34.5**
Лаазалсан махан бүтээгдэхүүн, мян.тн	33.0	139.5	20.9	93.6	- 46.0	- 33.0
Бусад хүнсний бүтээгдэхүүн		2.4		2.8	-	13.7
Үр тарианы хаягдал, мян.тн	22.1	4.9	6.8	1.3	- 3.6	- 74.1
Бусад		**308.8**		**323.1**	**14.3**	**4.6**
Тунгаасан зэс ба хайлш, мян.тн	12.5	102.5	13.2	116.7	14.2	13.8
Суудлын автомашин, ш	959.0	19.3	506.0	13.4	- 5.9	- 30.5
Бульдозер, эксковатор зэрэг, ш	9.0	23.3	8.0	1.1	- 22.2	- 95.2

[1] Дахин их

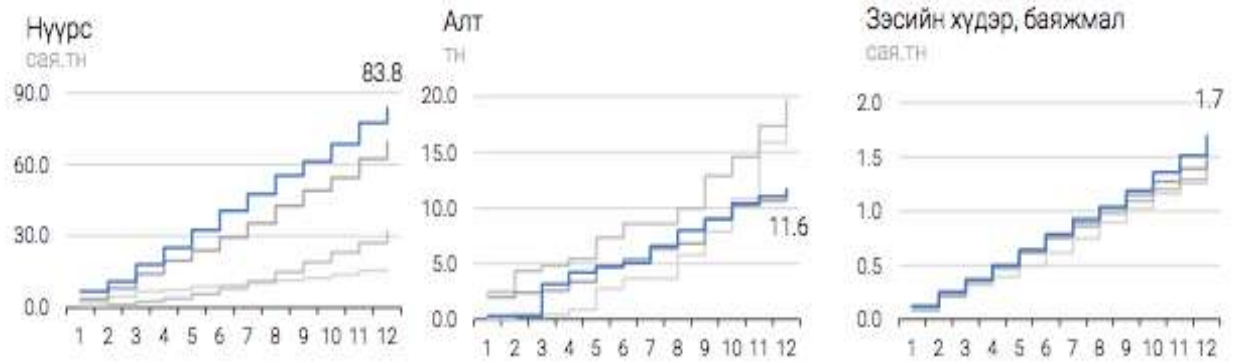


Figure 25. MAIN EXPORT PRODUCTS, in physical quantities, by month

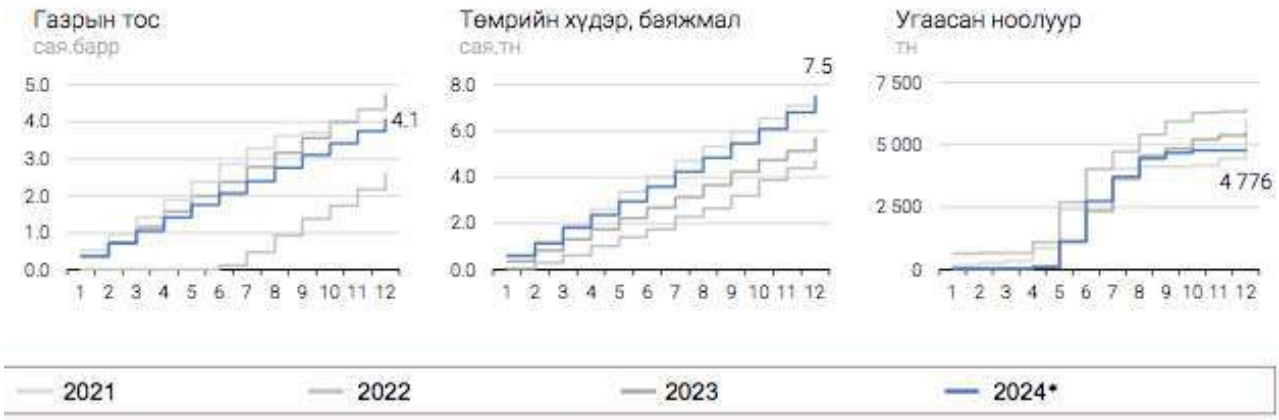


Figure 26. AVERAGE BORDER PRICE OF MAIN EXPORT GOODS, USD

Figure 27. EXPORTS, by main partner country, by year

Улс орон	2022		2023		2024*	
	Дүн	Эзлэх хувь	Дүн	Эзлэх хувь	Дүн	Эзлэх хувь
	сая ам.доллар					
Дүн	**12 538.6**	**100.0**	**15 186.9**	**100.0**	**15 783.4**	**100.0**
БНХАУ	11 061.6	88.2	13 940.2	91.8	14 420.7	91.4
Швейцарь улс	1 030.7	8.2	666.3	4.4	745.0	4.7
АНУ	9.9	0.1	36.6	0.2	166.4	1.1
ОХУ	93.4	0.7	112.7	0.7	100.6	0.6
Иран	8.0	0.1	34.9	0.2	66.3	0.4
Бусад	335.0	2.7	396.2	2.6	284.4	1.8

Coal and copper ore and concentrate account for 60.3 %of exports to China, while unprocessed or semi-processed gold accounts for 99.5 %of exports to Switzerland.

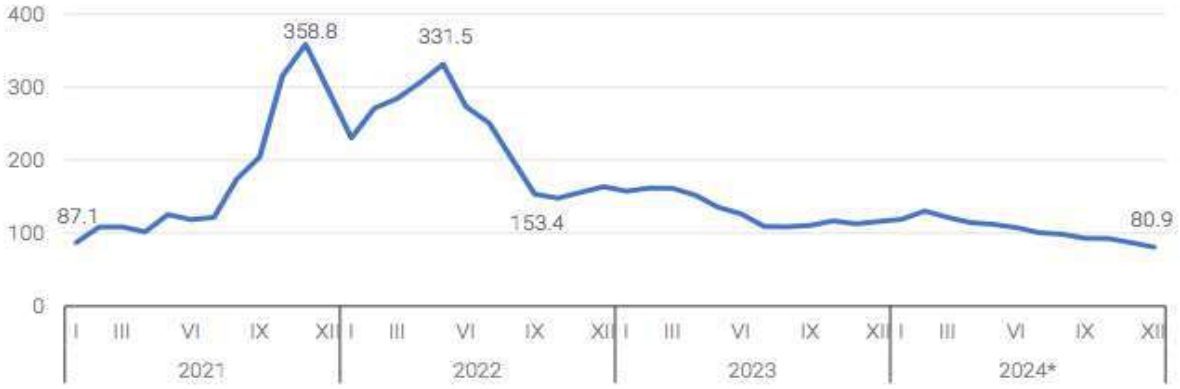


Figure 28. AVERAGE BORDER PRICE OF COAL EXPORTED TO CHINA, USD per ton

The average border price of coal exported to China in 2024 was $103.8 per ton, down $25.4 per ton from the previous year. Exports of mineral products, precious stones, metals, jewelry, and textile products accounted for 95.6 %of total exports, while imports of mineral products, machinery, electrical equipment, vehicles, their parts, and basic metals and products made of them accounted for 72.0 percent. In 2024, petroleum products accounted for 71.4 %of imports from Russia, passenger cars accounted for 77.1 %of imports from Japan, and trucks accounted for 10.9 %of imports from China.

Table 32. MAIN IMPORT PRODUCTS, year, million US dollars

Төрөл	2023		2024*		2024*/2023	
	Тоо хэмжээ	Үнийн дүн	Тоо хэмжээ	Үнийн дүн	Дүн	Хувь
Нийт		**15 186.9**		**15 783.4**	**596.5**	**3.9**
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Боловсруулаагүй газрын тос, мян.барр	4 730.4	364.7	4 074.1	322.1	- 42.6	- 11.7
Жоншны хүдэр, баяжмал, мян.тн	1 087.8	272.4	1 369.1	318.5	46.2	16.9
Цайрын хүдэр, баяжмал, мян.тн	150.5	220.0	126.2	183.3	- 36.7	- 16.7
Молибдены хүдэр, баяжмал, мян.тн	6.4	120.5	6.0	96.1	- 24.5	- 20.3
Хүрэн нүүрс, мян.тн	2 907.0	134.2	4 237.1	163.0	28.9	21.5
Сувд, үнэт ба хагас үнэт чулуу		**762.0**		**912.5**	**150.5**	**19.7**
Алт, тн	11.7	738.0	11.6	899.4	161.4	21.9
Мөнгө, тн	3.9	3.0	3.4	3.1	0.1	3.0
Нэхмэл эдлэл		**451.2**		**404.1**	**- 47.1**	**- 10.4**
Самнасан ноолуур, тн	1 001.1	95.9	707.3	69.8	- 26.0	- 27.2
Угаасан ноолуур, мян.тн	5.4	264.0	4.8	256.7	- 7.2	- 2.7
Хонины ноос, мян.тн	13.3	14.0	8.2	8.9	- 5.0	- 35.9
Амьд мал, амьтад		**200.1**		**197.6**	**- 2.5**	**- 1.3**
Хонь, ямааны мах, мян.тн	12.7	44.2	23.6	89.7	45.5	2.0[1]
Адууны мах, мян.тн	32.9	125.5	23.9	84.2	- 41.3	- 32.9
Богийн өлөн гэдэс, тн	517.3	11.2	593.6	13.1	1.9	17.0
Бусад мал, амьтад, тол	356.0	2.1	410.0	2.5	0.4	16.7
Ургамлын гаралтай		**160.7**		**73.0**	**- 87.7**	**- 54.6**
Рапс, мян.тн	73.5	44.8	76.1	44.8	0.0	0.0
Самар, мян.тн	8.5	115.4	1.9	27.3	- 88.1	- 76.3
Хүнсний бэлэн бүтээгдэхүүн		**157.7**		**103.3**	**- 54.4**	**- 34.5**
Лаазалсан махан бүтээгдэхүүн, мян.тн	33.0	139.5	20.9	93.6	- 46.0	- 33.0
Бусад хүнсний бүтээгдэхүүн		2.4		2.8	-	13.7
Үр тарианы хаягдал, мян.тн	22.1	4.9	6.8	1.3	- 3.6	- 74.1
Бусад		**308.8**		**323.1**	**14.3**	**4.6**
Тунгаасан зэс ба хайлш, мян.тн	12.5	102.5	13.2	116.7	14.2	13.8
Суудлын автомашин, ш	959.0	19.3	506.0	13.4	- 5.9	- 30.5
Бульдозер, экскаватор зэрэг, ш	9.0	23.3	8.0	1.1	- 22.2	- 95.2

[1] Дахин их

The share of petroleum product imports in total imports from Russia reached 71.4 %in 2024, an increase of 0.5 percentage points from the previous year.

Table 33. EXPORT, IMPORT, by port, 2024

Боомт	Экспорт		Импорт	
	XII	I-XII	XII	I-XII
	сая ам.доллар			
Нийт	**1 184.4**	**15 783.4**	**1 025.1**	**11 612.5**
Алтанбулаг	12.0	175.5	76.0	780.0
Арцсуурь	0.0	0.2	0.0	0.3
Байтаг	-	0.5	-	0.2
Баянхошуу	22.1	298.6	0.3	31.8
Бичигт	37.0	256.8	1.5	49.8
Боршоо	0.0	1.9	2.7	31.3
Булган	42.6	601.0	7.2	81.4
Бургастай	5.9	56.7	0.0	0.6
Буянт-Ухаа	0.3	48.4	0.0	22.6
Гашуун сухайт	530.4	7 189.4	75.6	849.4
Замын-Үүд	265.3	3 110.4	499.5	6 016.4
Сүмбэр	-	24.0	0.0	0.1
Сүхбаатар	5.3	52.7	239.2	2 475.6
Тэс	-	-	0.0	0.1
Хавирга	6.8	18.9	1.0	15.4
Ханги	54.2	771.1	2.3	25.1
Ханх	-	-	0.0	0.5
Ховд	-	-	-	0.0
Цагаандэл уул	-	-	0.2	0.7
Цагааннуур	2.0	12.5	9.0	107.5
Чингис хаан	59.7	1 004.9	71.5	734.1
Шивээ хүрэн	122.2	2 031.3	33.4	328.8
Эрээнцав	18.5	128.4	5.5	60.8

In 2024, 45.6 %of exports were made through Gashuunsukhait, 19.7 %through Zamyn-Uud, and 12.9 %through Shiveekhuren ports, accounting for 78.1 %of total exports. 51.8 %of imports were made through Zamyn-Uud and 21.3 %through Sukhbaatar ports, accounting for 73.1 %of total imports.

Gross Domestic Product: Mongolia's economy grew by 4.9 %in 2024 (at 2015 constant prices). Per capita GDP reached 23.4 million tugriks, or 6.9 thousand US dollars, at current prices.

Table 34. GROSS DOMESTIC PRODUCT, by production method, by economic activity, at annual prices

Салбар	Section	2020	2021	2022	2023	2024*
		тэрбум төгрөг / *billion togrogs*				
ДНБ	***GDP***	**37 453.3**	**43 555.5**	**53 851.5**	**70 441.5**	**79 956.3**
ДНБ, сая америк доллар[1]	*GDP, million US dollars[1]*	13 311.8	15 286.4	17 123.8	20 324.9	23 584.9
Нэг хүнд ногдох ДНБ[2], мянган төгрөг	*GDP per capita[2], thousand togrogs*	11 612.9	13 267.9	16 121.0	20 824.0	23 384.6
Нэг хүнд ногдох ДНБ[2], америк доллар	*GDP per capita[2], US dollars*	4 128	4 657	5 126	6 008	6 898

Considering the sector's contribution to the annual net growth and decline of GDP by economic activity sector and at constant prices in 2015, economic growth in 2024 will decrease by 2.5 percentage points from the previous year, but will fully overcome the 2020 pandemic economic downturn (-4.6%) and increase by 3.3 percentage points from the 2021 level.

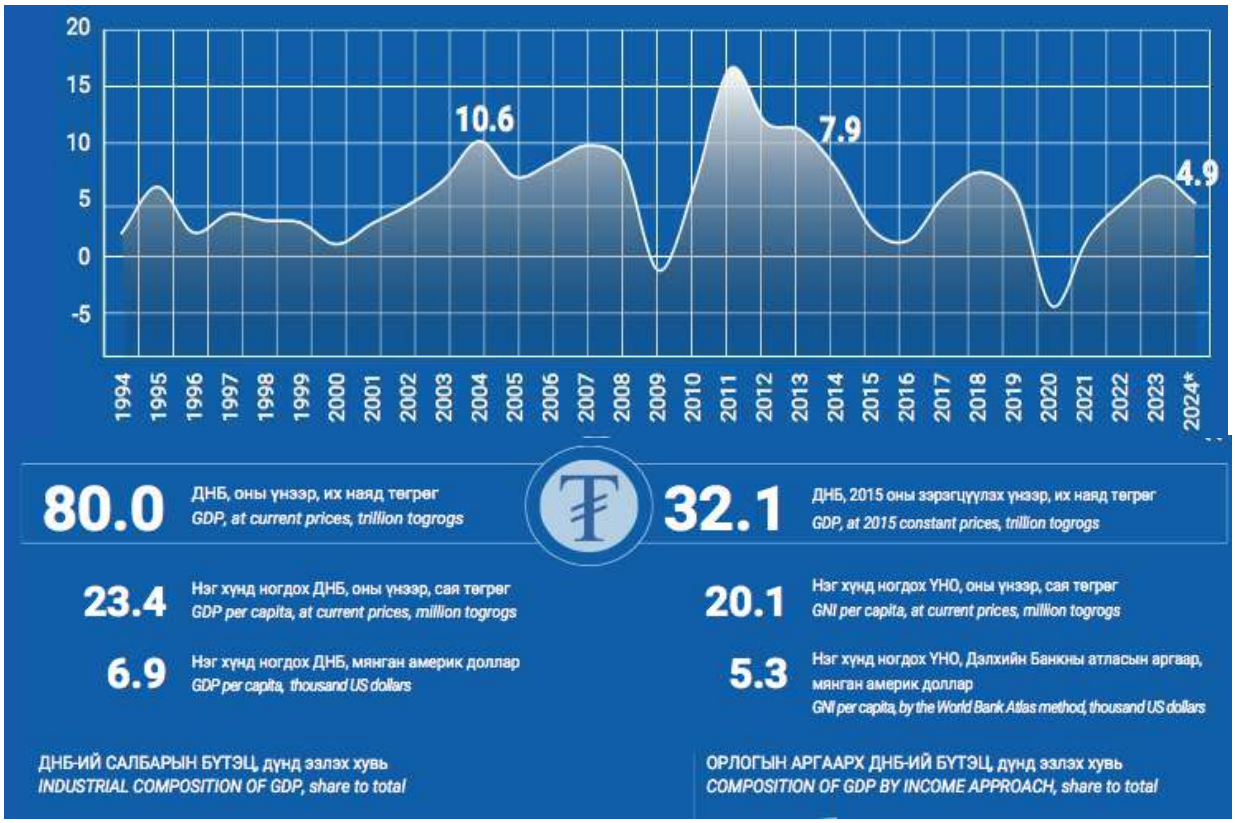

Figure 29. ECONOMIC GROWTH DECREASE IN MONGOLIA, in percent

Of the GDP (79956.3 billion.₮) produced in 2024, 55827.5 billion.₮ or 70% was produced in the project implementation region, namely Ulaanbaatar.

- The share of GDP by sector is:
- Agriculture, forestry, and fishing -7.3%,
- Mining and quarrying -27.9%,
- Industry and construction -12.5%,
- The service sector has the largest share -52.3%

Looking at the results of GDP calculated by the production, final use, and income methods, net exports accounted for 0.6% of GDP calculated by the final use method, gross capital formation accounted for 34.6%, government consumption accounted for 16.3%, and household and non-profit institutions serving households accounted for 49.7%.

- - Looking at the structure of GDP calculated by the income method:
- - Wages and salaries of employees and their equivalent income -28.8%,
- - Consumption of fixed assets -9.7%,
- - Net taxes on production and imports -11%,

Net operating profit (net mixed income) was the highest at 50.5%.

Figure 30. GDP- OCCUPATIONAL SHARE, share of output calculated by production, final use, and income methods

Table 35. GROSS NATIONAL INCOME

Үзүүлэлт	Indicators	2020	2021	2022	2023	2024*
Оны үнээр	At current prices					
ҮНО, тэрбум төгрөг	GNI, billion togrogs	33 908.6	37 196.6	48 695.9	62 716.0	70 866.6
Нэг хүнд ногдох ҮНО[4], мянган төгрөг	GNI per capita[4], thousand togrogs	10 191.3	10 992.7	14 181.5	18 015.9	20 105.2
Нэг хүнд ногдох ҮНО[4], Дэлхийн Банкны атласын аргаар, америк доллар	GNI per capita[4], by World Bank Atlas method, current US dollars	3 688	3 686	4 334	4 869	5 348
2015 оны зэрэгцүүлэх үнээр	At 2015 constant prices					
ҮНО, тэрбум төгрөг	GNI, billion togrogs	24 132.7	23 136.4	25 730.8	27 214.7	28 409.9
Нэг хүнд ногдох ҮНО[4], мянган төгрөг	GNI per capita[4], thousand togrogs	7 253.1	6 837.5	7 493.5	7 817.7	8 060.0
Нэг хүнд ногдох ҮНО[4], Дэлхийн Банкны атласын аргаар, америк доллар	GNI per capita[4], by World Bank Atlas method, constant 2015 US dollars	3 931	3 706	4 061	4 237	4 368

Consumer Price Index: Nationwide. The price of consumer goods and services nationwide increased by 9.0% in December 2024 from the same period a year earlier and by 1.2% from the previous month.

Table 36. INFLATION RATE

Statistical indicators	SHOW	2020	2021	2022	2023	2024
NATIONAL CONSUMER PRICE INDEX, 2015=100	Inflation rate	2.3	13.8	13.2	7.9	9

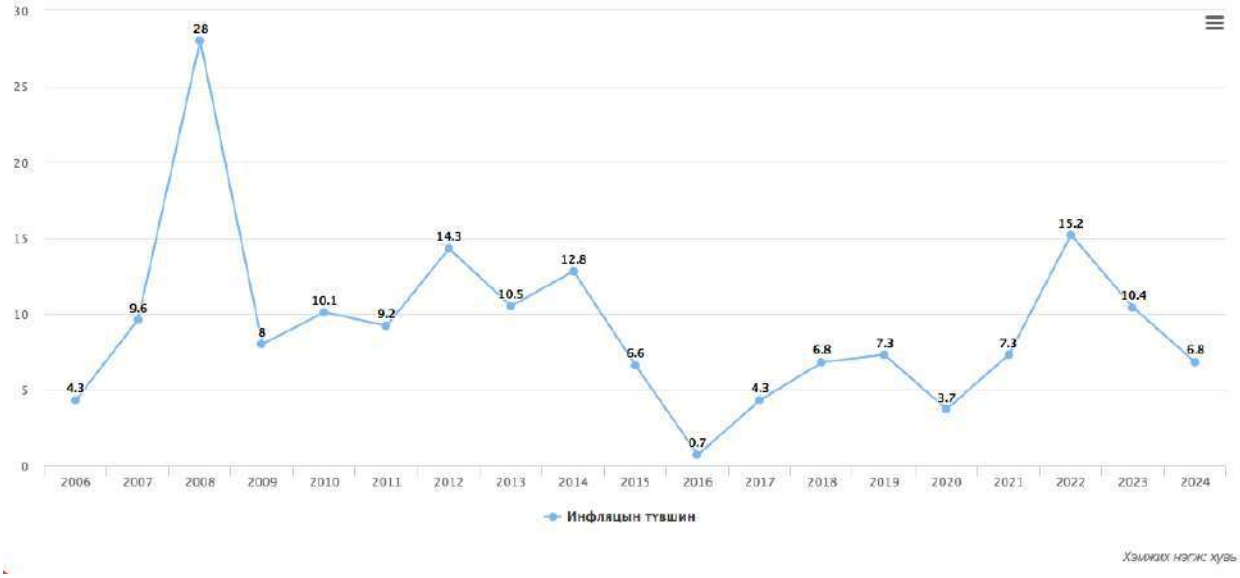

Figure 31. INFLATION DYNAMICS, 2006-2024

Source 1212

Figure 32. NATIONAL CONSUMER PRICE INDEX, 2024

Considering the prices of consumer goods and services by region as of December 2024, the highest increase was in the Khangai region, where the prices of goods increased by 7.8%, food prices by 10.2%, service prices by 22.2%, and non-food prices by 10.0% in the Western region.

Table 37. CHANGES IN THE PRICE INDEX OF FOOD AND NON-FOOD PRODUCTS, GOODS AND SERVICES GROUPS,

Огноо	Бүлэг	Улс	Улаанбаатар	Баруун бүс	Хангайн бүс	Төвийн бүс	Зүүн бүс
2023 XII	**Ерөнхий индекс**	**7.9**	**8.6**	**6.9**	**7.0**	**6.8**	**6.8**
	Хүнс	11.9	12.4	11.7	10.8	11.6	11.5
	Хүнсний бус	6.3	7.2	5.1	5.4	4.6	4.6
	Бараа	8.0	8.4	7.3	7.8	7.6	7.7
	Үйлчилгээ	7.6	9.4	5.4	3.5	4.0	3.0
2024 XII	**Ерөнхий индекс**	**9.0**	**9.1**	**9.6**	**9.3**	**8.1**	**8.2**
	Хүнс	8.7	8.3	8.6	10.2	9.7	6.9
	Хүнсний бус	9.1	9.4	10.0	8.9	7.3	8.8
	Бараа	7.1	7.1	6.8	7.8	6.9	6.4
	Үйлчилгээ	15.2	14.5	22.2	16.4	13.5	16.8

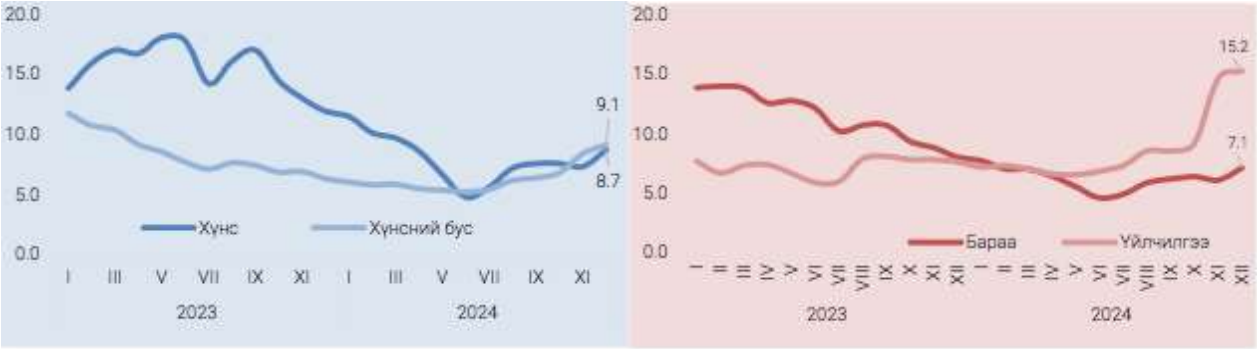

Figure 33. CHANGES IN THE PRICE INDEX OF FOOD AND NON-FOOD PRODUCTS, GOODS AND SERVICES GROUPS

In December 2024, compared to the same period of the previous year, the prices of food products increased by 8.7%, non-food products by 9.1%, goods by 7.1%, and services by 15.2%.

Figure 34. NATIONAL ANNUAL INFLATION COMPONENTS, as of December of each year, in percentage points

The inflation rate, or the price of consumer goods and services, was 7.9% in December 2023 and increased to 9.0% in December 2024, an increase of 1.1 percentage points from the same period last year. The price of imported goods other than gasoline and fuel contributed 2.9 percentage points (32.2%) to the national inflation. In comparison, the cost of domestic goods other than meat and solid fuels contributed 4.8 percentage points (53.3%).

Table 38. CONTRIBUTION OF PRICE INCREASE OF GROUPS OF GOODS AND SERVICES TO INFLATION, in December of each year, in percentage points

Бараа, үйлчилгээний бүлэг	2023 XII		2024 XII		Өмнөх сараас	
	Хувь	Оролцоо	Хувь	Оролцоо	Хувь	Оролцоо
Ерөнхий индекс	**7.9**	**100.0**	**9.0**	**100.0**	**1.2**	**100.0**
Хүнсний бараа, ундаа, ус	3.3	42.0	2.5	28.0	0.6	51.5
Согтууруулах ундаа, тамхи	0.1	0.7	0.0	0.4	0.0	0.2
Хувцас, бөс бараа, гутал	0.8	9.7	1.1	12.6	0.1	12.1
Орон сууц, ус, цахилгаан, түлш	0.4	5.3	2.2	24.3	0.1	9.5
Гэр ахуйн тавилга, бараа	0.3	4.3	0.4	4.3	0.0	2.3
Эм, тариа, эмнэлгийн үйлчилгээ	0.6	6.9	0.4	4.2	0.0	1.0
Тээвэр	0.1	1.1	0.2	2.6	0.2	16.8
Холбооны хэрэгсэл, шуудангийн үйлчилгээ	0.0	0.0	0.1	0.8	0.0	0.0
Амралт, чөлөөт цаг, соёлын бараа, үйлчилгээ	0.1	0.8	0.1	1.3	0.0	0.2
Боловсролын үйлчилгээ	0.7	9.4	0.9	10.0	0.0	0.0
Зочид буудал, нийтийн хоол, дотуур байрны үйлчилгээ	0.5	6.1	0.4	4.0	0.1	4.6
Даатгал, Санхүүгийн үйлчилгээ	0.0	0.4	0.0	0.2	0.0	0.0
Бусад бараа, үйлчилгээ	1.0	13.1	0.7	7.4	0.0	1.8

The inflation rate, or the price of consumer goods and services, reached 9.0% nationwide in December 2024, of which 2.5 percentage points (28.0%) were due to increases in the prices of food, beverages, and water.

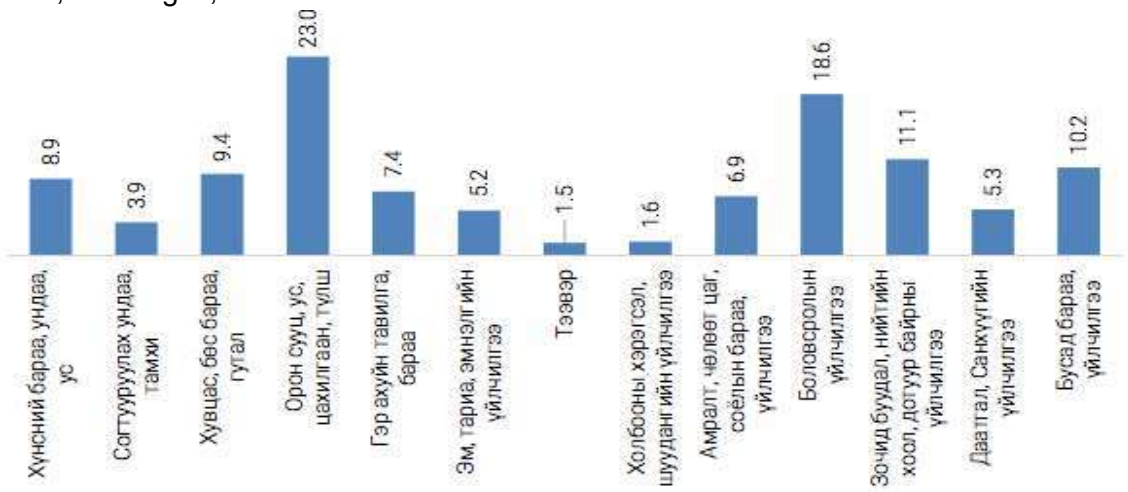

Figure 35. PRICE INCREASE OF GROUPS OF GOODS AND SERVICES, compared to the same period of the previous year, in December 2024, in per cent

The price of services increased by 9.0 %in December 2024 compared to the same period of the previous year, mainly due to an increase in the cost of food, beverages, and water by 8.9 %(the price of the non-alcoholic beverages subgroup by 8.5 percent), clothing, textiles, and footwear by 9.4 %, housing, water, electricity, gas, and other fuels by 23.0 %, household furniture, and household goods by 7.4 %, hotel, catering, and boarding house services by 11.1 %, and educational services by 18.6 percent.

Inflation reached 9.0% in December 2024, of which 2.6 percentage points (29.1%) were due to an increase in the price of imported goods. The consumer goods and services basket comprises a total of 410 types of goods and services, with the prices of 404 kinds of goods and services in Ulaanbaatar city being studied. Of the 410 types of goods and services, 221 are imported goods, accounting for 46.0 %of the total weight.

The price of meat and meat products increased by 17.1% in December 2024 compared to the same period of the previous year, mainly due to an increase in the price of beef by 16.3%, the price of horse meat by 8.7%, and the price of sheep and goat meat by 21.3%. The price of

bread, flour, and rice increased by 6.5 %, mainly due to an increase in the price of flour by 2.1 %, the price of bread and pastries by 9.4 %, and the price of pasta by 18.3%.

In the capital. The consumer goods and services price index increased by 1.3 %in January 2025 compared to the end of the previous year. This was due to an increase in the prices of food and non-alcoholic beverages by 1.9 %, alcoholic beverages and tobacco by 0.6 %, clothing, footwear by 0.9 %, housing, water, electricity, gas and other fuels by 0.1 %, household furniture and household goods by 3.4 %, medicines and medical services by 1.1 %, recreation, leisure, cultural goods and services by 0.8 %, hotels, catering and boarding services by 5.3 %, and insurance and financial services by 13.5 percent. In January 2025, the prices of 417 types of goods and services selected for consumer price observation in the capital city increased by 48.4%, decreased by 32.5%, and remained stable by 19.1% compared to the previous month. The prices of some of these consumer goods are as follows:

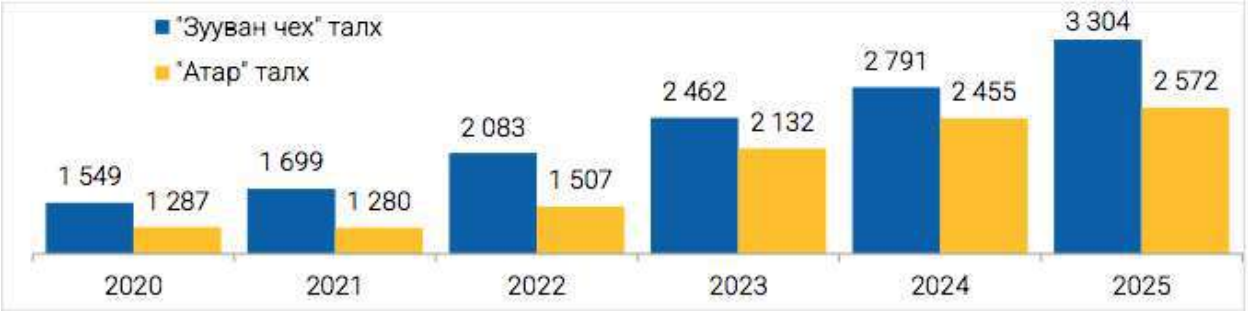

Figure 36. AVERAGE PRICE OF A LOAF OF BREAD, January of each year, tugriks

Figure 37. AVERAGE PRICE OF ONE KILOGRAM OF STOCKED FLOUR, January of each year, tugriks

Figure 38. AVERAGE PRICE OF ONE KILOGRAM OF VEGETABLES, January of each year, tugriks

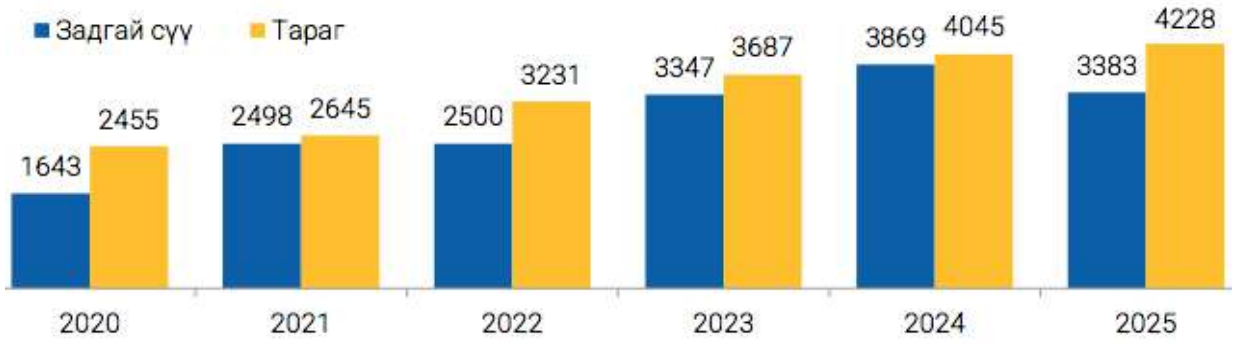

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Figure 39. AVERAGE PRICE OF ONE LITRE OF YOGURT AND MILK, January of each year, tugriks

In the capital, in January 2025, the price of beef bone-in meat sold at retail markets, supermarkets, and wholesale centres increased by 4.4%, and mutton bone-in meat by 5.8% compared to the previous month.

Table 39. AVERAGE RETAIL PRICE OF ONE KILOGRAM OF MEAT, MNT

Ухрийн ястай мах												
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
2020	10 535	11 415	11 665	11 735	11 940	12 640	12 760	11 760	11 235	10 855	11 075	11 210
2021	11 615	12 605	12 670	13 850	13 960	14 770	14 800	13 700	13 420	13 280	13 345	13 495
2022	14 060	14 235	14 260	14530	15 390	15 390	15120	14240	13730	13 590	13 275	13 395
2023	13 520	14 245	14 955	16 750	18 493	20 100	19 466	16 723	16 277	15 690	15 542	15 846
2024	16 437	17 150	17 624	18 209	18 418	18 159	18 475	17 735	18 138	17 865	17 783	18 264
2025	19 073											

Хонины ястай мах												
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
2020	8 705	9 600	9 765	9 835	10 125	10 385	10 650	9 870	9 170	8 715	8 635	8 580
2021	9 040	10 460	10 705	12 320	12 390	12 695	12 440	11 380	10 975	11 005	10 775	10 805
2022	11 485	12 295	12 585	12 620	12 705	12 805	12360	11530	11025	10270	9 870	9 920
2023	10 440	11 350	12 680	14 065	15 396	16 598	15 766	13 387	12 703	12 010	11 834	12 080
2024	12 926	13 776	13 917	14 632	16 290	16 322	15 339	14 746	14 510	14 245	14 088	14 701
2025	15 561											

Figure 40. AVERAGE PRICE OF ONE KG OF MUTTON AND BEEF MEAT, tugriks

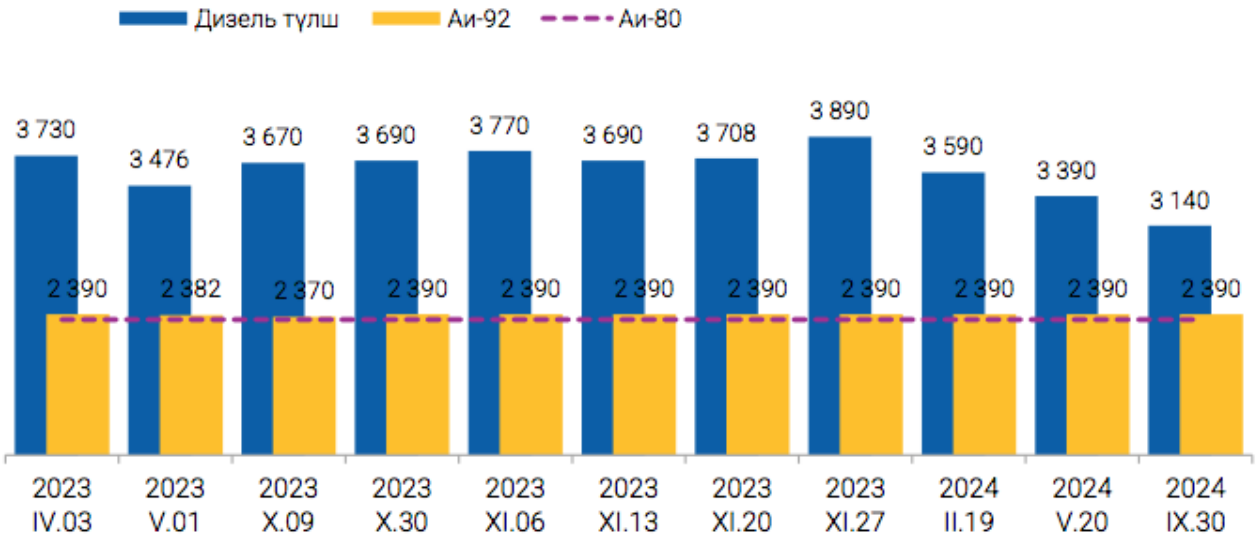


Figure 41. PRICE OF ONE LITER OF FUEL, as of the date of change

Table 40. FUEL PRICE, tugriks

Байршил	2023.I.30			2024.I.29			2025.I.27		
	Түлшний мод шуудай (6-7 кг)		Сайж-руулсан түлш 25 кг	Түлшний мод шуудай (6-7 кг)		Сайж-руулсан түлш 25 кг	Түлшний мод шуудай (6-7 кг)		Сайж-руулсан түлш 25 кг
	Хар мод	Нарс мод		Нарс мод	Хар мод		Хар мод	Нарс мод	
Чингэлтэй	7 000	6 000	3 750	7 000	7 500	3 750	7 500	7 000	3 750
Сүхбаатар	7 000	6 000	3 750	7 000	7 500	3 750	7 500	7 000	3 750
Цайз зах	6 500	6 000	3 750	7 500	8 500	3 750	8 500	7 500	3 750
Хангай зах	7 000	6 000	3 750	7 000	7 000	3 750	7 000	7 000	3 750
Дундаж үнэ	6 875	6 000	3 750	7 125	7 625	3 750	7 650	7 125	3 750

Table 41. PRICE OF ONE LITER OF FUEL, tugriks

ШТС	2024.I.29					2025.I.27				
	Аи 95	Аи 80	Аи 92	Дизель түлш	Газ	Аи 95	Аи 80	Аи 92	Дизель түлш	Газ
Жаст Ойл			2 390	3 890	-		-	2 390	3 140	-
Петровис	3 910	2 370	2 390	3 890	-	3 910	2 370	2 390	3 140	-
Магнай трейд	3 910	-	2 390	3 890	-	3 910	-	2 390	3 140	-
Сод монгол	3 910	2 315	2 390	3 890	-	3 910	2 315	2 390	3 140	-
Шунхлай	3 910	2 350	2 390	3 890	-	3 910	2 350	2 390	3 140	-
Юнигаз	-	-	-	-	1 790	-	-	-	-	1 790
Дундаж үнэ	3 910	2 345	2 390	3 890	1 790	3 910	2 345	2 390	3 140	1 790

Figure 42. AVERAGE MONTHLY MOVEMENTS OF THE AUD/USD EXCHANGE, tugriks

The producer price index (2015=100) for the industrial sector was 220.9 in December 2024, a 14.6% decrease from the same period last year, mainly due to a 19.5% decrease in the mining and quarrying sector (31.6% in metal ore mining).

Table 42. INDUSTRIAL PRODUCER PRICE INDEX (2015=100) as of December 2024, as of preliminary execution

Үзүүлэлт	2021	2022	2023	2024		2024 XII*	2024 XII*
			XII	XI	XII*	2023 XII	2024 XI
	2015=100					хувь	
Ерөнхий индекс	**200.5**	**241.1**	**258.5**	**228.7**	**220.9**	**-14.6**	**-3.4**
Уул уурхай, олборлолт	219.6	266.3	279.6	235.6	225.1	-19.5	-4.5
Боловсруулах үйлдвэрлэл	141.2	168.5	188.4	196.0	198.6	5.4	1.3
Цахилгаан, хий, уур, агааржуулалт	110.9	109.8	169.8	219.5	219.5	29.2	0.0
Ус хангамж, бохир ус зайлуулах систем, хог хаягдлын менежмент болон цэвэрлэх үйл ажиллагаа	169.9	209.2	220.1	224.1	224.1	1.8	0.0

* Урьдчилсан үзүүлэлтээр

However, in December 2024, it decreased by 3.4 %from the previous month. This was mainly due to a 4.5% decrease in the mining and quarrying sector (7.9% in metal ore mining).

Table 43. CONTRIBUTION OF SUB-SECTORS TO CHANGES IN THE INDUSTRIAL PRODUCER PRICE INDEX

Дэд салбар	2022 XII		2023 XII		2024 XII	
	нэгж хувь	хувь	нэгж хувь	хувь	нэгж хувь	хувь
Ерөнхий индекс	**20.3**	**100.0**	**7.2**	**100.0**	**-14.6**	**100.0**
Уул уурхай, олборлолт	18.2	89.6	4.3	59.6	-16.4	112.9
Боловсруулах үйлдвэрлэл	2.0	9.8	1.2	16.7	0.6	-3.9
Цахилгаан, хий, уур, агааржуулалт	0.0	-0.2	1.7	23.2	1.3	-8.9
Ус хангамж, бохир ус зайлуулах систем, хог хаягдлын менежмент болон цэвэрлэх үйл ажиллагаа	0.2	0.8	0.0	0.5	0.0	-0.1

Figure 43. CONTRIBUTION OF SUB-SECTIONS TO CHANGES IN THE PRODUCER PRICE INDEX OF THE INDUSTRY, units, per cent

The producer price index of the industrial sector decreased by 14.6% year-on-year, while the mining and quarrying sub-sector contributed 16.4 percentage points (112.9%). The producer price index of the transport sector (2015=100) was 198.5 in December 2024, representing a 3.5

%increase year-on-year, unchanged from the previous month. This increase was mainly driven by a 9.9 %increase in producer prices of the air transport sector.

Table 44. TRANSPORTATION INDUSTRY PRODUCER PRICE INDEX

Үзүүлэлт	2021	2022	2023 XII	2024 XI	2024 XII	2024 XII / 2023 XII	2024 XII / 2024 XI
	2015=100					хувь	
Ерөнхий индекс	**158.7**	**189.0**	**191.7**	**198.4**	**198.5**	**3.5**	**0.0**
Төмөр замын тээвэр	121.1	145.7	149.0	148.8	148.8	-0.1	0.0
Хуурай замын бусад тээвэр	157.1	172.3	175.2	165.6	165.0	-5.8	-0.4
Усан замын тээвэр	130.4	156.5	173.9	173.9	173.9	0.0	0.0
Агаарын тээвэр	214.2	253.5	254.8	279.6	280.0	9.9	0.1
Агуулахын болон тээврийн туслах үйл ажиллагаа	113.1	182.5	186.1	186.0	186.1	0.0	0.1
Шуудан, зарлага, элчийн үйл ажиллагаа	148.7	171.2	196.8	180.0	180.0	-8.5	0.0

Figure 44. CONTRIBUTION OF SUB-SECTORS TO THE CHANGE IN THE PRODUCER PRICE INDEX OF THE TRANSPORT INDUSTRY, PERCENTAGE

The hotel industry producer price index (2015=100) was 182.1 in December 2024, representing a 13.3 %increase in producer prices year-on-year and unchanged from the previous month.

Table 45. PRODUCER PRICE INDEX OF THE HOTEL INDUSTRY, by sub-sector, in per cent

Үзүүлэлт	2021	2022	2023 XII	2024 XI	2024 XII	2024 XII / 2023 XII	2024 XII / 2024 XI
	2015=100					хувь	
Ерөнхий индекс	**129.8**	**141.0**	**160.7**	**182.0**	**182.1**	**13.3**	**0.1**
Богино хугацаагаар байр, суулгаар үйлчлэх үйл ажиллагаа	129.5	139.7	159.9	181.5	181.5	13.5	0.0
Автомашины зогсоол бүхий зуслан, чөлөөт цаг өнгөрөөх хоноглох байраар хангах үйл ажиллагаа	161.7	183.0	186.5	205.6	205.6	10.3	0.0
Бусад төрлийн байраар хангах үйл ажиллагаа	101.4	152.1	172.6	178.9	178.9	3.7	0.0

The increase in the hotel sector producer price index from the same period of the previous year was mainly due to the rise in the producer price of the short-term accommodation and lodging sub-sector by 13.5% and the producer price of the camping and leisure accommodation sub-sector by 10.3%. In addition, the producer price of hotel service enterprises increased by 12.8% in the capital city and 15.5% in the aimag from the same period of the previous year. The producer price index of the public catering sector (2015=100) was 123.7 in December 2024, with producer prices increasing by 2.8% from the same period of the previous year and 1.3% from the previous month. The producer price of public catering enterprises increased by 4.8% in the aimag and 2.4% in the capital city from the same period of the previous year in December 2024. The increase in the producer price index of the catering sector compared to the same period of the previous year was mainly due to a 2.4 %increase in the producer price of enterprises providing catering services in the capital city.

The Bank of Mongolia is implementing a policy to stabilize inflation measured by the consumer price index around the target level in the medium term, as reflected in the “Main Directions of the State on Monetary Policy”. By stabilizing inflation at a low level, the Bank of Mongolia will protect citizens’ real income and assets from depreciation and create conditions for the stability of the banking and financial system. This is believed to support investment and economic growth.

The Bank of Mongolia aims to stabilize inflation at around 6 %per year in the medium term, within a +/-2 percentage point interval, and is projected to be 8.4 %, 7.3 %, and 6.0 %by the end of 2024-2026.

Figure 45. PREVIOUS AND CURRENT INFLATION ILLUSTRATIONS

Source: Bank of Mongolia: According to the Bank of Mongolia's forecast, inflation will stabilize at the target level in the second half of 2026.

Business Register: As of the end of 2024, there were 261.2 thousand legal entities registered in the Statistical Business Register (SBR), of which 26.4 thousand legal entities were added in the first half, and 1.7 thousand legal entities were liquidated.

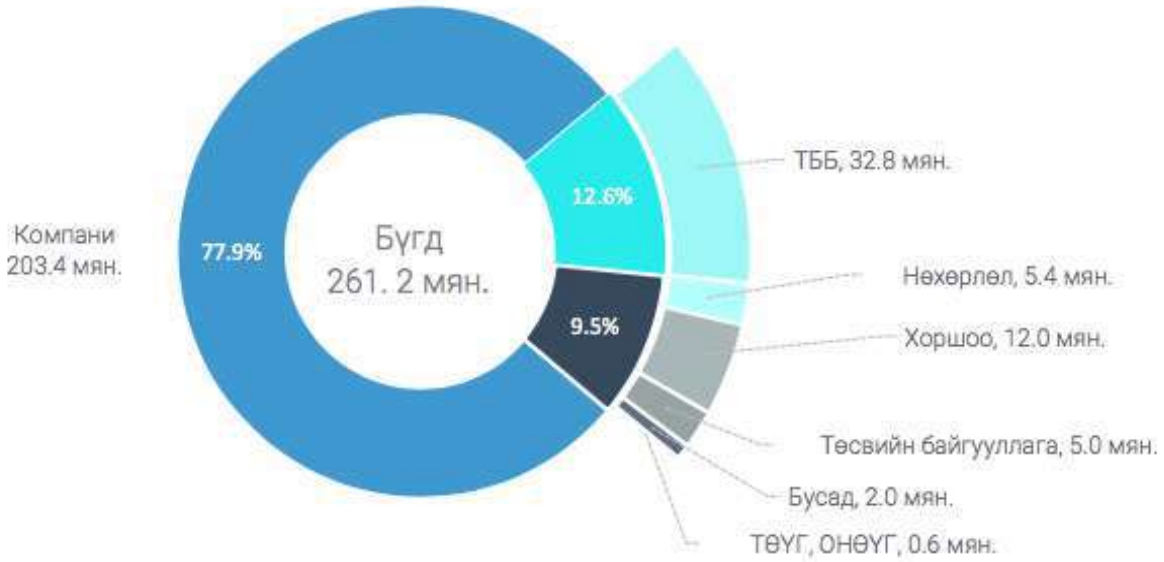


Figure 46. NUMBER OF LEGAL ACTIVITIES, FORM OF LIABILITY, BY 2024

203.4 thousand or 77.9 %of legal entities are companies, 32.8 thousand or 12.6 %are non-governmental organizations, 12.0 thousand or 4.6 %are cooperatives, 5.4 thousand or 2.1 %are partnerships, 5.0 thousand or 1.9 %are budget organizations, 2.6 thousand or 0.9 %are state-owned enterprises, state-owned enterprises and other forms. Of the total legal entities registered in the business registry, 190.7 thousand or 73.0 %are registered in Ulaanbaatar city, 24.1 thousand or 9.3 %in the Central region, 21.0 thousand or 8.0 %in the Khangai region, 16.8 thousand or 6.4 %in the Western region, and 8.6 thousand or 3.3 %in the Eastern region. There are 4.8-5.6 thousand legal entities registered in Orkhon, Darkhan-Uul, Khovd, Selenge, and Umnugovi aimags, while the number of legal entities registered in Govisumber, Sukhbaatar, and Dundgovi aimags is 0.8-1.9 thousand. Of the 261.2 thousand legal entities registered in the Statistical Business Register in 2024, 41.5 %were operating, and 58.5 %were not operating. Considering the number of employees of operating legal entities, 86.2 %were legal entities with

1-9 employees, 6.3 %were legal entities with 10-19 employees, 4.8 %were legal entities with 20-49 employees, and 2.7 %were legal entities with 50 or more employees. The share of legal entities with 1-9 employees increased by 0.3 percentage points compared to the previous year. Of the total number of legal entities operating in 2024, 85.3 thousand, or 78.7 %, were in the trade and services sector.

CHAPTER 4. KEY SECTORS OF THE ECONOMY

4.1. Livestock production

Livestock is the primary economic sector in Mongolia, and according to the national livestock census at the end of 2024, a total of 57.6 million head of livestock were counted, including 4.7 million horses, 5.1 million cattle, 480.6 thousand camels, 24.5 million sheep, and 22.9 million goats. The number of livestock decreased by 7.0 million (10.9%) compared to the previous year. By livestock type, sheep decreased by 4.9 million (16.7%), goats by 1.7 million (6.9%), cattle by

276.4 thousand (5.2%), horses by 146.6 thousand (3.0%), and camels increased by 6.7 thousand (1.4%).

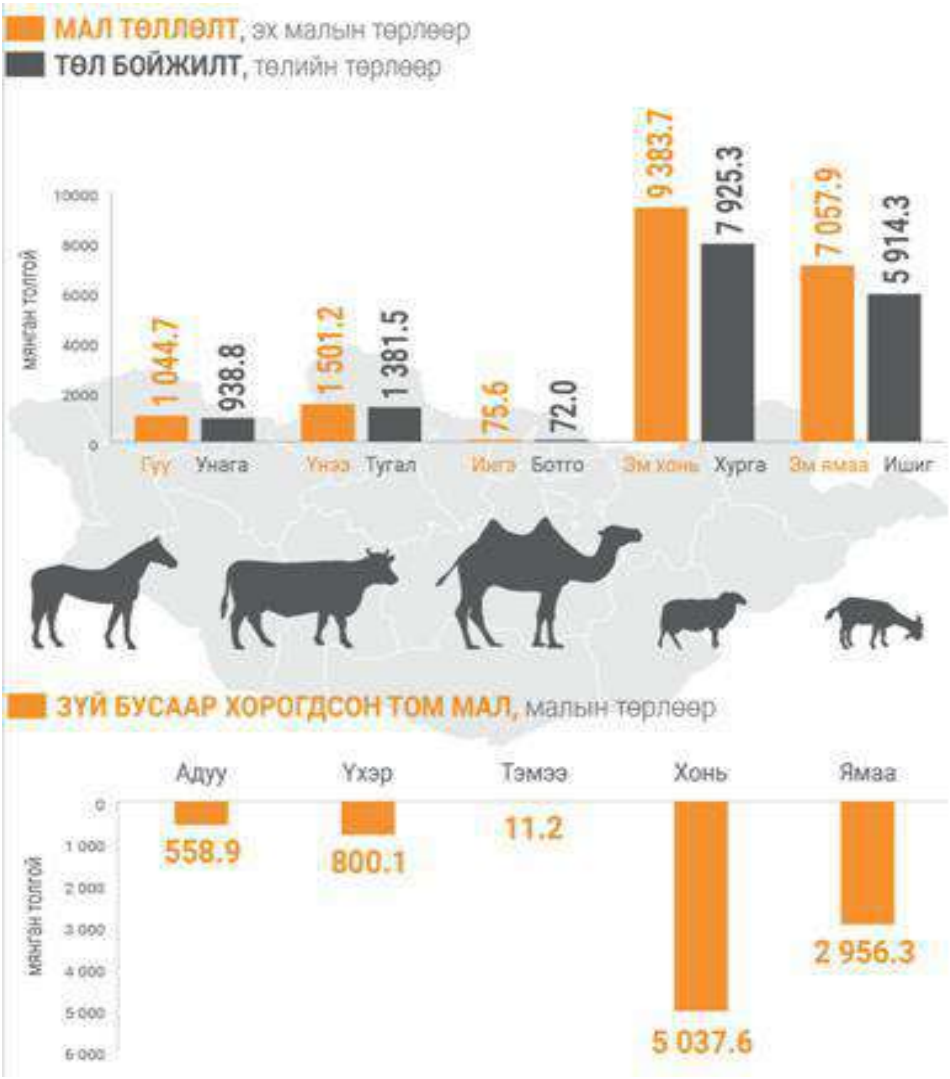


Figure 47. LIVESTOCK PRODUCTION, calving, young growth, and illegal culling in 2024

Table 46. NUMBER OF LIVESTOCK, by type of livestock

Малын төрөл	2021	2022	2023	2024	Өөрчлөлт	
					тоо толгой	хувь
Нийт	**67 343.8**	**71 121.5**	**64 681.9**	**57 647.9**	**- 7 033.9**	**-10.9**
Адуу	4 324.4	4 821.1	4 829.7	4 683.1	- 146.6	-3.0
Үхэр	5 022.2	5 512.8	5 350.8	5 074.4	- 276.4	-5.2
Тэмээ	454.0	470.5	473.9	480.6	6.7	1.4
Хонь	31 087.0	32 747.7	29 409.4	24 490.4	- 4 918.9	-16.7
Ямаа	26 456.1	27 569.4	24 618.2	22 919.4	- 1 698.8	-6.9

According to the 2024 livestock census, sheep account for 42.5% of the total herd, goats for 39.8%, cattle for 8.8%, horses for 8.1%, and camels for 0.8%. Compared to 1990, when livestock began to be transferred to private ownership, the share of goats has increased by 20.0 percentage points, while that of sheep has decreased by 15.8 percentage points, that of cattle by 2.2 percentage points, that of horses by 0.6 percentage points, and that of camels by 1.3 percentage points.

The sheep-goat ratio in Mongolia was maintained at a reasonable ratio of 75:25, or three sheep to 1 goat, until 1990. However, in recent years, this traditional ratio, which is appropriate for herd structure and pasture utilisation, has been lost for more than 30 years. For example, the increase in the number of goats began in 1993 and, due to the rise in the price of cashmere, reached the same level as the number of sheep in 1994-2003. The number of goats exceeded the number of sheep in 2003-2009, and was equal to the number of sheep in 2009-2015, reaching a ratio of 50:50. The proportion of sheep and goats in small livestock is expected to reach a ratio of 52:48 in 2024.

Nationally, Arkhangai aimag leads in the number of horses and cattle, Umnugovi aimag in the number of camels, Uvurkhangai aimag in the number of sheep, and Bayankhongor aimag in the number of goats. According to the livestock census results, Khuvsgul aimag led with a total of 5.2 million heads of livestock, followed by Uvurkhangai aimag with 5.1 million heads, Tuv aimag with 4.2 million heads, Arkhangai aimag with 4.1 million heads, and Bayankhongor aimag with 4.0 million heads. The calving rate decreased by 9.9 percentage points from the previous year, for mares by 6.8 percentage points, for cows by 6.6 percentage points, for rams by 3.1 percentage points, for ewe sheep by 11.9 percentage points, and for female goats by 8.6 percentage points. The number of calves fattened in 2024 was 16.2 million, a decrease of 2.1 million heads or 11.4% from the previous year, and the growth rate was 85.1%, an increase of 4.4 percentage points from the previous year. By species, 89.9% of foals, 92.0% of calves, 95.2% of heifers, 84.4% of lambs, and 83.7% of heifers were grown.

Table 47. ORGANIZED PRODUCE, by type of progeny, at the end of each year, thousand head

Төлийн төрөл	Гарсан төл		Бойжуулсан төл		Төл бойжилтын хувь	
	2023	2024	2023	2024	2023	2024
Бүгд	**22 719.5**	**19 079.7**	**18 323.0**	**16 231.9**	**80.6**	**85.1**
Унага	1 093.7	1 044.7	950.0	938.8	86.9	89.9
Тугал	1 653.4	1 501.2	1 474.5	1 381.5	89.2	92.0
Ботго	79.5	75.6	75.3	72.0	94.8	95.2
Хурга	11 635.7	9 394.0	9 455.4	7 925.3	81.3	84.4
Ишиг	8 257.3	7 064.2	6 367.8	5 914.3	77.1	83.7

In 2024, 14.5 %of the first year's livestock, or 9.4 million large animals, were illegally slaughtered. Of the total slaughtered animals, 33.1 thousand (0.4%) were killed by disease. When considering the illegal slaughter of large animals by type, 5.0 million sheep, 3.0 million goats, 800.1 thousand cattle, 558.9 thousand horses, and 11.2 thousand camels were killed. Goats accounted for 31.6 %of the total slaughtered animals, and sheep accounted for 53.8 percent.

Table 48. LARGE ANIMALS KILLED, by species, at the end of each year

Малын төрөл	Хорогдсон том мал				Оны эхний малд том малын хорогдлын эзлэх хувь			
	2021	2022	2023	2024	2021	2022	2023	2024
	мянган толгой				хувь			
Дүн	**3 012.3**	**667.5**	**4 921.5**	**9 364.1**	**4.49**	**0.99**	**6.92**	**14.48**
Адуу	118.4	34.2	269.7	558.9	2.89	0.79	5.59	11.57
Үхэр	188.4	56.8	415.5	800.1	3.98	1.13	7.54	14.95
Тэмээ	22.2	2.0	8.8	11.2	4.70	0.43	1.88	2.37
Хонь	1 123.5	301.8	2 174.2	5 037.6	3.74	0.97	6.64	17.13
Ямаа	1 559.9	272.7	2 053.3	2 956.3	5.63	1.03	7.45	12.01

Large livestock mortality In 2024, 1.8 million (19.5%) animals were killed in Sukhbaatar aimag, 1.5 million (16.1%) in Khentii aimag, 993.3 thousand (10.6%) in Arkhangai aimag, 843.1 thousand

(9.0%) in Tsov aimag, and 682.7 (7.3%) thousand animals were killed in Dornogovi aimag, accounting for 62.5% of the total large livestock mortality.

Hay produced. In 2024, a total of 1577.4 thousand tons of hay were produced, an increase of 12.7 thousand tons or 0.8 %from the previous year. When considering prepared hay by aimag, Bayankhongor, Arkhangai, Dornogovi, Umnugovi, Uvurkhangai, Dornod, Dundgovi, Darkhan-Uul, Tuv, Selenge, and Khuvsgul aimags decreased from 725.3 tons to 39.8 thousand tons, or 1.1-39.1 %, while in other aimags and Ulaanbaatar city, it increased from 1.5 thousand tons to 52.4 thousand tons, or 4.7 %to 66.1 percent. With the transfer to sheep, the number of livestock per 100 hectares of hay and pasture area decreased by 7 heads in 2024, to 84 heads, or 7 heads from the previous year. This indicator is 1-1140 heads higher than the national average in Ulaanbaatar city, Orkhon, Darkhan-Uul, Bulgan, Arkhangai, Khuvsgul, Selenge, Uvurkhangai, Tuv, Khentii, Govisumber, and Bayan-Olgii aimags. Other aimags are 3-63 heads lower than the national average.

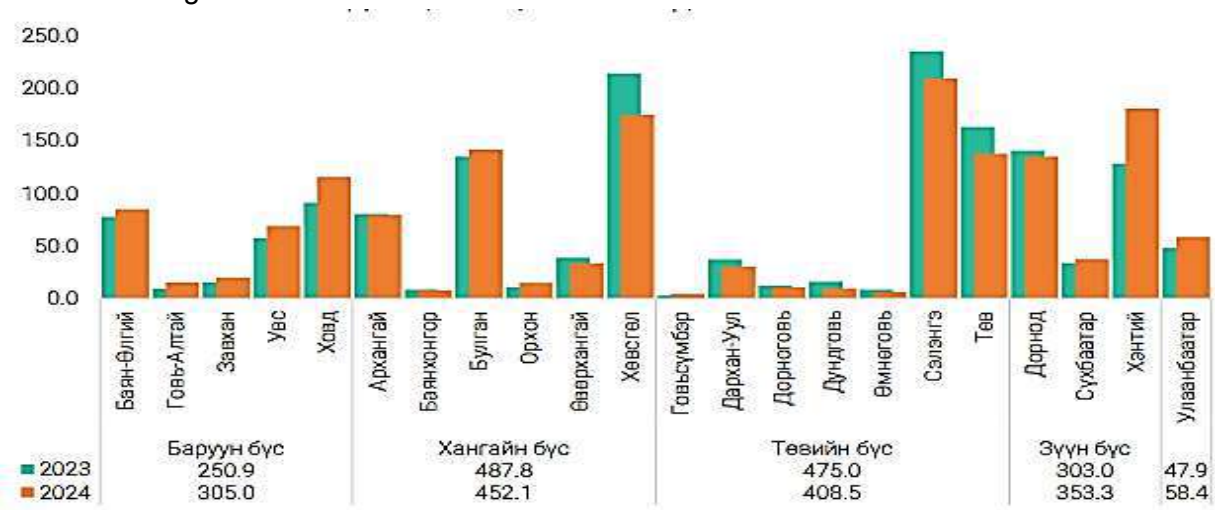


Figure 48. PREPARED FOOD, by province and capital city, thousand tons

Herder households. According to the national livestock census, 249.5 thousand households with livestock were included in the census, an increase of 1.6 thousand households or 0.6 %from the previous year. When livestock households are grouped by the number of livestock, households with up to 50 livestock increased by 13.0 %, households with 51-200 livestock increased by 4. 4 %, households with 201-500 livestock decreased by 4.7 %, households with 501-999 livestock decreased by 12.9 %, households with 1000-2000 livestock decreased by 28.3 %, and households with more than 2001 livestock decreased by 49.0 percent.

Table 49. GROUPING OF HOUSEHOLDS WITH LIVESTOCK, by livestock group, at the end of each year

	Малтай өрхийн тоо				Малтай нэг өрхөд ногдох малын толгой			
	2021	2022	2023	2024	2021	2022	2023	2024
Бүгд	**246 303**	**248 296**	**247 873**	**249 450**	**272**	**285**	**260**	**230**
50 хүртэлх малтай	53 577	52 748	56 706	64 084	24	24	24	23
51-200	85 086	83 751	85 947	89 734	118	119	118	116
201-500	67 035	67 316	66 407	63 275	320	322	321	319
501-999	29 857	32 332	29 959	26 094	683	687	680	674
1000-2000	10 195	11 519	8 460	6 062	1 218	1 226	1 208	1 189
2001-ээс дээш малтай	553	630	394	201	2 507	2 483	2 492	2 472

The number of livestock per household with livestock decreased by 30 animals or 11.5 %from the previous year to an average of 230 in 2024. There were 19 horses, 20 cows, 2 camels,

98 sheep, and 91 goats per household with livestock. The number of cattle per household with livestock decreased by 1, sheep by 21, and goats by 8, respectively, compared to the previous year, while the number of horses and camels remained unchanged.

According to the 2024 livestock census, 78.5 %or 195.7 thousand households with livestock are herding households, which herd their livestock throughout the four seasons of the year and serve as their source of livelihood. The number of herding households increased by 6.5 thousand or 3.4 %from the previous year. When herdsman households are grouped by the number of livestock, the number of households with up to 50 livestock increased by 25.1 %, the number of households with 51-200 livestock increased by 10.6 %, the number of households with 201-500 livestock decreased by 2.4 %, the number of households with 501-999 livestock decreased by 12.1 %, the number of households with 1000-2000 livestock decreased by 28.1 %, and the number of households with more than 2001 livestock decreased by 48.0 percent. The average number of livestock per herdsman household was 269 in 2024, a decrease of 40 livestock or 12.9 %from the previous year. There are 21 horses, 23 cows, 2 camels, 115 sheep, and 108 goats per herdsman household. The number of horses, cows, goats, and sheep per herding household decreased by 1, 10, and 28, respectively, compared to the previous year, while the number of camels remained unchanged.

Table 50. GROUPING OF LIVESTOCK HOUSEHOLDS, by livestock group, end of each year

	Малчин өрхийн тоо				Малчин нэг өрхөд ногдох малын толгой			
	2021	2022	2023	2024	2021	2022	2023	2024
Бүгд	**188 605**	**190 776**	**189 284**	**195 746**	**323**	**339**	**309**	**269**
50 хүртэлх малтай	26 916	26 411	28 605	35 771	27	26	26	26
51-200	62 588	61 224	63 814	70 556	122	122	121	119
201-500	59 637	59 902	59 137	57 733	323	326	324	321
501-999	28 894	31 256	28 993	25 486	684	688	681	675
1000-2000	10 034	11 365	8 352	6 001	1 217	1 225	1 207	1 188
2001-ээс дээш малтай	536	618	383	199	2 494	2 477	2 488	2 473

According to the results of the 2024 livestock census, 83.2% of herder households have an electricity generator, 75.5% have a television, 63.6% have a car, and 48.8% have a motorcycle. The number of households with an electricity generator in 2024 increased by 6.3 thousand (4.0%) from the previous year, the number of households with a television increased by 147.8 thousand (4.3%) of the prior year, the number of households with a car increased by 124.4 thousand (9.5%) from the previous year, and the number of households with a motorcycle increased by 2.1 thousand (2.3%) of the prior year.

According to the results of the 2024 livestock census, one in four employed people in our country, or 308.7 thousand herders, work in the livestock sector. The number of herders increased by 10.4 thousand or 3.5 %from the previous year. Of the total herders, 185.4 thousand or 60.1 %are male, and 123.3 thousand or 39.9 %are female. When the number of herders is considered by aimag, compared to the previous year, it decreased by 5-338 in Govisumber, Bayankhongor, Dornogovi, and Umnugovi aimags, while it increased by 27-1233 in other aimags.

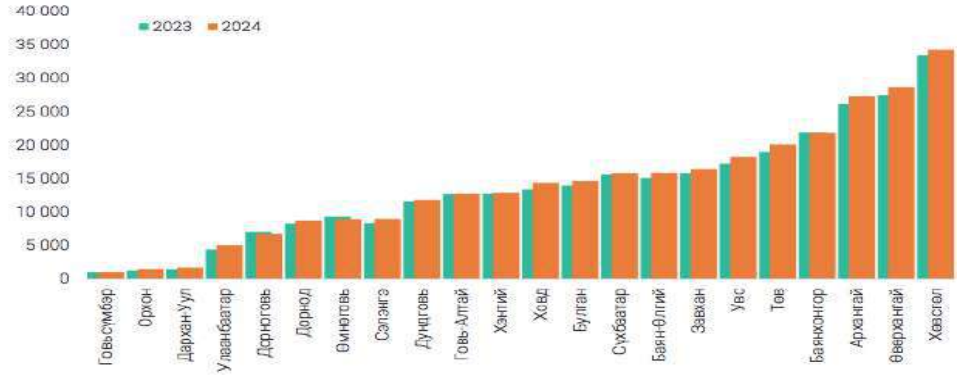


Figure 49. NUMBER OF LIVESTOCK, by province and capital city

When considering the total herders by age group, 5.6 %are under 24 years old, 18.9 %are 25-34 years old, 27.1 %are 35-44 years old, 27.2 %are 45-54 years old, 14.5 %are 55-64 years old, and 6.7 %are 65 years old and older.

Figure 50. LIVESTOCK INFORMATION, by age group, 2024

62.1 %of all herders, or 191.6 thousand herders, are covered by health insurance. 146.1 thousand herders, or 76.2 %, of the insured herders are aged 25-54. 53.5 %of all herders, or 165.1 thousand herders, have loans. Of the herders who have received loans, 17.7 %are 25-34 years old, 30.4 %are 35-44 years old, and 30.1 %are 45-54 years old.

4.2. Agriculture sector

In 2024, a total of 16.2 thousand households and 1.5 thousand enterprises and organizations operated in the agricultural sector. 38.4 %of agricultural households were in the Central region, 21.1 %in the Khangai region, 19.4 %in the Western region, 13.3 %in the Eastern region, and 7.8 %in Ulaanbaatar city. However, 51.2 %of agricultural enterprises and organizations were in the Central region, 22.4 %in the Khangai region, 13.6 %in the Western region, 9.3 %in the Eastern region, and 3.5 %in Ulaanbaatar city. In 2024, a total of 632.7 thousand hectares of land were cultivated nationwide, which is a decrease of 9.5 (1.5%) thousand hectares from the previous year.

Table 51. SOWED FIELDS, HARVESTED HARVESTS, PREPARED HAY

Төрөл	Тариалсан талбай, мянган га			Өөрчлөлт		Хураасан ургац, мянган тонн			Өөрчлөлт	
	2022	2023	2024	Дүн	Хувь	2022	2023	2024	Дүн	Хувь
Нийт	**618.6**	**642.2**	**632.7**	**-9.5**	**-1.5**	-	-	-	-	-
Үр тариа	385.1	363.1	354.4	-8.7	-2.4	428.6	470.3	443.2	-27.2	-5.8
Төмс	21.0	19.4	19.6	0.2	1.0	214.0	179.4	251.4	72.0	40.2
Хүнсний ногоо	14.2	15.8	20.2	4.4	28.1	148.9	208.4	282.3	73.9	35.5
Таримал тэжээл	73.5	106.9	100.8	-6.1	-5.7	171.2	258.2	259.2	1.0	0.4
Техникийн ургамал	124.1	136.9	132.4	-4.5	-3.3	49.2	55.4	59.4	4.0	7.3
Бэлтгэсэн өвс, хадлан	-	-	-	-	-	1 562.5	1 564.7	1 577.4	12.7	0.8

In the country, 354.4 (56.0%) thousand hectares of the total cultivated area were cultivated with cereals, 132.4 (20.9%) thousand hectares with technical crops, 100.8 (15.9%) thousand hectares with fodder crops, 20.2 (3.2%) thousand hectares with vegetables, and 19.6 (3.1%) thousand hectares with potatoes, respectively. Compared to the previous year, the area of cereals decreased by 8.7 (2.4%) thousand hectares, that of fodder crops by 6.1 (5.7%) thousand hectares, that of technical crops by 4.5 (3.3%) thousand hectares, and that of vegetables by 4.4 (28.1%) thousand hectares, and that of potatoes by 0.2 (1.0%) thousand hectares, respectively.

The total cultivated area in 2024 reached 632.7 thousand hectares, which is close to the level of 1990-1992. In the last 30 years, the lowest area under cultivation was 162.0 thousand hectares in 2006. Cereals accounted for 88.9 %of the total cultivated area on average from 1990 to 2007, but have decreased to 72.9 %in the last 17 years, from 2008 to 2024. This indicates that cereals remain the main agricultural product, but their share in the total area is decreasing, and the variety of vegetables, fodder crops, and technical plants is increasing.

The area under grain cultivation increased from 1.4 ha to 4.4 thousand ha or 1.9 %to 2.6 times in Bayankhongor, Bayan-Olgii, Gobi-Altai, Darkhan-Uul, Khovd, Uvurkhangai, Khuvsgul, Tuv, Khentii, and Selenge aimags from the previous year, while it decreased from 4.5 ha to 13.3 thousand ha or 0.6-98.4 %in other aimags and Ulaanbaatar city. The area under potato cultivation increased from 0.9 to 455.6 ha or 1.4-17.3 %in Dundgovi, Dornogovi, Khentii, Govisumber, Khuvsgul, Orkhon, Darkhan-Uul, Selenge, and Tuv aimags from the previous year, while it decreased from 1.4 to 158.8 ha or 2.5-48.6 %in other aimags and Ulaanbaatar city.

The area under vegetable cultivation decreased by 2.1-159.0 hectares or 1.7-39.8 %in Arkhangai, Umnugovi, Bayankhongor, Sukhbaatar, Dornogovi, Uvurkhangai, Khentii, Uvs, Zavkhan, Tuv aimags and Ulaanbaatar city from the previous year, and increased by 0.3 tons to 2.9 thousand hectares or 1.0-84.7 %in other aimags. Nationwide, in 2024, 443.2 thousand tons of grain, 251.4 thousand tons of potatoes, 282.3 thousand tons of vegetables, 259.2 thousand tons of fodder, 59.4 thousand tons of technical plants were harvested, and 1.6 million tons of hay and 58.5 thousand tons of fodder were prepared.

Compared to the previous year, harvested vegetables increased by 73.9 (35.5%) thousand tons, harvested potatoes by 72.0 (40.2%) thousand tons, harvested technical crops by 4.0 (7.3%) thousand tons, harvested fodder by 1.0 (0.4%) thousand tons, prepared hay and hay by 12.7 (0.8%) thousand tons, while harvested grains decreased by 27.2 (5.8%) thousand tons. Of the total harvested grains, 89.6 %were wheat, 8.0 %were oats, 2.1 %were barley, and 0.3 %were other grains. Harvested grains increased from 1.6 tons to 7.1 thousand tons, or 37.0%, in Dundgovi, Bayankhongor, Bayan-Olgii, Gobi-Altai, Khovd, Uvs, and Khentii aimags compared to the previous year. In contrast, other aimags and Ulaanbaatar city saw a decrease from 21.0 tons to 12.9 thousand tons, ranging from 0.3% to 95.2%. Harvested potatoes increased from 24.9 tons to 63.6 thousand tons or 1.2-63.0 %in Govisumber, Uvs, Zavkhan, Dornod, Khovd, Bayan-Olgii,

Orkhon, Bulgan, Darkhan-Uul, Selenge, and Tuv aimags from the previous year, while in other aimags and Ulaanbaatar city it decreased from 17.2 tons to 1.7 thousand tons or 5.0-54.0 percent.

Harvested vegetables increased from 24.8 tons to 63.7 thousand tons or 0.3-73.8 %in Govisumber, Dornod, Khovd, Arkhangai, Bayan-Ulgii, Uvs, Orkhon, Tuv, Darkhan-Uul, and Selenge aimags from the previous year, and decreased from 25.0 tons to 2.1 thousand tons or 3.7-49.8 %in other aimags and Ulaanbaatar city. Prepared grass and hay decreased from 725.3 tons to 39.8 thousand tons or 1.1-39.1 %in Bayankhongor, Arkhangai, Dornogovi, Umnugovi, Uvurkhangai, Dornod, Dundgovi, Darkhan-Uul, Tuv, Selenge, and Khuvsgul aimags from the previous year, but increased from 1.5-52.4 thousand tons or 4.7-66.1 %in other aimags and Ulaanbaatar city.

42.3 %of the harvested grain is in Selenge aimag, 23.2 %in Tuv aimag, 9.3 %in Bulgan aimag, 5.0 %in Khentii aimag, and 4.0 %in Khuvsgul aimag; 65.5 %of the harvested potatoes are in Tuv aimag, 17.3 %in Selenge aimag, 3.6 %in Khovd aimag, and 1.9 %in Darkhan-Uul aimag; 53.1 %of the harvested vegetables are in Selenge aimag, 14.5 %in Tuv aimag, 12.3 %in Darkhan-Uul aimag, and 6.4 %in Khovd aimag.

In 2024, the average yield of grain per hectare was 12.5 quintals and 128.2 quintals of potatoes, which is an increase of 35.8 (38.8%) quintals for potatoes compared to the previous year and 29.5 (29.9%) quintals higher than the multi-year average. However, the yield of grain per hectare decreased by 0.4 (3.5%) quintals and 2.4 (23.8%) quintals higher than the multi-year average. The yield of grain per hectare in 2024 is 1.3-28.0 quintals higher than the national average in Selenge, Bayankhongor, Ulaanbaatar city, Gobi-Altai, Tuv, Bayan-Olgii, Orkhon, and Dornogovi aimags, while in other aimags it is 0.9-11.1 quintals lower than the national average.

Table 52. AREA CROPPED, HARVESTED, by plant type, at the end of each year

Төрөл	Тариалсан талбай, мян.га				Хураасан ургац, мян.тн			
	2023	2024	Өөрчлөлт		2023	2024	Өөрчлөлт	
			Дүн	Хувь			Дүн	Хувь
Үр тариа	**363.1**	**354.4**	**-8.7**	**-2.4**	**470.3**	**443.2**	**-27.2**	**-5.8**
Улаан буудай	**335.8**	**317.7**	**-18.1**	**-5.4**	**443.4**	**397.3**	**-46.2**	**-10.4**
Арвай	5.0	8.8	3.8	75.9	6.5	9.1	2.6	39.8
Овьёос	18.9	24.5	5.7	30.0	18.8	35.6	16.8	89.4
Бусад үр тариа	3.4	3.3	-0.1	-2.1	1.6	1.2	-0.4	-26.2
Төмс	**19.4**	**19.6**	**0.2**	**1.0**	**179.4**	**251.4**	**72.0**	**40.2**
Хүнсний ногоо	**15.8**	**20.2**	**4.4**	**28.1**	**208.4**	**282.3**	**73.9**	**35.5**
Байцай	1.9	2.1	0.2	9.9	45.8	53.0	7.2	15.6
Лууван	3.8	4.7	0.9	23.3	53.9	83.5	29.6	55.0
Шар манжин	4.5	6.3	1.8	40.2	45.3	77.0	31.7	70.1
Хүрэн манжин	0.9	1.2	0.3	38.4	12.0	16.9	4.9	40.7
Сонгино	1.9	1.7	-0.2	-11.8	25.0	24.1	-0.9	-3.7
Сармис	0.4	0.3	0.0	-13.9	2.1	2.0	0.0	-0.5
Өргөст хэмх (урт)	0.4	0.4	0.0	-7.9	5.0	4.7	-0.3	-6.8
Өргөст хэмх (давжаа)	0.3	0.3	0.0	11.1	3.5	5.3	1.8	51.8
Улаан лооль	0.2	0.2	0.0	7.6	2.2	2.1	-0.1	-4.0
Тарвас, гуа	1.2	2.7	1.5	125.3	10.9	11.6	0.8	7.3
Бусад хүнсний ногоо	0.3	0.3	0.0	-5.7	2.8	2.0	-0.8	-27.6
Тарималь тэжээл	**106.9**	**100.8**	**-6.1**	**-5.7**	**258.2**	**259.2**	**1.0**	**0.4**
Ногоон тэжээл	97.3	89.5	-7.8	-8.1	243.3	236.8	-6.5	-2.7
Олон наст	3.5	3.4	-0.2	-4.5	9.6	8.2	-1.4	-15.0
Даршны ургамал	5.1	4.6	-0.5	-9.2	4.2	11.5	7.3	173.3
Бусад тарималь тэжээл	1.0	3.3	2.4	242.8	1.1	2.6	1.6	149.1
Техникийн ургамал	**136.9**	**132.4**	**-4.5**	**-3.3**	**55.4**	**59.4**	**4.0**	**7.3**
Рапс	134.4	131.2	-3.2	-2.4	55.3	59.4	4.1	7.4
Бусад техникийн ургамал	2.5	1.2	-1.3	-52.5	0.1	0.1	-0.1	-51.8

4.3. Industrial sector

The total production of the industrial sector nationwide is estimated to reach 32.2 trillion tugriks in 2024, an increase of 1.5 (5.0%) trillion tugriks compared to the same period of the previous year. This was mainly due to an increase in mining by 1.2 (5.7%) trillion tugriks and an increase in the electricity, gas, steam and air conditioning sector by 191.2 (10.2%) billion tugriks.

Table 53. PRODUCTION AND SALES OF THE INDUSTRY SECTOR, by sector, at the end of each year, in billion tugriks

Салбар	Үйлдвэрлэл			Борлуулалт			Өөрчлөлт %	
	2022	2023	2024*	2022	2023	2024*	Үйлд	Бор
Нийт дүн	21 096.5	30 671.9	32 202.6	30 836.8	47 340.8	50 449.1	5.0	6.6
Уул уурхай, олборлох аж үйлдвэр	14 330.7	21 602.4	22 833.1	22 633.1	36 706.0	39 444.7	5.7	7.5
Боловсруулах аж үйлдвэр	5 095.1	6 965.9	7 028.6	6 526.4	8 520.3	8 655.0	0.9	1.6
Цахилгаан хий, уур, агааржуулалт	1 476.4	1 876.1	2 067.3	1 477.9	1 878.9	2 064.4	10.2	9.9
Ус хангамж, сувагжилтын систем	194.3	227.5	273.5	199.3	235.7	285.0	20.2	20.9

*Урьдчилсан гүйцэтгэл

The total output of the mining and extractive industries sector is estimated at 22.8 trillion tugriks in 2024, an increase of 1.2 (5.7%) trillion tugriks compared to the same period of the

previous year, mainly due to an increase in hard coal and lignite mining by 834.7 (8.8%) billion tugriks, and metal ore mining by 509.1 (4.9%) billion tugriks, respectively. In the mining and extractive industries sector, the physical volume of copper concentrates by metal content, enriched coal, hard coal, iron ore, lignite, zinc concentrate, fluorspar, and iron ore concentrate increased by 12.0 - 50.6 %compared to the same period of the previous year, while silver concentrate, oil, unrefined gold, and fluorspar concentrate decreased by 5.0 - 32.5 percent. In the manufacturing sector, the physical production of key products such as lime, coal briquettes, liquid milk, water, juice drinks, livestock, cement, and white alcohol increased by 0.6 to 15.1 percent. However, the production of key products such as pure alcohol, metal billets, flour, cigarettes, cashmere knitwear, cathode copper, and combed cashmere decreased by 4.2 to 46.3 percent.

Table 54. PRODUCTION OF MAIN TYPES OF PRODUCTS IN THE INDUSTRY, in thousand tons

Бүтээгдэхүүн	2023		2024*		Өөрчлөлт	
	XII	I-XII	XII	I-XII	дүн	хувь
Уул уурхай, олборлох аж үйлдвэр						
Чулуун нүүрс	7 235	69 699	5 701	82 575	12 876	18.5
Хүрэн нүүрс	1 230	11 606	2 025	15 146	3 541	30.5
Баяжуулсан нүүрс	444	6 979	583	8 042	1 062	15.2
Газрын тос, мянган баррел	388	4 889	345	4 188	- 701	-14.3
Зэсийн баяжмал, металл агуулгаараа	105	1 395	167	1 562	167	12.0
Цэвэршүүлээгүй алт, кг	982	14 855	830	12 595	-2 260	-15.2
Төмрийн хүдэр	337	5 335	536	6 642	1 307	24.5
Төмрийн хүдрийн баяжмал	90	2 304	216	3 470	1 166	50.6
Хайлуур жонш	32	304	67	431	127	41.8
Хайлуур жоншны баяжмал	29	188	14	127	- 61	-32.5
Цайрын баяжмал	41	403	54	552	149	37.0
Мөнгөний баяжмал, тонн	1 084	16 454	853	15 637	- 817	-5.0
Боловсруулах аж үйлдвэр						
Малын мах, тонн	8 994	49 491	6 786	54 453	4 961	10.0
Шингэн сүү, мянган литр	4 769	54 400	5 781	59 576	5 175	9.5
Гурил, тонн	21 568	191 346	13 141	144 366	-46 979	-24.6
Цэвэр спирт, мянган литр	883	11 040	752	10 575	- 465	-4.2
Цагаан архи, мянган литр	3 350	27 230	2 117	31 332	4 102	15.1
Ус, ундаа, жүүс, мянган литр	32 984	408 858	36 987	448 942	40 084	9.8
Янжуур тамхи, мянган блок	265	3 206	368	2 403	- 803	-25.0
Ноолууран сүлжмэл эдлэл, мянган ширхэг	60	495	37	368	- 127	-25.7
Самнасан ноолуур, тонн	114	1 166	35	626	- 540	-46.3
Нүүрсэн шахмал түлш	59	505	66	511	7	1.3
Цемент	37	1 714	66	1 895	181	10.6
Шохой, тонн	4 394	58 815	6 395	59 146	331	0.6
Катодын зэс, тонн	734	9 661	730	6 976	-2 685	-27.8
Металл бэлдэц, тонн	3 778	37 681	3 236	35 987	-1 693	-4.5

*Урьдчилсан гүйцэтгэл

The sales of industrial products in 2024 amounted to 50.4 trillion tugriks according to preliminary results, an increase of 3.1 (6.6%) trillion tugriks compared to the same period of the previous year. This was mainly due to an increase in sales of the mining and extraction sector by 2.7 (7.5%) trillion tugriks, and sales of the electricity, steam, and air conditioning sector by 185.5 (9.9%) billion tugriks. The increase in sales of the mining and extraction industry sector by 2.7 (7.5%) trillion tugriks compared to the same period of the previous year was mainly due to an increase in metal ore mining by 1.8 (13.8%) trillion tugriks, coal mining by 996.5 (4.6%) billion tugriks, and other mineral mining by 78.6 (16.8%) billion tugriks. In the foreign market, sales of 36.2 trillion tugriks according to preliminary results in 2024, 34.9 trillion tugriks were accounted

for by the mining and extraction sector. The coal mining sector accounted for 60.0 %of foreign sales of mining products, the metal ore mining sector for 35.6 %, the oil mining sector for 3.1 %, and the other mineral mining sector for 1.3 percent.

The industrial production index (seasonally adjusted) was 260.0 (2015=100) in December 2024, down 6.6 %from the same period last year.

4.4. Tourism sector

Mongolia's unique natural and cultural heritage sites are an important factor in ensuring economic growth and diversification, improving the livelihoods of citizens, and are the basis for sustainable development of the tourism sector. In this sense, the competitive advantage of Mongolia's tourism sector in the relevant market is its pristine nature and nomadic lifestyle, which are not found anywhere else in the world.

The Government of Mongolia has declared 2023-2028 as the "Visit Mongolia Year", while Goal 8.2 of Mongolia's development policy "Vision 2050" states that "Develop tourism in regions and localities based on leading economic sectors and locational advantages." The stages of implementation of this goal and the results to be achieved are defined as follows.

Including:

- Phase I (2021-2030): Development phase.

Regional development of tourism based on ecology, archaeology, paleontology, nomadic heritage, history, culture, recreational resources, and local communities will be carried out. In promising settlements, agricultural production and technology parks suitable for regional characteristics and nomadic livestock farming will be established in stages, along with a supply chain.

The Government of Mongolia announced 2023-2028 as the Visit Mongolia Year, which will allow the tourism sector (TS) to receive 651 thousand tourists in 2023 and generate $1.3 billion in revenue for the state budget, while the goal of receiving one million tourists in Mongolia by 2024 has been set. In this context, the following measures have been taken to strengthen the tourism sector. These include:

13 billion tugriks were allocated from the state budget to the TS and a total of 55 billion tugriks in soft loans were provided to support enterprises operating in the tourism sector. This has greatly supported the improvement of tourist accommodation services at tourist camps and the resolution of sanitation issues.

As part of the development of tourism infrastructure, Mongolia has set a goal to attract countries with five time zones, which has created the opportunity to operate direct flights with Korea, Japan, China, Russia, and Turkey.

In order to develop the First Strategy in the sector, the Ministry of Culture, Sports, Tourism, and Youth, the Mongolian Association of Tourism Professionals, and the international "Boston Consulting Group" have signed a trilateral agreement to work together. This agreement will be aimed at expanding public-private cooperation in the sector, increasing tourist flows, reducing the seasonality of the Mongolian tourism sector, and developing and providing recommendations and support for solving the challenges faced by tourists traveling to the Mongolian Republic.

If we examine the international projects and programs implemented in the MFA and the policy documents developed within this framework, it is important to note that in 2011, the Asian Development Bank implemented the project “Strengthening the Management of Natural and Cultural Heritage Assets” as part of its policy to expand tourism in the MFA and ensure further economic development. The document provides recommendations to focus on the following policy issues: It includes:

It provides valuable recommendations to guide decision-makers in improving the management of Mongolia’s unique natural and cultural heritage sites (HHCs), increasing economic opportunities, especially for local communities, and developing a sustainable tourism industry. For example, the document (68640) states that “The majority of foreign tourists come to Mongolia to experience the natural beauty, vast landscapes, nomadic lifestyles, and wildlife. However, due to poor management, a few key HHC sites in Mongolia are being overrun by humans and vehicles, while many other scenic spots remain inaccessible and unused.

The rapid construction of numerous tourist resorts without any planning is leading to the loss of the tourist attractions of the most popular sites, such as Terelj and Khuvsgul Lake. There are no formal plans for the provision of necessary services and routes, and waste management is inadequate in many areas.

In addition, there are direct threats from mining development, logging, and other extractive activities, and the law "Many species of flora and fauna and cultural treasures are being lost due to illegal trade. The root of all these problems is the lack of development planning, infrastructure management of tourist flows, and the inadequate distribution of economic activities and mitigation of negative consequences." Mongolia's unique natural and cultural heritage sites (HCS) are a solid foundation for the sustainable development of the tourism industry, which is an important factor in ensuring economic growth, diversifying it, and improving the livelihoods of citizens. However, many HCS are vulnerable to economic interests and uncontrolled exploitation, and lack proper management.

Tourist camps are clustered in a few well-known complexes, their number is increasing rapidly, and they are detracting from the beauty of natural parks, while some of the beautiful places that attract tourists are still undeveloped. Some of the policies of the BSCs are unclear, lack of strict supervision, and weak financial and human and technical capacities, which limit the effectiveness of management. All these conditions do not encourage agencies and local communities to protect the parks for long-term sustainable use. International experience has been successfully used to identify and protect the parks by involving local communities in the protection of parks.

Mongolia's competitive advantage is its pristine nature and nomadic lifestyle, which are difficult to find anywhere else in the world. Among the unique natural attractions that attract foreign tourists are the Gobi and Khuvsgul lakes, as well as endemic and rare plants and animals (tul fish, tamarins, leopards, etc.), as well as a large number of well-preserved paleontological finds. There are several obstacles that affect the rapid development of the tourism sector. The harsh weather, the short tourist season, generally concentrated in June, July, and August,

Despite the relatively short tourist season in Mongolia, the number of tourists visiting Mongolia has been steadily increasing over the past decade. From 2000 to 2007, the number of tourists visiting Mongolia increased by about 15 %per year. Tourism remains the third largest source of foreign exchange. According to the World Tourism Council, the direct contribution of tourism to total GDP in 2010 is expected to reach 233 million US dollars, or 3.3 %of GDP. The total tourism economy (direct and indirect economic impact) is estimated to be approximately 8.9 %of total GDP, or approximately US$635 million. The sector directly supports 29,000 jobs (2.5 %of total employment) and indirectly supports 81,000 jobs (7.1 %of total employment).

There is potential for direct linkages to national economic development, but there are currently many challenges. Government policies do not support the redistribution of tourism revenues to

local economic and social welfare, and protected areas and special protection areas are still managed centrally rather than locally.

Another challenge is that the current supply chain structure of the tourism sector lacks local linkages between the economy and services (guide services, horse rentals, etc.) and between sectors (food services, local suppliers, etc.).

The current tourism tax system is concentrated in the capital city. Although tourism activities take place outside Ulaanbaatar, tourism-related taxes are paid by service providers in the city. Many ger camps and local restaurants are registered in Ulaanbaatar and the revenue from the taxes they pay is not distributed to the regions or places where tourism activities take place.

Strengthening the management of BSCs and ensuring that local communities benefit from tourism revenues is a potential way to decentralize Ulaanbaatar. The Asian Development Bank's "Strengthening the Management of Natural and Cultural Heritage" project provides the following recommendations: "The issue of modern tourism policy and legislation in Mongolia is of great importance. There is no unified position between government officials and private sector experts on tourism development. If a strategic document for tourism development (master plan or national strategy) is developed with the participation of government and private sector representatives, this will serve as a unified goal to ensure sustainable development of the sector.

The tax and assessment network needs to be supported by policy. It would be useful to conduct a detailed study to identify the exact problems and their appropriate solutions. In the case of taxes, it is important to examine what policy options are available to improve the collection of taxes locally, retain an appropriate share there, and allocate them from state funds.

Service culture and other professional skills can be improved through specialized training. There is a need to improve the business plans and management of local entrepreneurs and small service enterprises. Programs can be implemented in cooperation with educational institutions with professional trainers.

Local facilities and service providers have limited financial resources to ensure the growth and improvement of their activities. Having a mechanism for easy and affordable access to financial resources will allow small and medium-sized tourism businesses, in particular, to have the necessary investment resources at the beginning of the season and to improve their facilities and services.

Developing management plans and creating appropriate infrastructure to receive tourists in and around cultural and natural complexes is a crucial issue for the protection of cultural and natural heritage assets.

In order to improve the management of complexes, it is worth considering the implementation of concessions to the private sector. The management of infrastructure facilities in natural and cultural complexes and their surroundings

Tourist camps are unplanned, uninhabited Including:

- Mongolian State Festival
- Playtam
- Ulaanbaatar Winter Festival
- "Khiimori" Horse Archery and Horse Fighting Festival
- Sheep Festival
- Talyn Tumen Aduu
- Tumen Camel Festival
- "Khukh Suvd" - Khuvsgul Ice Festival
- "Golden Eagle- 2 Eagles Festival
- Western Mongolia Traditional Arts Festival

The capital of Mongolia, Ulaanbaatar, is located in the centre of the country and has relatively good infrastructure, such as communications, roads, and railways.

In Tuv aimag, which is the closest 45 km to the capital, there are 7 fantastic tourist attractions, including the ruins of the Manjushir Monastery, the Khustai National Park, the Gunji Temple, Zorgol Khairkhan Mountain, the equestrian statue of Genghis Khan, the inscription on the illuminated statue of Tonyukuk, and the rock inscription of the song of Prince Tsogt, which are valuable historical, cultural, and tourist heritage and contribute significantly to the development of regional and local economic development. Tourists regularly travel from Ulaanbaatar on the following routes every year, which are recognised as travel routes by the United Nations. These include:

- Zuunmod - Manzushir Monastery - Natural Museum - Seruun Lavrin (7km).
- Zuunmod - Terelj - Melkhiy Khad (63km) - Tsonzhinboldog (30km) - XIII century complex (31km) - Gunji Temple (96km) - Zuunmod (105km). Total 324km.
- Zuunmod - Tonyukuk Monument (42km) - Tsogtchandman Mountain - Janchivlang Spring (24km) - Zuunmod (66km). Total 132km.
- Zuunmod - Khoolt Pass (23km) - Khentii Range Branch - Nagalkhan Mountain Pass (108km) - Zuunmod (66km) Total 253km.
- Zuunmod - Nalaikh (34km) - Terelj (25km) - Khagiin Khar Nuur (110km) - Yestiin Spa (40km) - Zuunmod (210km). Total 420km, 4-5 days
- Zuunmod - Khustain National Park, Ongatin Bel Complex (51km), - Lun sum, museum, Enkhdaajin (107km) – Erdenesant sum Bathaan Uul BNG (86km) - Zuunmod (261km). Total 505km, 5-7 days
- Zuunmod - Bayan-Onjul Zorgolkhairkhan (131km) - Buren (95km) - Delgerkhaan sum Kulchurn Helt Statue, Tsogtyn Duut Khad (54km) - Zuunmod (246km). Total 526km, 5-7 days
- Zuunmod - Bayankhangai (153km) - Avdrant road, Enkhin Els (30km) - Tavangi Els (20km) – Lun sum (30km) - Zaamar (56km) - Sumber (120km) – Bornuur sum Aglag Tshering Monastery, Museum of Strange Things, Yol Khad (70km) – Batsumber sum, Noyon Uul Tomb (44km) – Jargalant sum (79km) – Ulaanbaatar (128km) – Zuunmod (43km). Total 765km, 7 days
- Zuunmod - Bayan (78km) – Bayanjargalan (63km) – Booroljutiin Spa (42km) – Zuunmod (141km). Total 324km 2-3 days
- Zuunmod - Kherlen Bayan Ulaan (161km) – Khudeu Aral (19km) – Zuunmod (180km). Total 360km, 3-4 days
- Zuunmod - Avdarkhangai Mountain, Ee Khad (65km) – Ulziit Lake (52km) – Zuunmod (117km). Total 224km 3-4 days
- Ulaanbaatar – Zuunmod (43km) – Manzushir Monastery (7km) – Khustai National Park (138km) – Ongat Monument (22km) – Zorgolkhairkhan Mountain (134km) – Zuunmod (131km). Total 475km, 5-6 days
- Zuunmod - Tonyukuk Light Statue (40km) – Tsonjinboldog (33km) – Terelj, Melkhiy Khad, Aryaabalyn Temple (33km) – Gunjiy Temple (35km) – Zuunmod (105km) Total 245km, 2-3 days
- Tourism statistics. In 2024, 7,179.2 (doubled) thousand passengers crossed the Mongolian border, an increase of 1,844.3% (34.6%) thousand compared to the previous year. In 2024, 3,576.6 thousand passengers crossed the state border, of which 34.0 %entered through Zamyn-Uud, 25.9 %through Chinggis Khaan, 9.6 %through Altanbulag, 8.9 %through Gashuun Sukhait, 5.2 %through Shivee Khorun, and 16.4 %through other ports.

Of the passengers who entered the state border, 2,722.8 (76.1%) thousand were Mongolian citizens, and 853.8 (23.9%) thousand were foreign citizens. The number of Mongolian citizens who entered the state border increased by 714.0 (35.5%) thousand and foreign citizens by 209.8 (32.6%) thousand compared to the previous year. Of the foreign passengers who entered the state border, 516.6 (60.5%) thousand were men, and 337.2 (39.5%) thousand were women. Of the foreign passengers who entered the state border in 2024, 764.0 (89.5%) thousand stayed for up to 30 days, 2.4 (0.3%) thousand stayed for more than 60 days, 9.1 (1.0%) thousand stayed for up to 90 days, and 78.3 (9.2%) thousand stayed for more than 90 days.

Of the foreign passengers who entered the country, 63.3 %came from East Asia and the Pacific region, 32.1 %from Europe, 2.5 %from the Americas, 1.2 %from the Middle East, 0.7 %from South Asia, and 0.2 %from Africa. Of the foreign passengers who entered the country, 29.6 %were Chinese citizens, 26.2 %were Russian citizens, 22.6 %were South Korean citizens, 3.1 %were Japanese citizens, 2.9 %were Kazakh citizens, 2.1 %were US citizens, and 13.5 %were citizens of other countries. Compared to the previous year, the number of tourists entering the country increased by 68.0 (62.5%) thousand from China, 35.8 (25.6%) thousand from South Korea, 5.2 (26.5%) thousand from Japan, 3.4 (16.4%) thousand from Kazakhstan, and 6.5 (2.3 times more) thousand from Taiwan. The number of citizens traveling abroad from Mongolia reached 2,752.8 thousand in 2024, an increase of 709.7 (34.7%) thousand people compared to the previous year, mainly due to the increase in the number of citizens traveling to China by 607.4 (42.9%) thousand people, Russia by 45.4 (17.2%), the Republic of Korea by 22.3 (15.1%), and Japan by 8.2 (20.9%) thousand people.
Of the Mongolian citizens traveling abroad, 1,719.3 (62.5%) thousand were men and 1,033.5 (37.5%) thousand were women. Of these, 2,650.1 (96.3%) thousand traveled abroad for up to 30 days, 4.2 (0.2%) thousand for more than 60 days, 11.8 (0.4%) thousand for up to 90 days, and 86.7 (3.1%) thousand for more than 90 days.

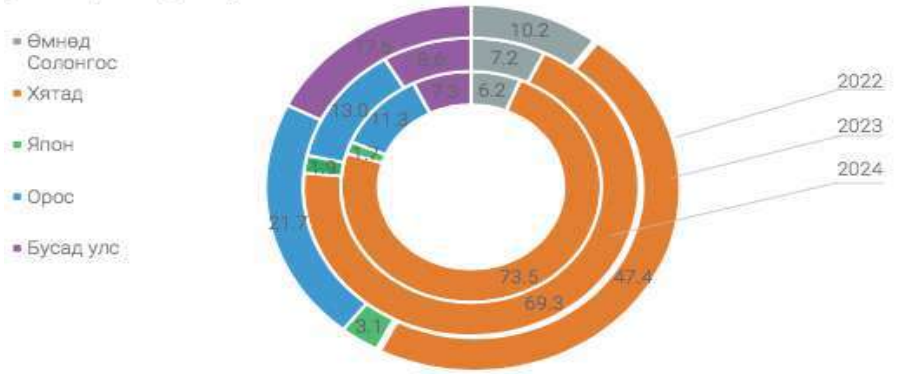


Figure 51. Mongolian citizens traveling abroad

In 2024, a total of 4,030.5 thousand vehicles were imported across the Mongolian border, an increase of 1,048.8 (35.2%) thousand compared to the previous year. Of these, 42.3 %were trucks, 21.0 %were freight wagons, 17.8 %were passenger cars, and 18.9 %were other vehicles. 33.7 %of the total vehicles entered through Zamyn-Yud, 22.1 %through Gashuunsukhait, 12.0 %through Shiveekhuren, 7.5 %through Altanbulag, and 24.7 %through other ports.

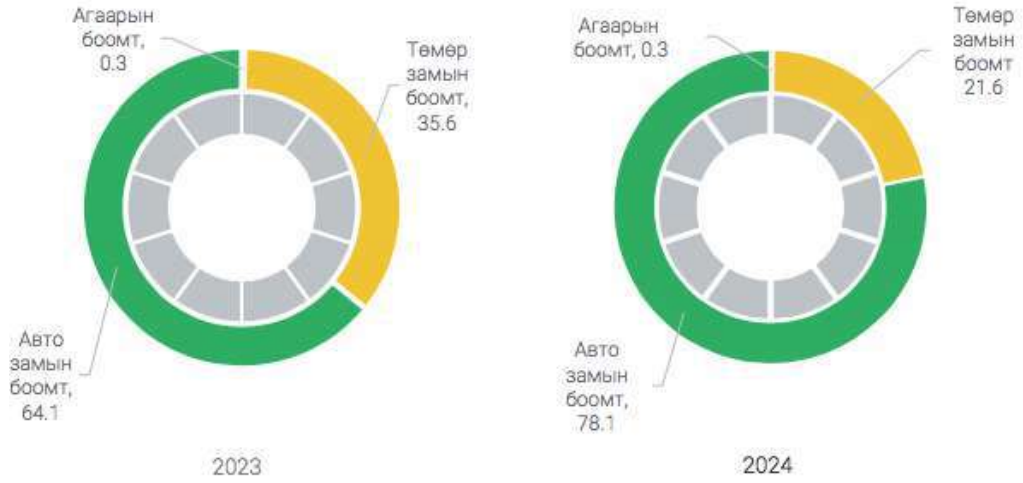


Figure 52. VEHICLES ENTERING THE BORDER OF MONGOLIA, as of year-end, percentage of total, 2023, 2024

4.5. Surrounding environment

Weather and hazardous events. In Mongolia, 5,118 hazardous events and accidents were recorded in 2024, an increase of 634 (14.1%) from the previous year.

A total of 6,628 people were affected by hazardous events and accidents in 2024. Damages due to hazardous events and accidents amounted to 41.7 billion tugriks in 2024.

Table 55. DANGEROUS INCIDENTS, ACCIDENTS, at the end of each year

Indicator	2021	2022	2023	2024	Өөрчлөлт	
					дүн	хувь
Dangerous phenomena and accidents	4053	4299	4484	5118	634	14.1
Number of people who lost their lives	319	247	320	336	16	5.0
Damage caused, billion tugriks	26.3	35.1	53.0	41.7	-11.3	-21.4

*Excluding the number of coronavirus cases and related costs

Figure 53. HAZARDOUS INCIDENTS, ACCIDENTS, by type at the end of each year

Weather. The average annual air temperature at stations located in the capital, provincial centers, and major soums in 2024 was 2.4ºC, which was 1.3ºC warmer than the long-term average (LMA). In Mongolia, the coldest annual average temperature in 2024 was -3.0ºC in Tosontsengel soum of Zavkhan aimag, -4.2ºC colder than the LMA, while the warmest was 8.8ºC in Khanbogd soum of Umnugovi aimag, 7.5ºC warmer than the LMA.

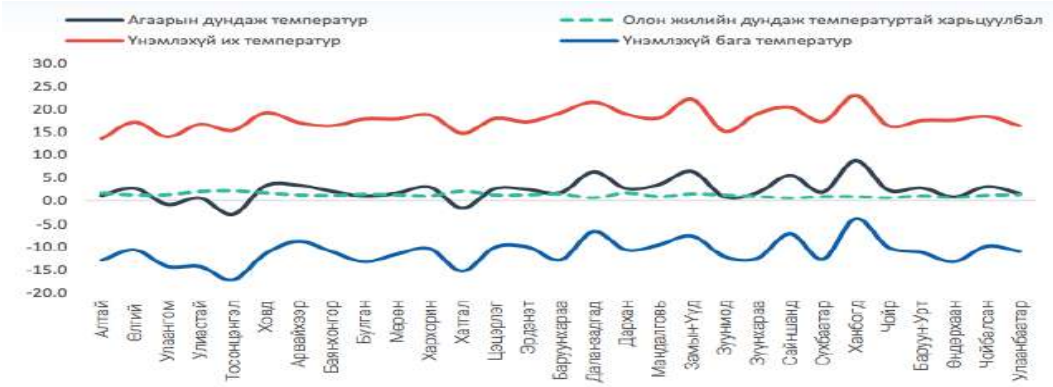


Figure 54. AVERAGE AIR TEMPERATURE, by station location, 2024

Air quality. The average concentration of sulfur dioxide in the air of Ulaanbaatar city exceeded the permissible concentration by 0.005-0.102 mg/m3 in January, February, March, November, and December 2024, the average concentration of nitrogen dioxide exceeded the permissible concentration by 0.007-0.022 mg/m3 in January, February, and December 2024, the average concentration of PM 10 particles exceeded the permissible concentration by 0.004-0.032 mg/m3 in January, February, November, and December 2024, and the average concentration of PM 2.5 particles exceeded the permissible concentration by 0.031-0.064 mg/m3 in January, February, and December 2024, respectively.

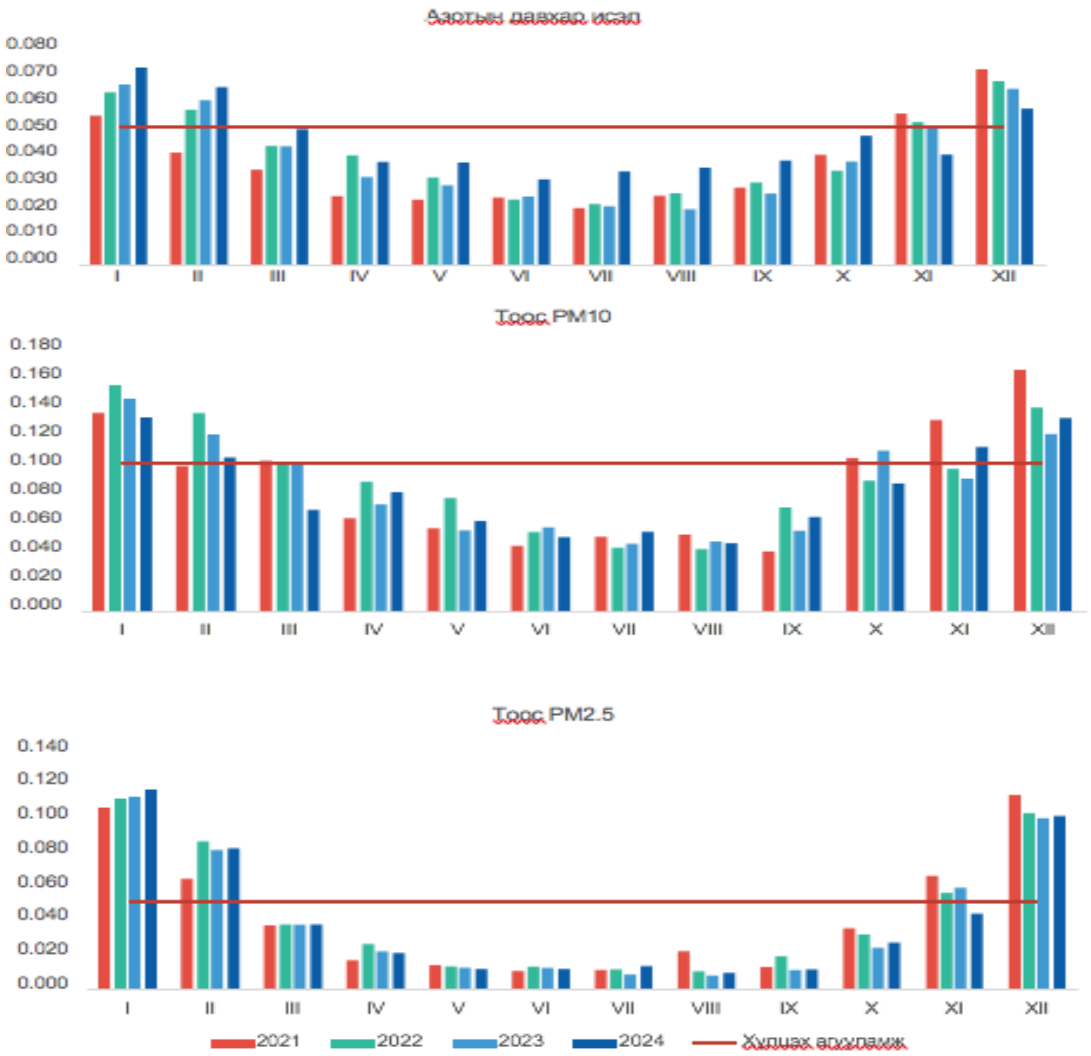


Figure 55. AVERAGE CONTENT OF POLLUTANTS IN THE AIR OF ULAANBAATAR CITY, by type, 2024

CHAPTER 5. ROADS AND TRANSPORTATION SECTOR

In order to analyze the current state of development of the road and transport sector, the “Road Transport Statistics Bulletin” published annually by the Ministry of Road Transport Development and the relevant data and information from the National Statistics Committee’s website www.1212mn were used as sources in this section of the report.

5.1. Transport Sector

The transport sector transported a total of 131.1 million tons of cargo in 2024 by all types of transport, an increase of 22.1% from the previous year. In addition, freight turnover increased by 15.2% from 29,512.7 million ton-km in 2023 to 33,992.8 million ton-km in 2024.

5.1.1. Freight transport .

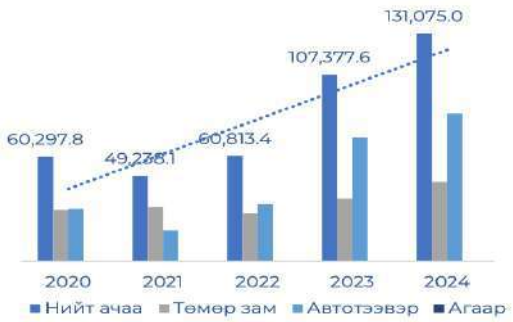
64.9% of total freight transport is accounted for by road transport, 35.0% by railway transport, and 0.01% by air transport.

Road freight increased by 19.5% from the previous year to 85.2 million tons, railway freight increased by 27.1% from the previous year to 45.9 million tons, and air freight increased by 21.2% from the previous year to 10.4 thousand tons.

Of the total freight transported in 2024, 90.5% or 118.6 million tons were mining products, 5.1 million tons or 3.9% were construction products, 1.5 million tons or 1.1% were food and

agricultural products, and 5.9 million tons or 4.5% were other sectors. Of this, 96.2% of freight transported by road and 80.0% of freight transported by rail were mining products.
Interstate freight transport increased from 86.0 million tons in 2023 to 80.1% of total freight transport, and increased from 100.6 million tons in 2024 to 76.7% of total freight transport. Of this, export freight accounted for 71.5% of total freight transport, and increased by 18.0% from the previous year to 93.7 million tons in 2024. Import freight, on the other hand, increased by 3.7% from the previous year to 6.9 million tons.
Domestic freight increased by 54.9% from the previous year to 25.2 million tons in 2024, and rail transit increased by 4% from the previous year to 5.3 million tons.

Of the interstate freight transported in the reporting year, 96.5% entered and exited through ports bordering China and 3.5% through ports bordering Russia. 96.3% of cargo transported with China is export cargo, while 92.8% of cargo transported with Russia is import cargo.



Тээврийн төрөл	2019	2020	2021	2022	2023	2024
Нийт тээсэн ачаа, мянган тонн	**68,997.5**	**60,297.8**	**49,238.1**	**60,813.4**	**107,377.6**	**131,075.0**
Төмөр зам	28,143.0	29,840.1	31,261.4	27,724.9	36,114.1	45,899.1
Автотээвэр	40,848.8	30,455.0	17,970.3	33,075.6	71,254.9	85,165.5
Агаарын тээвэр	5.8	2.7	6.4	12.9	8.6	10.4
Нийт ачаа эргэлт, сая тн.км	**23,601.8**	**23,861.0**	**20,674.6**	**17,534.1**	**29,512.7**	**33,992.8**
Төмөр зам	17,384.1	19,167.6	18,345.1	14,910.2	18,869.3	21,217.6
Автотээвэр	6,203.8	4,685.3	2,313.9	2,591.9	10,619.1	12,746.1
Агаарын тээвэр	13.9	8.1	15.6	32.0	24.3	29.0

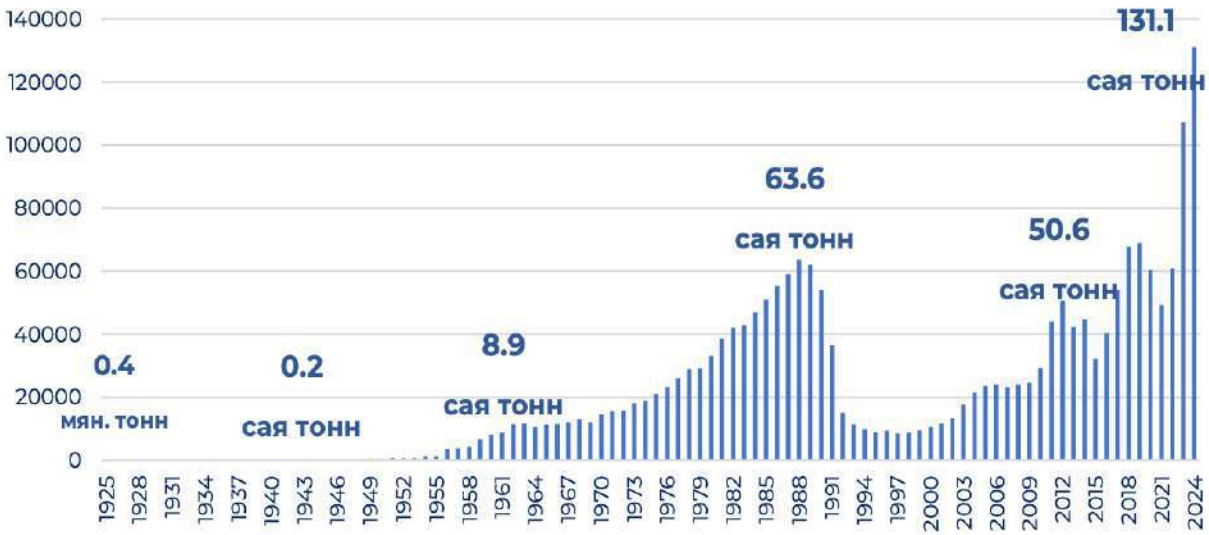


Figure 56. TOTAL CARGO, thousand tons, by type of transport, year

The total cargo transported by all modes of transport in 2024, as well as the volume of cargo transported by road and rail, reached historical highs.
Compared to the average annual figures for 2019-2022, the total cargo transported is 88.9% higher, the cargo transported by road is 2.2 times higher, and the cargo transported by rail is 49.8% higher.

Figure 57. Changes in freight transport and the share of the transport sector

In 2023, road transport accounted for 66.36% of total freight transport, rail transport for 33.63%, and air transport for 0.01%, respectively. In 2024, road transport accounted for 64.9%, rail transport for 35%, and air transport for 0.01%.

In 2024, total freight turnover was 33,992.8 million tkm, an increase of 44.0% from the level in 2019 and an increase of 15.2% from the previous year. Road transport freight turnover was 12,746.1 million tkm in 2024, an increase of 20% from the prior year and 2 times compared to 2019. Railway freight turnover remains the highest in total freight turnover. In 2024, it reached 21,217.6 million ton-km, an increase of 12.4% from the previous year and 22.1% from the 2019 level. Air freight turnover reached 29.0 million ton-km, an increase of 2.1 times compared to 2019 and 19.3% from the previous year.

Transport indicators, measured in ton-km transported, also showed growth in all sectors. Compared to the previous year, railway transport showed the highest increase, or 2,336.7 million ton-km, while the air transport sector showed the highest growth rate.

The increase in freight volume was mainly due to the rise in mining extraction by 50% and total exports by 21%. In 2024, a total of 131.1 million tons of cargo were transported, of which 118.6 million tons or 90.5% were mining sector products, 5.1 million tons or 3.9% were construction sector products, 1.5 million tons or 1.1% were food and agricultural sector products, and 5.9 million tons or 4.5% were cargo from other sectors.

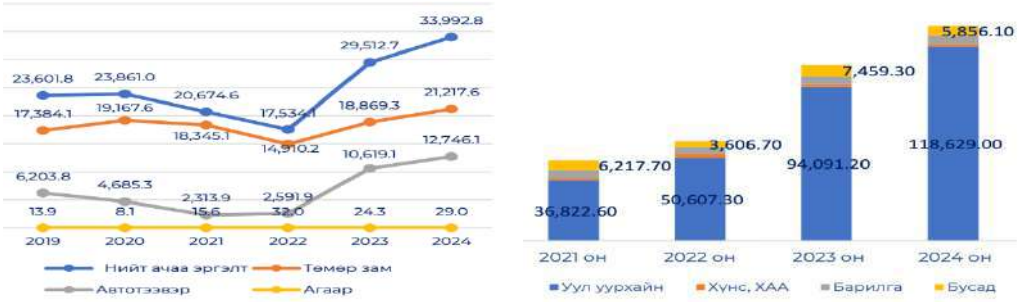


Figure 58. CARGO TURNOVER, CARGO TRANSPORT, by economic sector, million ton.km

The changes in freight transport in the economic sector are directly related to the growth and decline of the industry. The volume of exports of mining and mining products has increased, and in 2024, 96.2% of freight transported by road and 80.0% of cargo transported by rail were mining products. The volume of transportation of raw materials and products in the construction sector increased to 5.1 million tons in 2024, an increase of 15.8% from the previous year. The slowdown in the growth of the agricultural industry affected the volume of transportation of products in this sector. While 2.6 million tons of products were transported in 2022, this figure decreased to 1.4 million tons in 2023, representing a 44.4% decrease. In 2024, however, it increased to 1.5 million tons, marking a 1.8% increase from the previous year. However, the volume of freight transport of products in other sectors decreased by 21.5% of the prior year.

Mining products account for 99.2% of export transportation. 88.1% or 81.9 million tons of cargo was transported by road, and 11.9% or 11.0 million tons of freight was transported by rail.

When considering the export transportation of mining products by product, 82.2 million tons or 88.5% were coal, 7.3 million tons or 7.8% were iron ore, 1.6 million tons or 1.7% were copper concentrate, 1.3 million tons or 1.4% were fluorspar, 483.9 thousand tons or 0.5% were oil, and 51.8 thousand tons or 0.1% were zinc concentrate.

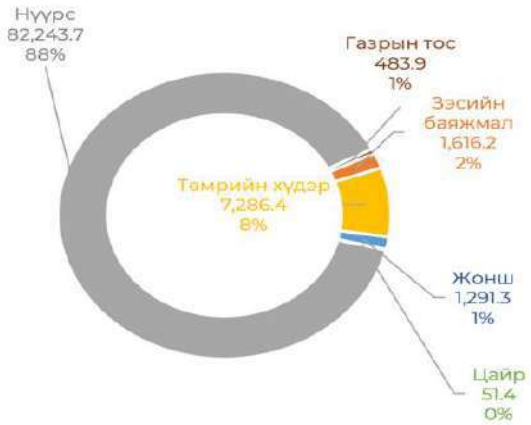
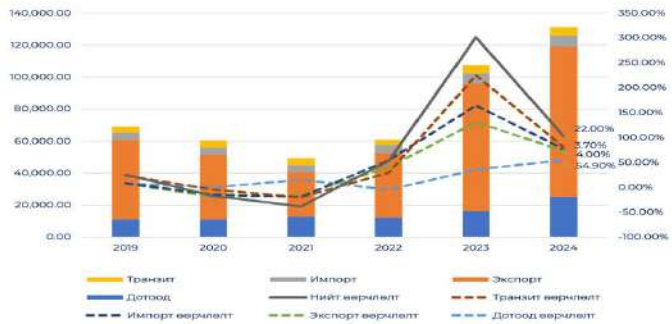


Figure 59. EXPORT OF MINING PRODUCTS



Үзүүлэлт	Тээврийн төрөл	2023 он	2024 он
Нийт тээсэн ачаа, сая тонн		**107,377.6**	**131,075.0**
Транзит	Төмөр зам	5,094.4	5,299.2
Экспорт	Төмөр зам	11,128.9	11,610.1
	Автотээвэр	68,245.0	82,076.6
	Нийт	**79,373.8**	**93,686.7**
Импорт	Төмөр зам	3,629.5	3,794.2
	Автотээвэр	3,010.0	3,088.9
	Нийт	**6,639.5**	**6,883.1**
Дотоодод	Төмөр зам	16,261.3	25,195.5
	Агаар	8.57	10.4
	Нийт	**16,269.9**	**25,205.9**

Figure 60. CARGO SIZE, by type of transportation

Export cargo transported by all modes of transport increased by 18% to 93.7 million tons, domestic cargo increased by 54.9% to 25.2 million tons, import cargo increased by 3.7% to 6.9 million tons, and rail transit increased by 4.0% to 5.3 million tons.

Although export cargo increased by 18%, export cargo, which accounted for 73.9% in 2023, decreased to 71.5% in 2024, and import cargo increased by 3.7% to 5.3% in total transport. The share of rail transit transport passing through Mongolia is 4.0%. Domestic freight transport risen from 16.3 million tons in 2023, or 15.1% of total freight transport, to 25.2 million tons in 2024, or 19.2%. This shows that the volume of domestic freight transport has increased.

Interstate freight transport, or export and import freight, is carried out by rail and road, while rail plays a key role in transit transport and domestic transport. Today, Mongolia carries out export and import transport with its two neighbours through 3 railway ports and 13 road ports. An average of 15.6 trains are exchanged through railway ports per day, and the number of exchanged wagons has increased by 26.3 %, which has contributed to the increase in export cargo transported by rail.

In 2024, road transport carried 87.6% of export cargo and 44.9% of import cargo, while rail transported 100% of transit cargo, 99.9% of domestic cargo, 55.1% of import cargo, and 12.4% of export cargo.

In 2023, interstate cargo transport reached 86.0 million tons, accounting for 80.1% of total cargo transport, while in 2024 it reached 100.6 million tons, accounting for 76.7% of total cargo transport.

Figure 61. INTERNATIONAL FREIGHT TRANSPORT AND EXPORT

In 2024, 96.5% of interstate cargo transported entered and exited through 10 ports bordering China and 3.5% through 3 ports bordering Russia. Of these, the largest share (38.9%) was through Gashuunsukhait, 24.6% through Shiveekhuren, 15.2% through Zamyn-Uud, and 8.6% through Hangi. Altanbulag port handled 3.4 million tons of cargo (3.4%).

96.3% of cargo transported with China was export cargo, while 92.8% of cargo transported with Russia was import cargo. 99.7% of Mongolia's export cargo went to China, while 52.2% of import cargo came from China and 47.8% came from Russia.

Gashuunsukhait Port handled the largest amount of cargo in 2024, at 38.7 million tons, accounting for 41.3% of total cargo, followed by Shiveekhuren Port with 26.2% and Zamyn-Uud Port with 13.1%.

In 2024, 45.4% of total import cargo entered through Altanbulag Port, 44.2% through Zamyn-Uud Port, 5.1% through Gashuunsukhait Port, 1.6% through Tsagaannuur Port, and 3.7% through other ports.

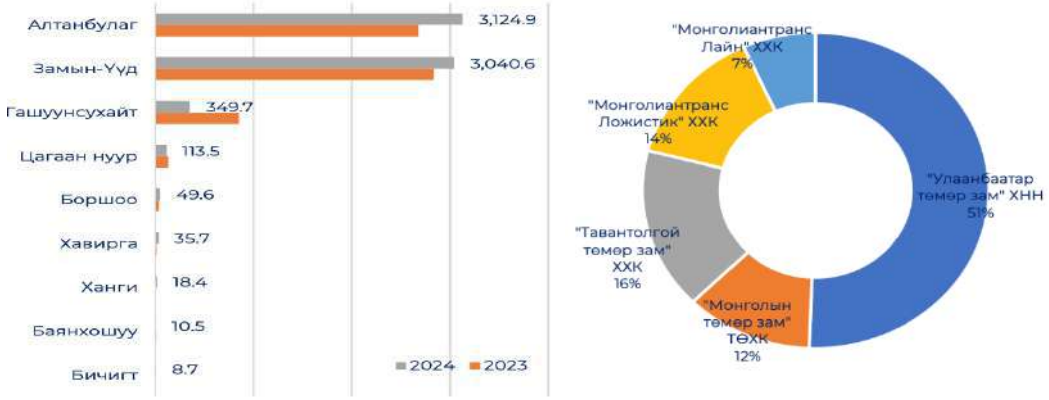


Figure 62. IMPORT FREIGHT AND DOMESTIC RAILWAY TRANSPORTATION WEIGHT

84.6% or 3.0 million tons of cargo entered from China through Zamyn-Uud port, 9.7% or 349.7 thousand tons of cargo entered through Gashuunsukhayt port, and 131.2 thousand tons of cargo entered through Shiveekhuren port, or 3.7%.

Of the imported cargo from Russia, 95.0% or 3.1 million tons of cargo entered through Altanbulag port, 3.5% through Tsagaannuur port, and 1.5% through Borshoo port.

Domestic cargo transported by rail in 2024 was the highest growth, increasing by 54.9% from the previous year. This was mainly due to the increase in freight transportation by domestic railway

companies. Zamyn-ud port accounted for 84.6% or 3.0 million tons of imported cargo from China, Gashuunsukhayt port accounted for 9.7% or 349.7 thousand tons of cargo, and Shiveekhuren port accounted for 131.2 thousand tons of cargo, or 3.7%.

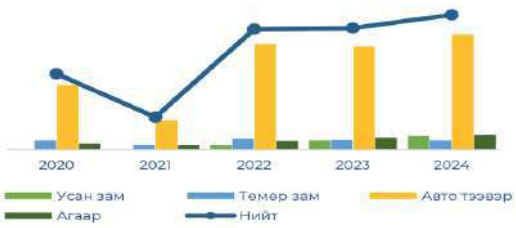
Of imported cargo from Russia, 95.0% or 3.1 million tons of cargo came through Altynbulag port, 3.5% through Tsagaannuur port, and 1.5% through Borshoo port.

In 2024, domestic cargo transported by rail increased by 54.9% compared to the previous year, the highest increase. This was mainly due to the increase in cargo transportation by domestic railway organizations. Railway organizations, taking full responsibility for the transportation of energy coal and briquette raw materials and transporting them within the framework of social responsibility, contributed to the growth of domestic cargo.

In 2024, Ulaanbaatar Railway transported 12.5 million tons, or 51%, of domestic cargo, while other railway organizations transported 49% of domestic cargo.

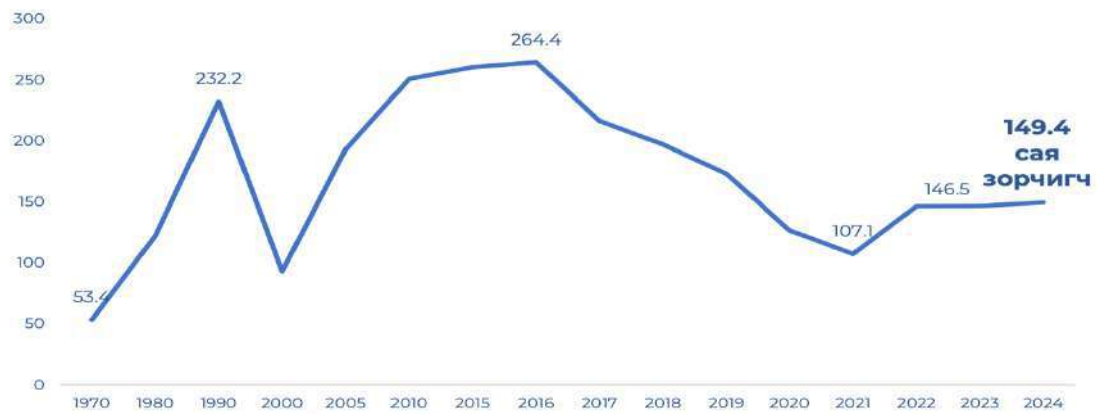
5.1. Passenger transport

In 2024, all types of transport transported a total of 149.4 million passengers, an increase of 2.0% from the previous year. Of this, the number of passengers on public transport in the capital city was 142.8 million. In addition, 2.2 million passengers were transported by air, an increase of 25.2% from the previous year, 145.1 million passengers were transported by road, an increase of 1.8% from the previous year, 94.2 thousand passengers were transported by water, an increase of 45.7% from the previous year, and 2.0 million passengers were transported by rail, a decrease of 7.7% from the previous year.



Тээврийн төрөл	2021	2022	2023	2024	2024/2023
Нийт зорчигчдын тоо, сая хүн	**107.1**	**146.3**	**146.5**	**149.4**	**2.0%**
Автотээвэр	106.5	143.0	142.6	145.1	1.8%
Төмөр замын тээвэр	0.4	2.4	2.1	2.0	-7.7%
Агаарын тээвэр	0.2	0.9	1.7	2.2	25.2%
Усан замын тээвэр	0.02	0.04	0.06	0.09	45.7%
Зорчигч эргэлт, сая хүн/км	**1,563.44**	**4,444.8**	**6,492.7**	**7,886.2**	**21.5%**
Автотээвэр	1,023.01	1,914.9	1,813.2	2,204.5	21.6%
Төмөр замын тээвэр	90.66	701.5	797.5	786.1	-1.4%
Агаарын тээвэр	449.37	1,828.4	3,880.8	4,894.0	26.1%
Усан замын тээвэр	0.4	0.9	1.2	1.6	31.7%

Figure 63. PASSENGER TRANSPORT, by year, by type of transport



In 2023, 98.4% of road transport passengers were in the capital city, while in 2024 they accounted for 98.4%, indicating that the number of passengers traveling by road has increased, and the number of passengers traveling by road in the capital city has also increased. In 2023, 98.4% of road transport passengers were in the capital city, while in 2024 they accounted for 98.4%,

indicating that the number of passengers traveling by road has increased, and the number of passengers traveling by road in the capital city has also increased.

Үзүүлэлт	Тээврийн төрөл	2023 он	2024 он
Нийт зорчигч		**146,490.8**	**149,355.9**
Олон улсад зорчигч	Автотээвэр	850.2	769.0
	Төмөр зам	23.7	41.2
	Агаарын тээвэр	1,312.2	1,746.9
	Нийт	**2,186.0**	**2,557.1**
Орон нутагт зорчигч	Автотээвэр	1,417.1	1,570.1
	Төмөр зам	2,118.1	1,935.3
	Агаарын тээвэр	419.1	420.4
	Усан зам	64.7	94.2
	Нийт	**4,019.0**	**4,020.0**
Нийслэлд зорчигч	Автотээвэр	141,643.7	142,778.8

Figure 64. CHANGES IN PASSENGER TRANSPORT

The sharp decline in passenger traffic due to the pandemic has continued to increase in recent years. In 2023, the number of intercity and interstate passengers by all modes of transport was 6.2 million, and in 2024, it was 6.6 million, an increase of 6.0% from the previous year.

Intercity and local air transport carried 2.2 million passengers, an increase of 25.2% from the previous year, water transport carried 94.2 thousand passengers, an increase of 45.7% from the previous year, and road transport carried 2.3 million passengers, an increase of 3.2% from the previous year, while rail transport carried 2.0 million passengers, a decrease of 7.7% from the previous year. In 2023, 98.4% of road transport passengers were in the capital city, while in 2024, it accounted for 98.4%, indicating that the number of passengers traveling by road increased and the capital city's transport passengers also increased.
By mode of transport, in 2024, 35.6% of intercity and intercountry passengers traveled by road, 30.1% by rail, 33.9% by air, and 1.4% by water.
All modes of transport International passenger transport.

Figure 65. PASSENGER VEHICLE OCCUPANCY

In 2024, a total of 2.6 million passengers were transported internationally by all modes of transport, an increase of 17.0% from the previous year. Of this, the number of international passengers by air transport was 1.7 million, an increase of 33.1% from the prior year, accounting for 68.3% of the total international passengers.

However, the number of international passengers by road transport decreased by 9.6% from the previous year to 769.0 thousand in 2024. International passenger transport by railway began in August 2023, with 23.7 thousand passengers transported. In 2024, this number increased to 41.2 thousand passengers, representing a 73.8% rise from the previous year.

Of the international passengers travelling by road and rail, 42.7% entered through Zamyn-Uud port, 4.7% through Altanbulag port, and 52.6% through other road ports. The number of domestic

passengers by all modes of transport increased by 0.03% from the previous year to 4.0 million in 2024.

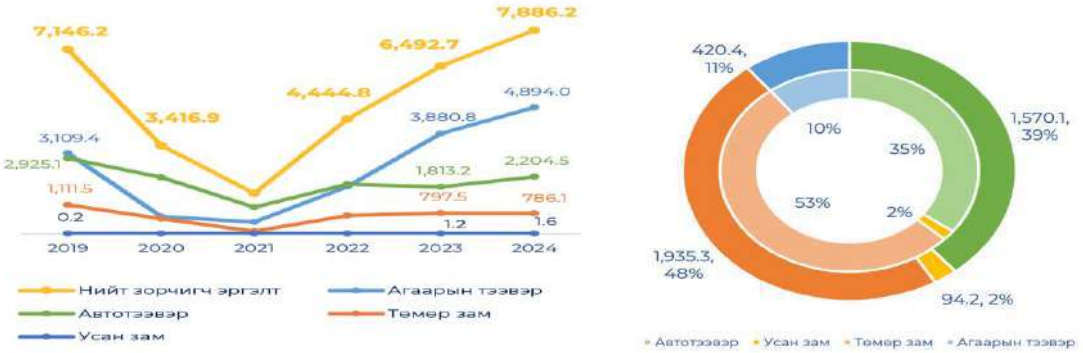


Figure 66. TOTAL PASSENGER TRANSPORT, LOCAL PASSENGER TRANSPORT, million persons/km

In 2024, railway passengers accounted for the largest share of local passengers, or 48%, with 2.0 million passengers, a decrease of 7.7% from the previous year. The reduction in the number of local passengers by rail was due to the increase in railway passenger fares, the aging of passenger cars, improved road conditions, and an increase in the number of passengers by road. In 2024, the number of local passengers by road increased by 10.8% from the previous year to 1.6 million, accounting for 39.1% of local passengers.

The Ministry of Roads and Transport has been pursuing a policy of increasing the availability of air transport services in local passenger routes and resuming local flights since 2023. As a result of policy measures, the number of local passengers by air in 2024 reached 420.4 thousand.

In 2024, total passenger traffic increased by 21.5% to 7,886.2 million person-km. Of this, air passenger traffic increased by the highest percentage, by 26.1%, to 4,894.0 million person-km. Rail passenger traffic decreased by 1.4%, while road passenger traffic increased by 21.5%.

5.2. Road sector

5.2.1. National highway

Within the framework of Mongolia's long-term development policy "Vision-2050", the road sector has set a goal of developing the National Road Network by building a total of 23,502 km of roads. This policy is planned to be implemented in the medium term in the following stages. These include:

First Revival Policy - 2,966.5 km of roads within the framework of the Port Revival

2,338.9 km of roads within the framework of the five-year development direction of Mongolia for 2021-2025;

2,409.5 km of roads within the framework of the Government's 2020-2024 Action Program, major repairs of 1,306.8 meters of reinforced concrete bridges;

49 projects and measures within the framework of the five ring roads of the First Revival;

54 projects and measures within the framework of the 2024 state budget /as proposed to the Parliament/;

The 2024-2028 Action Plan of the Government of Mongolia includes the implementation of the following projects and measures in the project's impact area.

These include:

The capital's Great and Small Roundabouts, or 770 hectares of land, will be dismantled, and the "Go Mongolia" steel cable-stayed bridge project and the Khushigiin Valley Tunnel project will be implemented.

The Zamyn-Uud-Altanbulag and Ulaanbaatar-Mandalgovi-Dalanzadgad highways will be expanded to 4 lanes, a 2-lane special-purpose road will be launched on the Khushigiin Valley-

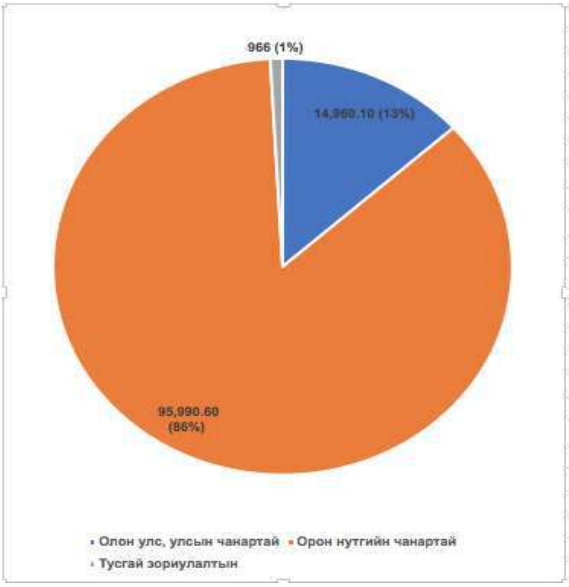
Choir-Zamyn-Uud route, a 6-lane road will be launched on the Ulaanbaatar-Lun route, and the Choir-Mandalgovi-Arvaikheer highway will be fully commissioned.
The Government has paid great attention to the development of the road network in Ulaanbaatar, the capital of Mongolia. It has declared 2025 as the "Year of Supporting the Development of the Capital's Infrastructure".

The total length of the Mongolian National Highway Network is 111,916.7 km. Of which:
14,960.1 km of international and national roads
95,990.6 km of local roads
966.0 km of special-purpose roads

The 14,960.1 km of national roads are classified by type:
7,887.8 km of paved roads,
5,711.9 km of ordinary dirt roads,
310.1 km of improved dirt roads,
1,050.3 km of gravel roads

7,863.0 km of paved roads are asphalt concrete, and 24.8 km are cement concrete.
The 95,990.6 km of local roads in the national road network are classified by type: 93,365.5 km are ordinary dirt roads, 393 km are improved dirt roads, 255.43 km are gravel roads, and 1,941.8 km are paved roads.
1,906.9 (98.2%) km of local paved roads are asphalt concrete roads, and 34.9 km are cement concrete roads.
Of the 966.0 km of special-purpose paved roads, 96% or 922.8 km are asphalt concrete roads, and 4% or 43.2 km are cement concrete roads. The length of special-purpose roads has increased by 1.1% compared to the previous year.

Figure 67. NATIONAL QUALITY HIGHWAY NETWORK



A	Үндэсний авто замын сүлжээ	км	%
А-1	Олон улс, улсын чанартай	14,960.10	13%
А-2	Орон нутгийн чанартай	95,990.60	86%
А-3	Тусгай зориулалтын	966	1%
	Нийт	111,916.70	100%
А-1	Улсын чанартай		
А-1.1	· хатуу хучилттай авто зам	7,887.80	53%
А-1.2	· ердийн хөрсөн зам	5,711.90	38%
А-1.3	· сайжруулсан хөрсөн зам	310.1	2%
А-1.4	· хайрган хучилттай зам	1,050.30	7%
	Нийт	14,960.10	100%
А-1.1	Хатуу хучилттай авто замаас		
А-1.1.1	· асфальт бетон,	7,863.00	99.7%
А-1.1.2	· цемент бетон	24.8	0.3%
	Нийт	7,887.80	100.0%
А-2	Орон нутгийн чанартай		
А-2.1	· ердийн хөрсөн	93,365.50	97.3%
А-2.2	· сайжруулсан хөрсөн	393	0.4%
А-2.3	· хайрган хучилттай	255.43	0.3%
А-2.4	· хатуу хучилттай	1,941.80	2.0%
	Нийт	95,955.73	100.0%
А-3	тусгай зориулалтын		
А-3.1	· асфальт бетон,	922.8	95.5%
А-3.2	· цемент бетон	43.2	4.5%
	Нийт	966	100.0%

Figure 68. STRUCTURE AND CLASSIFICATION OF THE NATIONAL HIGHWAY NETWORK

There are a total of 389 bridges along national highways, of which 15,959.4 (92%) are reinforced concrete bridges, 284 (2%) are steel bridges, and 1,049.7 (6%) are wooden bridges. As of 2024, a total of 208.9 meters of bridges have been put into operation, of which 35.0 meters of bridges have been put into operation along national highways and 173.9 meters of bridges have been put into operation on local highways.

The vertical axis of the Asian highway network, the AN-3 route, the AN-4 route, and the horizontal axis, the AN-32 route, pass through Mongolia. The 204 km Ulaanbaatar-Darkhan highway extension, part of the 1,002.9 km AN-3 road network connecting Russia and China, has been implemented and fully opened to traffic. By 2024, 21 aimags and 107 soums will have paved roads, expanding the road network.

5.2.2. Capital highway

Ulaanbaatar city covers an area of 35,206 hectares of built-up area, and the road network is divided into two types: national and capital. The total length of paved roads in the city and suburbs is 853.4 km, with 70 bridges and bridge structures, which increased by 211.2 km in 2020-2024.

The main road is designed to carry the main transport load within the territory of Ulaanbaatar city. As of 2024, the town has 161.60 km of central streets in the 1st and 2nd grades, 423.0 km of auxiliary roads in the same grades, and 480.0 km of residential streets within its built-up area. As of 2024, there are three multi-level intersections in the city, and one bridge structure has been added.

The carriageway of Ulaanbaatar city roads, depending on the road category, mainly has 2-6 lanes, the lane width is 3.5-3.75 m, and is paved with asphalt concrete, cement concrete, and stone aggregate.

Depending on the spatial planning characteristics of Ulaanbaatar city, the availability of paved roads in the built-up area is 75%, and in the ger districts, it is about 25%. However, due to the

insufficient quality of the road pavement and the lack of access to stormwater drainage lines, the city's roads are easily damaged during the rainy season.
Considering the age of the city's primary and secondary roads, there are 164.1 km of roads with an age of 1-5 years, 306.9 km of roads with an age of 5-10 years, and 237.2 km of roads with an age of 10-15 years, and 82 %of the total road network is considered to need repair and maintenance.

According to the basic study of the “General Development Plan of Ulaanbaatar City until 2040”, the value of the fixed assets of Ulaanbaatar city’s roads is 1.5 trillion tugriks. If no maintenance is carried out for 10 years, the value will decrease to 420 billion tugriks, according to the Urban Planning and Research Institute.

In recent years, 138.8 km of roads in 68 locations in the capital’s road network have been upgraded with domestic bond resources worth 270.6 billion tugriks, and 65.2 %of the main roads have been upgraded. The seventh resolution of the City Council dated February 8, 2024, set the tax rate for motor vehicles and self-propelled vehicles at the same rate (with amendments to the vehicle tax law, the tax has increased 2-3 times, and the road use fee has increased 5 times).
This will create an opportunity to increase the capital's road fund revenue to 151.5 billion tugriks, which will have a positive impact on improving the capital's road network, reducing congestion, and improving road maintenance, repair, and technology.

There are 86 large and small bridges registered in Ulaanbaatar city, totalling 7325.71 m in length, divided into:
Large /100m or more in length/ 13 in total, totalling 4700.0 m in length
Medium /25-100m in length/ 44 in total, totalling 2196.61 m in length
Small /up to 25m in length/ 29 in total, totalling 429.1 m in length.

There are also 103 pedestrian bridges over embankments in Ulaanbaatar city.
If we classify the bridges by structure, there are 82 asphalt concrete bridges, two steel bridges, and one wooden bridge. In the built-up area of the city, there are nine multi-level pedestrian overpasses, four tunnels, and 9 highway tunnels.
According to the basic research of the “General Development Plan of Ulaanbaatar City until 2040”, the bridge structures used in the capital are mainly 25 years old or more. Of the 33 bridges built before 1990, a total length of 2287.6 m, and 37 bridges were built before 1990.
According to a baseline study for the “General Development Plan for Ulaanbaatar City until 2040” developed by the Urban Planning and Research Institute in 2024, 87% of bridge structures have good vibration resistance, 6% have reduced vibration resistance, and 7% have poor vibration resistance. The Urban Planning and Research Institute determined that 6-13% of all bridges in Ulaanbaatar are likely to be at risk during seismic events.

5.3. Public transport in the city

In the capital city of Ulaanbaatar, public transport will transport 139.1 million passengers in 2023, with a passenger turnover of 472.9 million person-km, and a total route length of 4,309.6 km. More than 1,653 vehicles of 32 public transport organizations are registered, and 1,067 vehicles serve the line daily. The share of public transport in road traffic is less than 5%, but it transports more than 50% of all citizens' trips.
As of 2024, a total of 1,145 stops are in use in the capital, of which 68 are final and 1,076 are intermediate.

Also, in developing the “Ulaanbaatar City Development Master Plan until 2040”, the Urban Planning and Research Institute concluded that the public transport network is sufficient for a 300m walking distance to a public transport stop within the built-up and urbanized areas of Ulaanbaatar City.
The baseline study for the “Ulaanbaatar City Development Master Plan until 2040” highlighted that “the inaccessibility of the city’s street and road network increases the overlap of public transport routes and is a condition for traffic congestion,” and determined that the average speed of public transport is 11 km/h on weekdays and 16 km/h on weekends.

Figure 69. PUBLIC TRANSPORT PARKING

An integral part of the roads and road infrastructure of Ulaanbaatar city is pedestrian paths. Currently, there are 340.0 km of pedestrian paths and 98.3 km of bicycle paths in the city. The width of the pedestrian paths is 1.5-3.0 m, and there are 84.8 km of designated bicycle paths in the city. Although much work is being done to support the use of bicycles and develop their infrastructure, the availability of designated bicycle paths that meet the standard requirements is insufficient. This means that cyclists mainly travel on foot, which creates the risk of hitting and injuring pedestrians.
The basic study of the “General Development Plan of the Capital City of Ulaanbaatar until 2040” has made the following conclusions. These include:
Construction of urgently needed roads based on the travel demand of citizens;
Improving the use of existing roads, increasing the efficiency of public transport, and organizing management;
Encourage public transport use instead of cars, and address policy and regulation in the Ulaanbaatar city transport network;
The inaccessibility of the road network is a condition that increases the overlap of public transport routes and causes traffic congestion;
Promote pedestrian traffic throughout the city, and increase the accessibility and quality standards of pedestrian roads.
Urban freight transport
The current state of logistics in Ulaanbaatar city consists of terminals located along the railway and its branches in the city center, private sector storage warehouses in the west of the city, open

and semi-open warehouses for unloading imported cargo at Zamyn Udi in the east, and food and light industry warehouses, distribution centers, wholesale and retail centers, and markets located in the built-up area of the city.

According to the Logistics Performance Index of the World Bank, Mongolia's LPI in 2023 was 97, an increase from 2018 (LPI= 129), reaching the level of countries such as Albania, Armenia, Grenada, Moldova, and Tajikistan.

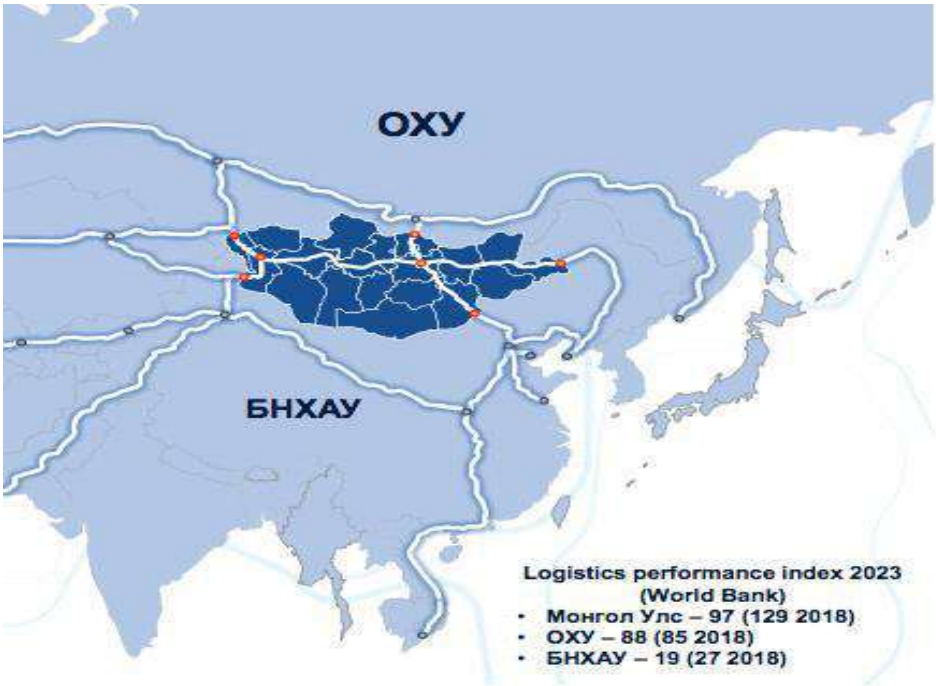


Figure 70. MONGOLIA LOGISTICS PERFORMANCE INDEX (LPI) 2023

Source: https:/lpi.worldbank.org/international/global

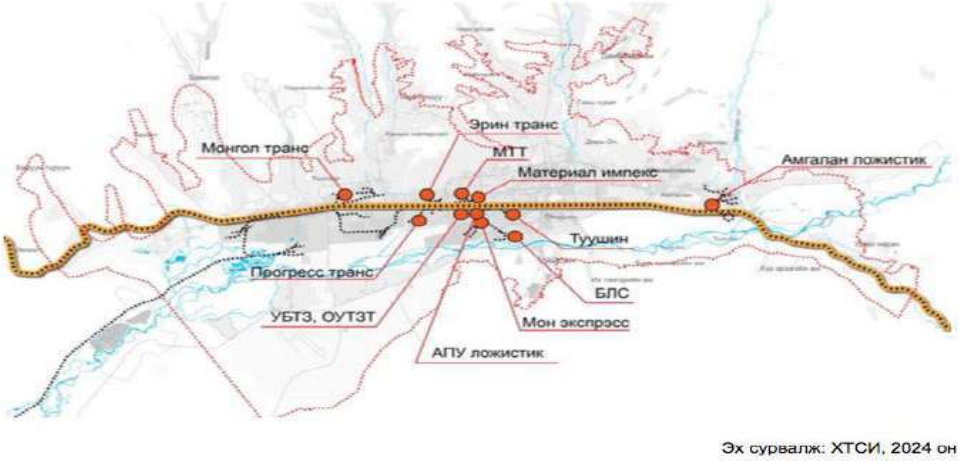


Figure 71. LOCATION OF RAILWAY TERMINALS IN ULAANBAATAR CITY

However, the operation of integrated wholesale centers and large warehouses with freight terminals along the railways operating throughout Ulaanbaatar city is one of the reasons for traffic congestion during the withdrawal of goods. Currently, 11 freight terminals are operating along the main railway line, mostly located in Zones 1 and 2 of the city.

The “General Development Plan for the Capital City of Ulaanbaatar until 2040” states that “the rapid population growth and future trends of Ulaanbaatar city will further increase the need for the concentration of industries and services, road transport, and logistics. The future development of Mongolia’s transport, especially the development of road transport, will be determined by the development of logistics.”

The study shows that in developing transport and logistics infrastructure, it is important to plan and plan efficiently and effectively in accordance with the city, planning-infrastructure network, production-trade-services-population, and to create a legal environment as a priority today. Therefore, in the future development of logistics centers, it is of utmost importance to create a legal environment for the development of transport and logistics infrastructure through a unified policy and coordination between government and non-government organizations within the framework of public-private partnerships.

Registered vehicles

As of the end of 2024, there were 1,338,956 registered vehicles in Mongolia, an increase of 14.2% from the previous year. 796,689 (60%) of the registered vehicles nationwide are in the capital city. When considering the type of vehicle, 65% of passenger cars, 55% of buses, 46% of trucks, 67% of special-purpose vehicles, 70% of machinery, and 29% of motorcycles are registered in Ulaanbaatar.

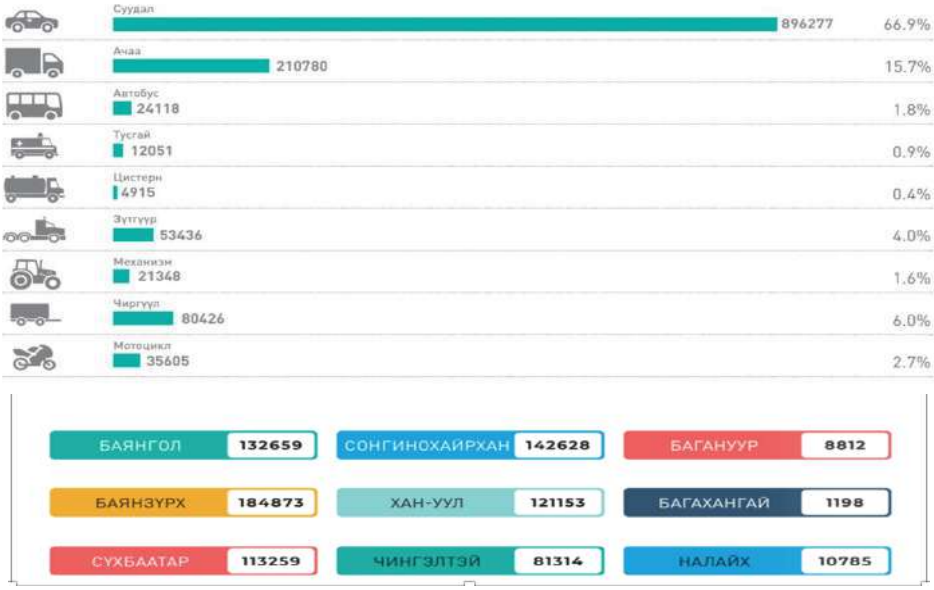


Figure 72. REGISTERED VEHICLE TYPE AND CATEGORY, by country and capital city

Based on the total number of registered vehicles in Mongolia from 2020 to 2024, the average annual growth rate of the fleet structure and vehicles is 5.3% nationwide and 7.1% in the capital city.

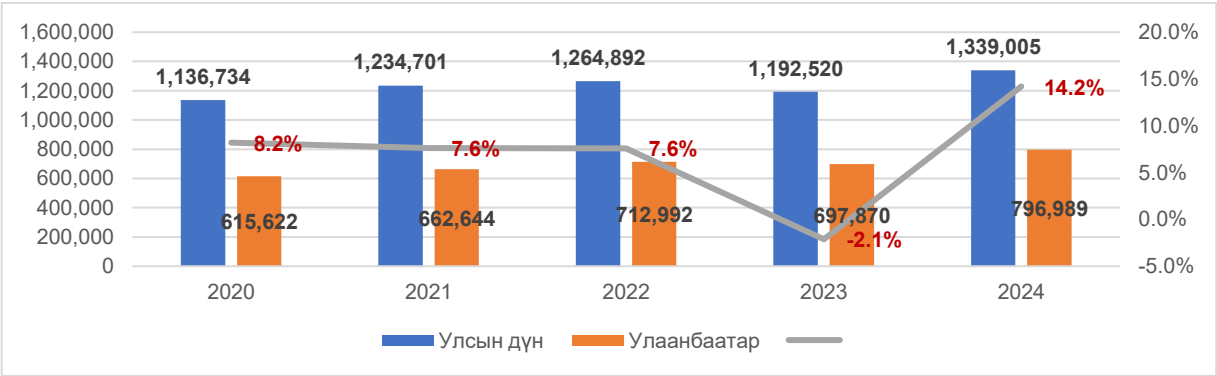


Figure 73. REGISTERED VEHICLES, by country, capital city, district

Table 56. OCCUPANCY PERCENTAGE OF REGISTERED VEHICLES, country, capital city

Type	Location	2019	2020	2021	2022	2023	2024	percentage %

Bus	Location	19,535	36,084	34,073	31,832	23,356	24,110	100%
	State results	11,021	16,834	16,573	16,192	12,464	13,145	55%
Truck	Ulaanbaatar	227,525	241,268	263,852	265,661	244,867	269,134	100%
	State results	91,670	98,176	107,243	114,883	110,336	125,094	46%
Passenger car	Ulaanbaatar	667,375	715,309	775,171	812,263	788,038	896,309	100%
	State results	417,383	447,413	478,469	513,953	505,463	580,220	65%
Special	Ulaanbaatar	20,075	20,672	20,404	18,604	14,705	12,051	100%
	State results	9,984	9,925	10,084	10,404	9,868	8,097	67%
Mechanism	Ulaanbaatar	13,595	15,004	16,527	17,603	16,979	21,361	100%
	State results	10,120	10,988	12,000	12,705	11,946	15,026	70%
Trailer	Ulaanbaatar	47,972	40,616	52,997	64,169	73,055	80,433	100%
	State results	22,959	22,452	27,326	34,538	40,078	45,007	56%
Motorcycle	Ulaanbaatar	46,951	67,781	71,677	54,760	31,520	35,607	100%
	State results	5,729	9,834	10,949	10,317	7,715	10,400	29%
Total	Ulaanbaatar	1,043,028	1,136,734	1,234,701	1,264,892	1,192,520	1,339,005	100%
	State results	568,866	615,622	662,644	712,992	697,870	796,989	60%

Growth rate

Type	Location	2020	2021	2022	2023	2024	Average %
Bus	State results	84.7%	-5.6%	-6.6%	-26.6%	3.2%	9.8%
	Ulaanbaatar	52.7%	-1.6%	-2.3%	-23.0%	5.5%	6.3%
Truck	State results	6.0%	9.4%	0.7%	-7.8%	9.9%	3.6%
	Ulaanbaatar	7.1%	9.2%	7.1%	-4.0%	13.4%	6.6%
Passenger car	State results	7.2%	8.4%	4.8%	-3.0%	13.7%	6.2%
	Ulaanbaatar	7.2%	6.9%	7.4%	-1.7%	14.8%	6.9%
Special	State results	3.0%	-1.3%	-8.8%	-21.0%	-18.0%	-9.2%
	Ulaanbaatar	-0.6%	1.6%	3.2%	-5.2%	-17.9%	-3.8%
Mechanism	State results	10.4%	10.2%	6.5%	-3.5%	25.8%	9.9%
	Ulaanbaatar	8.6%	9.2%	5.9%	-6.0%	25.8%	8.7%
Trailer	State results	-15.3%	30.5%	21.1%	13.8%	10.1%	12.0%
	Ulaanbaatar	-2.2%	21.7%	26.4%	16.0%	12.3%	14.8%
	State results	44.4%	5.7%	-23.6%	-42.4%	13.0%	-0.6%

Motorcycle	Ulaanbaatar	71.7%	11.3%	-5.8%	-25.2%	34.8%	17.4%
Total	State results	9.0%	8.6%	2.4%	-5.7%	12.3%	5.3%
	Ulaanbaatar	8.2%	7.6%	7.6%	-2.1%	14.2%	7.1%

REGISTERED VEHICLE OCCUPANCY, country, capital city. Considering vehicles by wheel position, right-hand drive vehicles account for 792,678 or 65.9%, and left-hand drive vehicles account for 409,844 or 34.1%.

Figure 74. VEHICLE ACCESS POSITION

In 2024, right-hand drive vehicles increased by 14.8% from the previous year, and left-hand drive vehicles by 7.7%.

When classified by engine type, 34.8% were gasoline, 37.5% were combined, 26.2% were diesel, 1.3% were gas-powered, and 0.1% were electric vehicles.

The number of electric vehicles reached 1,563, an increase of 491 or 45.8% from the previous year, which was the highest percentage increase.

Figure 75. By vehicle engine type and capacity

Figure 76. IMPORTS OF VEHICLES, by country and by type of vehicle

In 2024, a total of 162,912 cars were imported into Mongolia, a decrease of 70.9 thousand or 30.3% from the previous year.

Considering the import figures of motor vehicles in 2024 by exporting country, 24 thousand cars or 15% were imported from China, 119.8 thousand vehicles or 73% from Japan, and 14.5 thousand vehicles or 9% from the Republic of Korea, accounting for 97% of the total imported cars.

The number of vehicles imported from Japan increased by 67%, vehicles imported from the United States by 20%, and cars imported from the Republic of Korea by 15%, respectively, while the number of vehicles imported from China decreased by 83% from the previous year.

Considering the type of imported vehicles, 74.4% or 121.2 thousand passenger cars were imported, an increase of 64.8% from the previous year, while a total of 17 thousand trailers, locomotives and other mechanisms were imported, a decrease of 6 times and 7 times of the prior year, respectively. However, the import of trucks increased by 19.4% from the previous year, public transport by 32.9%, and special-purpose vehicles by 40.4%.

Considering the age of the car

There are 1,094,618 registered vehicles aged 10 years or more, accounting for 81.8% of the total number of cars, or the highest percentage.

69,819 vehicles aged 0-3 years accounted for 5.2%, 65,989 vehicles aged 4-6 years accounted for 4.9%, and 108,530 cars aged 7-9 years accounted for 8.1%.

In 2024, 74.9% of the total registered vehicles, or 1,003,409 cars, were subject to state vehicle inspection, which is 2.7% higher than the previous year's coverage rate.

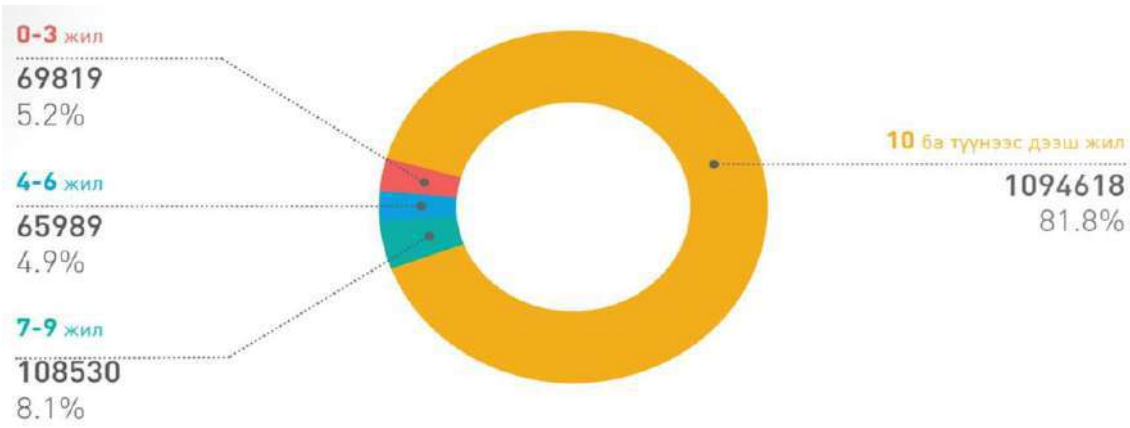


Figure 77. CAR LIFE

5.6. Traffic safety

In 2024, 30,977 road accidents were registered nationwide, an increase of 22.8% from the same period of the previous year. In the capital, 26,056 road accidents were registered, an increase of 23.8% from the same period of the previous year, accounting for 84% of the total road accidents in the country.

A road accident (RA) is understood as a loss of life or health, damage to vehicles, roads, road structures, and cargo or other property caused by the movement of vehicles on the road specified in Article 3.1.6 of the Law on Road Traffic Safety. The order of the Chairman of the National Road Safety Commission No approved the methodology and methods for calculating RA. A/118 dated November 1, 2018, based on the methodology for calculating statistical indicators of crimes and judicial proceedings.
As defined in the Law of the Republic of Mongolia on Road Traffic Safety, road traffic accidents are defined as the total number of road traffic accidents that result in loss of life or health, damage to vehicles, roads, and road structures, and damage to cargo and other property.

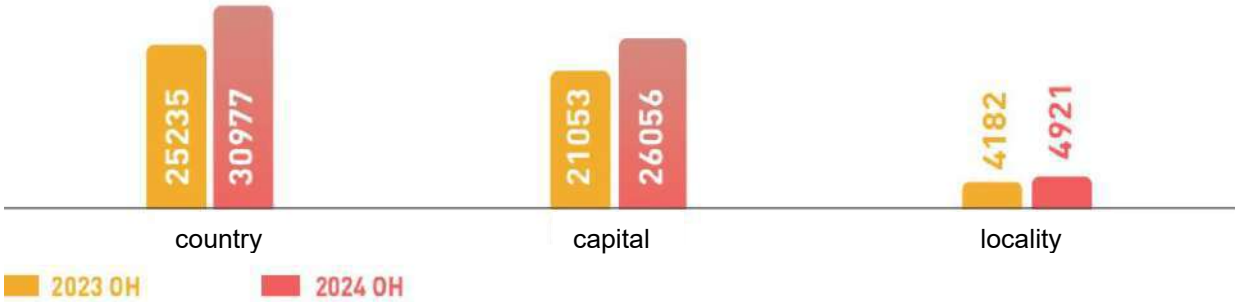


Figure 78. ROAD ACCIDENTS, by country, capital city, and locality

Of the total number of accidents registered in the capital, 6,502 (25%) were registered in Bayanzurkh, 4,685 (18%) in Khan-Uul, 4,677 (17.9%) in Songinokhairkhan, 4,518 (17.3%) in Bayangol, 3,552 (13.6%) in Sukhbaatar, 1,832 (7%) in Chingeltei, and 290 (1.1%) in three remote districts.

Of the total number of accidents registered nationwide, 27,264 (88%) were property damage accidents, and 371 (12%) were personal injury accidents. The number of personal injury accidents increased by 103 units, or 2.8%, compared to the same period last year, and the number of property damage accidents increased by 5,639 units, or 26%.

Figure 79. ROAD ACCIDENTS by capital and district

2024	country	capital	locality
Хүн гэмтсэн	3713	2570	1143
Эд материалын хохиролтой осол	27264	23486	3778

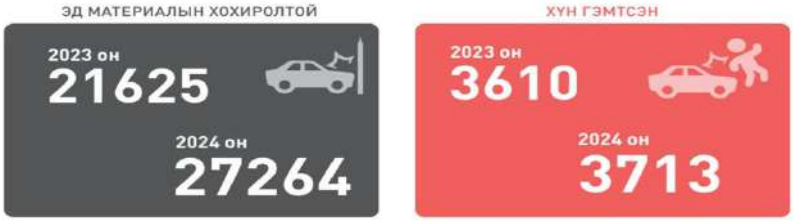


Figure 80. PERSONS INJURED IN ROAD ACCIDENTS, DAMAGES CAUSED, by country, capital city, and locality

In terms of the causes of road accidents, 30,977 road accidents (97.2%) recorded nationwide were due to driver error, 759 (2.5%) to pedestrian error, and 120 (0.4%) to road conditions and technical defects.

Of the road accidents caused by driver error, 25,308 (84.1%) were recorded in the capital city and 4,790 (15.9%) in the localities. Of the road accidents caused by pedestrian error, 662 (87.2%) were recorded in the capital city and 97 (12.8%) in the localities. However, 86 (71.6%) of the road accidents caused by road conditions and technical defects were recorded in the capital city and 34 (28.3%) in the localities.

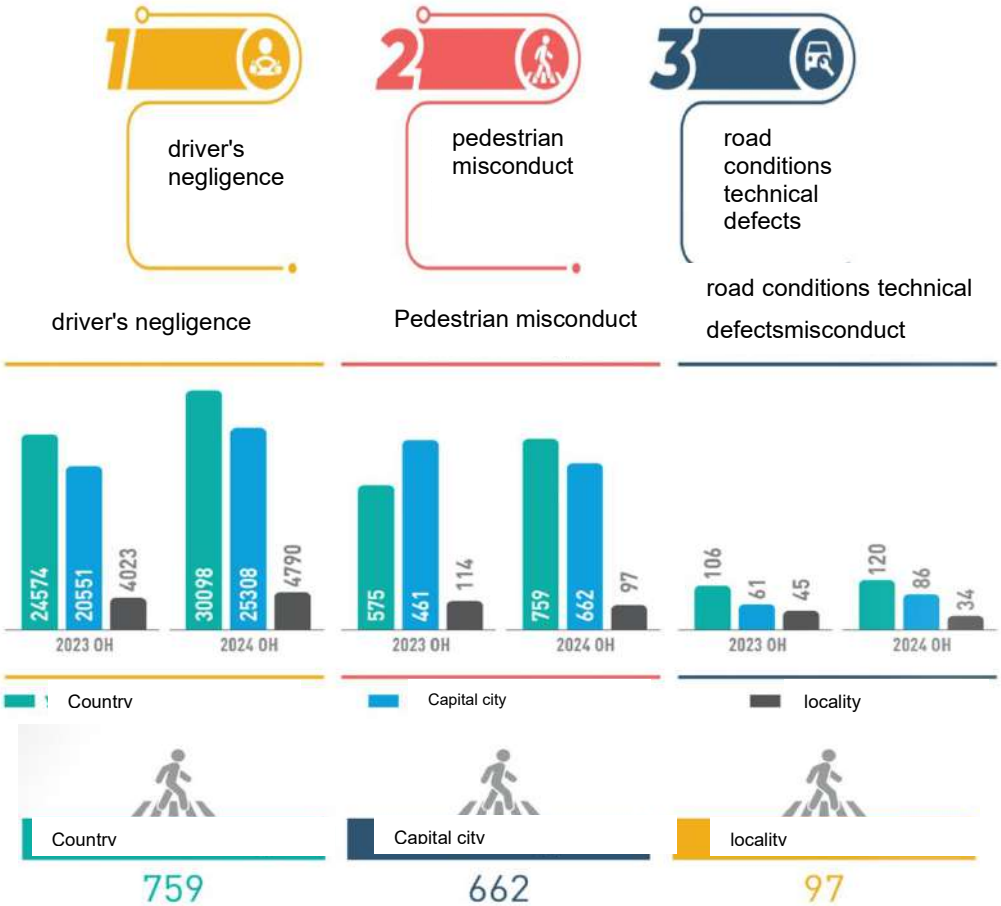
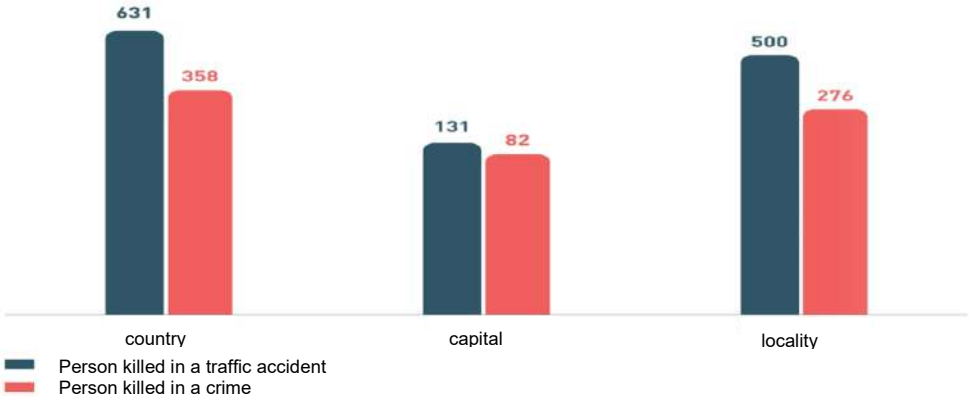


Figure 81. CAUSES OF ROAD ACCIDENTS, by type

Crimes against traffic safety and vehicle operation regulations were recorded in 2024, with 3167 crimes recorded in the country, 2.5 times in the region, 2.1 times in the region, and the highest number in the capital city, 2.8 times, compared to the previous year.
In the country, 4493 people were killed or injured in 30977 road accidents, of which 631 (14%) were killed and 3862 (86%) were injured. Of those who were killed or injured, 2946 (65.6%) were injured in the capital city and 1547 (34.4%) were injured on local roads. The number of people injured in road accidents increased by 27.6% compared to the same period last year.



ӨРТСӨН ХҮН			АМЬ НАСАА АЛДСАН ХҮН			ГЭМТЭЖ, БЭРТСЭН ХҮН		
Улс	Нийслэл	Орон нутаг	Улс	Нийслэл	Орон нутаг	Улс	Нийслэл	Орон нутаг
4493	2946	1547	631	131	500	3862	2815	1047

Figure 82. NUMBER OF PEOPLE INJURED IN ROAD ACCIDENTS

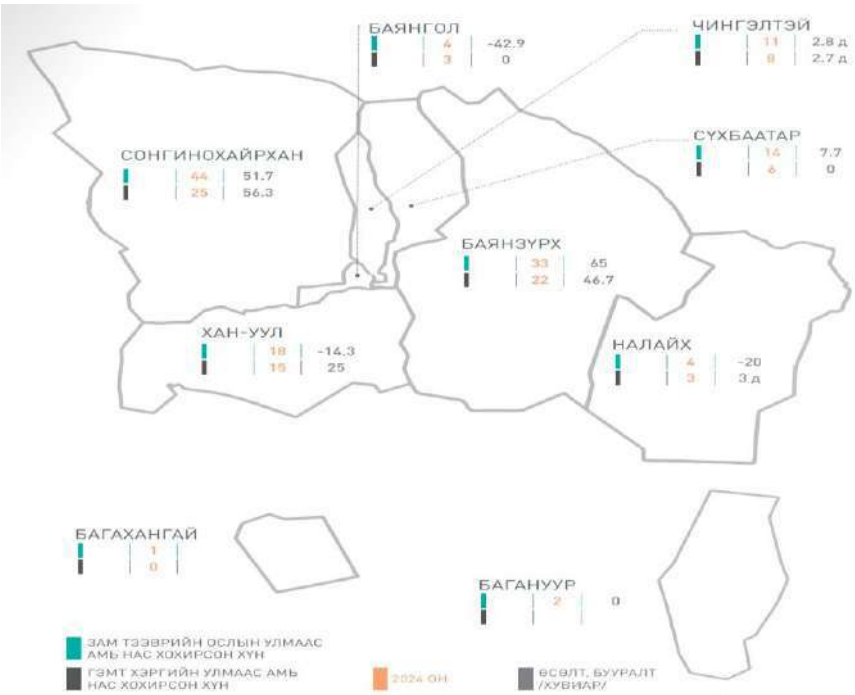


Figure 83. NUMBER OF PEOPLE INJURED IN ROAD ACCIDENTS,

Nationwide, 1,230 cases of child abuse were registered in 2024, of which 842 (68.5%) were registered in the capital and 388 (31.5%) in the localities. Compared to last year, the number of child abuse cases increased by 45.4% nationally and 4% locally.

ХҮҮХЭД ӨРТСӨН ЗАМ ТЭЭВРИЙН ОСОЛ	НИЙТ ХОХИРСОН ХҮҮХЭД	ҮҮНЭЭС	
		АМЬ НАС ХОХИРСОН ХҮҮХЭД	ГЭМТЭЖ БЭРТСЭН ХҮҮХЭД
УЛСЫН ХЭМЖЭЭНД			
1230	1377	69	1308
НИЙСЛЭЛ			
842	927	11	916
ОРОН НУТАГ			
388	450	58	392

Figure 84. NUMBER OF CHILDREN INJURED IN ROAD ACCIDENTS

According to the Ministry of Transport and Infrastructure and the Transport Police, the damage caused by road accidents in Mongolia in 2024 amounted to 68,871.0 million.₮, an increase of 37.9% from the previous year. However, if we consider this amount in the capital city, it is 49,280.0 million.₮, an increase of 66.7% from the previous year, while in the local area, it is 19,591 million.₮, a decrease of 3.9% from the previous year.

Table 57. DAMAGE CAUSED BY ROAD ACCIDENTS

№	Indicator	Capital		Locality		Country		*capital city growth and decline*	*local growth and decline*	*country growth and decline*
		2023	2024	2023	2024	2023	2024			
1	Traffic accident call	104632	125046	7207	8429	111839	133475	*19.5*	*17.0*	*19.3*
2	Registered traffic accidents	21053	26056	4182	4921	25235	30977	*23.8*	*17.7*	*22.8*
3	Crime	581	1239	699	1928	1280	3167	*2.1д*	*2.7д*	*2.4д*
	Of which: committed while intoxicated	57	564	172	1328	229	1892	*9.8д*	*7.7д*	*8.2д*
4	Deaths due to crime /statistics/	57	82	255	276	312	358	*43.9*	*8.2*	*14.7*
5	Actual mortality	101	131	450	500	551	631	*29.7*	*11.1*	*14.5*
6	Person injured in the incident	525	729	571	623	1096	1352	*38.9*	*9.1*	*23.4*
7	Injured person /accident/	1807	2815	1164	1047	2971	3862	*55.8*	*-10.1*	*30.0*
8	Accident involving a child	473	842	373	388	846	1230	*78.0*	*4.0*	*45.4*
	the child who died from this is real	3	11	50	58	53	69	*3.6д*	*16.0*	*30.2*
9	Damage caused by road accidents (million ₮)	29,561.4	49,280	20,392	19,591	49,953	68,871	*66.7*	*-3.9*	*37.9*
10	of which: compensated damages	27,863	45,676	17,924	17,237	45,787	62,913	*63.9*	*-3.8*	*37.4*

Source: MINISTRY OF TRAFFIC AND TRANSPORT POLICE OFFICIAL NEWS 2024

Road traffic accidents are consistently among the top 10 causes of death in the world, and this is a major concern in Mongolia. According to statistical studies, an average of 500-600 people die in road traffic accidents every year. This means that approximately 1-2 people die every day from road traffic accidents.

The National Road Safety Program was approved by the Government of Mongolia in 2019, and the actual performance of the Traffic Police compared with the results of some indicators of the program in 2024:

Table 58. ENSURING ROAD SAFETY

№	Indicators	Basic level (2018)	Reach level 2024	Performance	Change
1	Number of registered ZTOs nationwide	29474	15000	30977	+2.0д
2	Amount of material damage caused by the ZTO	19.2 тэрбум	10.0 тэрбум	68,8 тэрбум	+6.9д
3	Deaths from CVD (per 10,000 people)	1.7	0.85	1.8	+2.1д
4	Number of people dying from heart disease (per 10,000 people)	56.4	28	10.9	-17.1
5	Left-hand drive vehicles (percentage of total vehicles)	46.7	65	34.1	-1.9д
6	Number of cars used up to 6 years (share of total cars)	17	30	10.1	+20.1

Table 59. SOME INDICATIONS OF ROAD ACCIDENTS PER 100,000 PEOPLE IN MONGOLIA

ҮЗҮҮЛЭЛТ	2015 он	2016 он	2017 он	2018 он	2019 он	2020 он	2021 он	2022 он	2023 он	2024 он
хүнд ногдох зам тээврийн осол	1477	1497	1151	910	767	648	659	697	720	873
хүнд ноогдох зам тээврийн ослын улмаас нас барсан хүн	17	15	16	17	17	13	11	16	16	18
хүнд ноогдох зам тээврийн ослын улмаас гэмтсэн хүн	191	172	148	147	115	81	73	83	87	109
хүнд ноогдох хүүхдийн осол	36	35	32	29	23	16	14	23	24	35
хүнд ногдох ТХХАБАЖЭГэмт хэрэг	66	57	48	38	39	29	27	35	37	89
хүнд ногдох гэмт хэргийн улмаас нас барсан хүн	18	15	16	17	17	13	11	16	9	10
хүнд ногдох гэмт хэргийн улмаас гэмтсэн хүн	45	40	36	31	33	23	23	30	31	38
хүнд ногдох тээврийн хэрэгсэл	25826	26973	28325	29980	31607	33870	36209	36573	34002	37752
хүнд ногдох автомашин	23556	24552	25646	26906	28334	30194	32067	32619	30535	33879
жолоочид ногдох автомашин	69349	69742	70648	72150	73813	74418	77726	76737	142759	131660
жолоочид ногдох тээврийн хэрэгсэл	76034	76617	78026	80391	82338	83477	87764	86040	128205	118152
жолоочид ногдох зөрчил	153587	120958	122796	135134	174445	151094	136610	176598	192794	194402
жолоочид ногдох согтууруулах ундааны зүйл хэрэглэсэн зөрчил	4227	3067	2647	2677	2733	1960	2803	3737	2824	1780

Source : Traffic Police Service News 2024

Conclusion:

The number of vehicles per 10,000 drivers in Mongolia has increased to 11,815 (47%) since 2018, but the number of road accidents has increased significantly;

Compared to the level to be achieved in 2024 as set out in the National Road Safety Program approved by the Government of Mongolia with Resolution No. 163 of 2019, the number of road accidents registered nationwide has increased by 2 times per 10,000 people, the amount of material damage caused by road accidents has increased by 6.9 times, and the number of people who died from road accidents has increased by 2.1 times;

Although the target of reducing the number of vehicles used up to 6 years in total by 30% in 2024 was set, this indicator was not met by 20.1%;
This shows that the implementation of the National Road Safety Program in Mongolia is extremely inadequate, and the number of traffic accidents has increased by 5% (1,503) rather than decreasing from the 2024 target level, which is the program's baseline level, in 2018.
The main cause of traffic accidents and violations is drunk driving, which is 178 violations per 10,000 people.

CHAPTER 6. PROJECT ECONOMIC ANALYSIS

6.1. Analysis control and adjustment data

According to the project road map and project engineering plan, the economic analysis of the Ulaanbaatar City "First Ring Road" was planned to compare and analyze the current road under the project implementation conditions with two route options and three road slope options.

Table 60. PROJECT ROADMAP

Version	Long km	By planning the slope along the road	
Трасс 1	24.793	Трасс1.1	4%
		Трасс1.2	6%
Трасс 2	25.8	Трасс 2	6%

Source: Engineering research

The “Control” and “Adjustment” databases of the program include control data such as the project road name, analysis start date, planning estimate year, population of the project impact area, monetary unit for economic calculations, and discount rate. The adjustment data encompasses the type and classification of vehicles involved in the project's road traffic, the geographical location of the project's implementation region, the type of road pavement, and the selection of indicators to evaluate road conditions in the analysis, all in accordance with the project's road characteristics.

Control Data

Country Name	Mongolia
Project Name	Ulaanbaatar I toiruu road
Road Identification Code	UB1-Trass1
Road Name	UB TOIRUU -I
Currency Name	Dollars
Currency Symbol	$

Duration of the Wet Season (days)	90
Evaluation Date	06-11-2025
Road Agency Economic Costs Factor	0.85
Discount Rate (%)	12%
Evaluation Period (years)	20
Initial Calendar Year	2025
Population Served (persons)	1,768,151

Setup Data

	Name of Each Vehicle Type (two words max.)
Vehicle Type 1	Car Medium
Vehicle Type 2	Jeep4WD
Vehicle Type 3	Bus Light
Vehicle Type 4	Bus Medium
Vehicle Type 5	Bus Heavy
Vehicle Type 6	Truck Light
Vehicle Type 7	Truck Medium
Vehicle Type 8	Truck Heavy
Vehicle Type 9	Truck Articulated

	Name of Each Terrain Type
Terrain Type A	Flat
Terrain Type B	Rolling
Terrain Type C	Mountainous

	Name of Each Road Type
Road Type X	Paved
Road Type Y	Gravel
Road Type Z	Earth

Road Condition Indicator Option	○ Roughness ◉ Speed of a Reference Vehicle ○ Both Roughness and Speeds of Vehicle Fleet

Figure 85. PROGRAM "CONTROL" AND "CONFIGURATION" INFORMATION

6.2. Speed and travel time

Of the existing road sections included in the project road route, 18,173 (73%) km are unpaved, 1,900 km (8%) are dirt, and 4,720 km (19%) are asphalt-concrete paved (three- and four-way intersections of primary and secondary roads).

An engineering survey of the average speed and travel time of the project road route (specifically, Route 1) by passenger car (SAM) along each section of the road was conducted, and the average speed and travel time before the project was implemented were determined to be 22 km/h and 5.18 hours.

Table 61. PROJECT ROAD TRAVEL TIME AND AVERAGE SPEED

№	Starting point	End point	Dirt road (m)	Asphalt concrete road (m)	No road (m)	Total	Average speed (km/h)	Travel time (hours)	Travel time (min)
1	0	400		400		400	22	0.02	1.09
2	400	1850	1450			1450	22	0.07	3.95
3	1850	2300		450		450	22	0.02	1.23
4	2300	12750			10450	10450	0	-	-
5	12750	13200	450			450	22	0.02	1.23
6	13200	13970		770		770	22	0.04	2.10
7	13970	16400			2430	2430	0	-	-
8	16400	18750		2350		2350	22	0.11	6.41
9	18750	21700			2950	2950	0	-	-
10	21700	22100		400		400	22	0.02	1.09
11	22100	22900			800	800	0	-	-
12	22900	23250		350		350	22	0.02	0.95
13	23250	24793			1543	1543	0	-	-
14	Total length, km, of which		1900	4720	18173	24793	22	0.30	18.05
15	paved			4720		4720	22	0.21	12.87
16	unpaved		1900		18173	20073	22	0.09	5.18
17	percentage		8%	19%	73%	100 %			

Source: Engineering research

However, the engineering team modelled the future speed and travel time of the two road route options during the project implementation using TransCAD software. According to this modelling, the average future traffic speed of the project road was estimated to be 61 km/h for the CAM and the travel time was estimated to be 0.398 hours.

In the economic analysis, the RED program developed by the World Bank with the HDM-4VOC program extension (hereinafter referred to as the program) was used to calculate the future based on the current road speed of the project. The minimum permissible speed of the paved road in the mountainous area was estimated to be 25 km/h, and the maximum speed was estimated to be 74.7 km/h.

This shows that the average speed modelling conducted by the engineering team is equivalent to the speed limit calculated by the economic analysis. Therefore, the future traffic speed of the project road was planned to be 61 km/h, and the travel time was 0.398 hours.

Table 62. SPEED LIMIT ON PROJECT ROAD

			Valid Speeds Range (km/hr)	
			Minimum	Maximum
AX	Terrain: A	Road: X	25.0	100.5
AY	Terrain: A	Road: Y	25.0	84.7
AZ	Terrain: A	Road: Z	25.0	75.0

BX	Terrain: B	Road: X	25.0	92.2
BY	Terrain: B	Road: Y	25.0	81.9
BZ	Terrain: B	Road: Z	25.0	73.8
CX	Terrain: C	Road: X	25.0	74.7
CY	Terrain: C	Road: Y	25.0	74.7
CZ	Terrain: C	Road: Z	25.0	69.9

Combining the calculated speed simulations by vehicle type by the corresponding road surface parameters of the program project for the Trass-1 variant:

Table 63. PROJECT ROAD SPEEDS, by vehicle type

Truss-1 Option:

Vehicle Speeds Function of Roughness Coefficients		Columns to Check Relationships		
		Speed at IRI = 28.0 (km/hour)	Speed at IRI = 10.0 (km/hour)	Speed at IRI = 3.0 (km/hour)
Terrain: C Mountainous	Car Medium	35.83	61.36	80.04
	Jeep4WD	34.90	60.05	77.64
	Bus Light	31.77	56.84	71.05
	Bus Medium	29.93	54.64	66.19
	Bus Heavy	31.66	53.83	66.64
	Truck Light	27.45	51.24	60.24
	Truck Medium	27.24	51.14	59.27
	Truck Heavy	32.42	54.49	68.39
	Truck Articulated	26.69	46.27	55.46

Source: Consultant's estimate

6.3. Unit cost of transportation

Авто The most critical calculation in the economic analysis of a road project investment is the calculation of the transportation operating costs. This cost saving represents the most significant percentage of the project's financial efficiency, or the total benefit to road users from the project road. The transportation operating cost (TOC) unit comprises the vehicle's price per 1 km, the driver's salary, fuel, lubricants, spare parts, tire prices, depreciation, repair work, and other operating costs. However, the TOC unit is dependent on the planned road category, pavement type, geographical location or geographical classification of the region, climatic characteristics, road roughness index (IRI), vehicle speed, vehicle category and type.
The program models this dependence function as follows.

TAZ unit = a0 + a1*IRI + a2*IRI^2 + a3*IRI^3 (1)
Where:
TAZ unit - Unit cost of transport operation ($/t.h-km)
IRI- planned road smoothness index
a0,a1,a2, a3 - corresponding coefficients of the road smoothness index (IRI) function

In other words, when calculating TAZ unit, since IRI has a variable value, it is considered in the analysis as a functional relationship with the road type, vehicle speed, geographical classification of the project implementation region, and vehicle type.

If it is not possible to determine the IRI for the project road, in this case, the TAZ unit is determined by planning the corresponding IRI indicator of the road that will be created in the estimated year or upon project implementation using the speed dependence function of the program.

IRI = c0 + c1Speed* + c2*SpeedI^2 + c3*SpeedI^3 (2)
Speed = b0 + b1*IRI + b2*IRI^2 + b3*IRI^3 (3)
Here:
IRI- planned road smoothness index
c0,c1,c2, c3 - corresponding coefficients of the function for determining the road smoothness index concerning speed
b0,b1,b2, b3 – corresponding coefficients of the function for determining the vehicle speed concerning the road smoothness index (IRI)

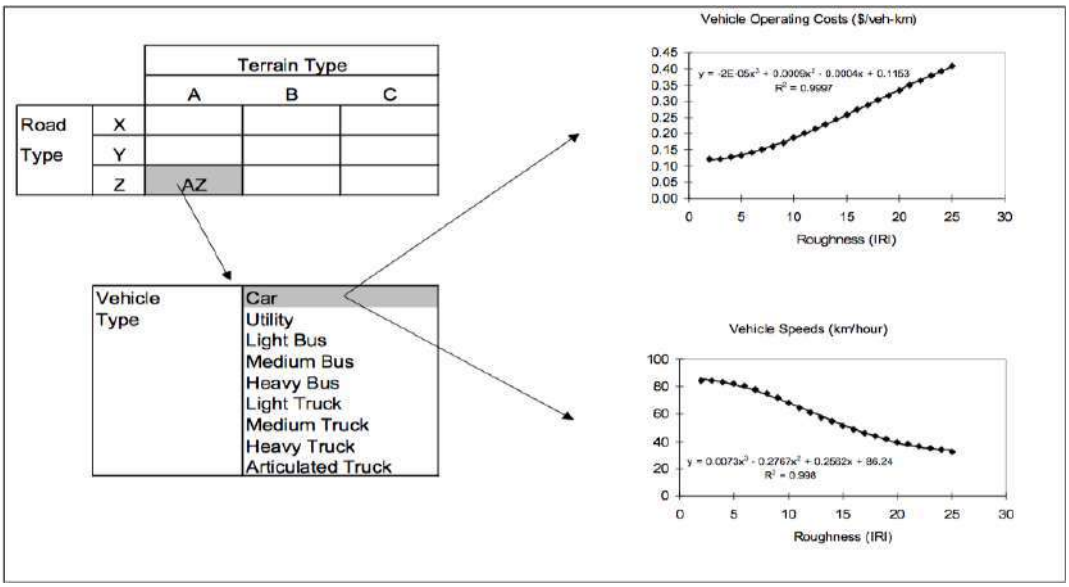


Figure 86. TRANSPORTATION COST DEPENDENCE

Based on the above relationship, the unit cost of the project road (TAZ unit) or vehicle operation for the Trass-1 option is calculated as:

Economic Vehicle Operating Costs Function of Roughness Coefficients		Columns to Check Relationships		
		VOC at IRI = 22.0 ($/veh-km)	VOC at IRI = 10.0 ($/veh-km)	VOC at IRI = 3.0 ($/veh-km)
Terrain: C Mountainous	Car Medium	0.218	0.142	0.119
	Jeep4WD	0.278	0.176	0.137
	Bus Light	0.296	0.194	0.151
	Bus Medium	0.421	0.266	0.190
	Bus Heavy	0.606	0.382	0.280
	Truck Light	0.446	0.282	0.203
	Truck Medium	0.661	0.434	0.322
	Truck Heavy	0.984	0.637	0.483
	Truck Articulated	1.481	0.957	0.723

Source: Consultant's estimate

Figure 87. UNIT COST OF VEHICLE OPERATION

If the project is implemented according to the Asphalt Concrete (AC) Road One construction option with bridges and tunnels, the current TAZ per kilometre for SAM will be 0.218 ($/veh-km) and TAZ = 0.142 - 0.119 ($/veh-km), which is an estimated decrease of 54.8%-65% or $0.100 per kilometre.

6.4. Unit cost of travel time

When preparing the project's EIA, the program calculates the unit cost of travel time for both passenger and freight transport, adjusting it by entering relevant information. In this context, for passenger transport, the standard number of passenger seats and the cost of travel time per passenger were studied. For freight transport, the loading and unloading time, the price and tariff, and the transportation operation costs were studied.

In this calculation, the standard tariff for passenger freight transportation approved by the Minister of Transport and Communications No. A/233 of 2022 and the standard prices for loading and unloading times of international transport and logistics organisations were used as a basis.

Travel Time Costs

	Number of Passengers (#)	Passengers Time Cost ($/pas-hr)	Cargo Holding Time Cost ($/veh-hr)
Car Medium	4	0.69	0.00
Jeep4WD	5	0.69	0.00
Bus Light	10	0.69	0.00
Bus Medium	20	0.69	0.00
Bus Heavy	40	0.69	0.00
Truck Light	0	0.00	1.45
Truck Medium	0	0.00	4.07
Truck Heavy	0	0.00	21.96
Truck Articulated	0	0.00	16.38

Source: Consultant's estimate

Figure 88. UNIT COST OF TRAVEL TIME

6.5. Road and transport accident and emergency costs

To calculate these costs, enter the relevant information into the program, and adjust the project's EER, a study of road traffic accidents in the capital city of Ulaanbaatar was conducted and presented in Chapter 5.6 of this report.

According to the national road traffic accident (RTA) data from the Traffic Police, a total of 26,056 RTAs were registered in Ulaanbaatar in 2024, an increase of 23.8% from the same period of the previous year. This accounts for 84% of the total RTAs in the country.

The damage caused by RTAs in the reporting year was 68,871.0 million.₮ in Mongolia, an increase of 37.9% from the previous year, and 49,280.0 million.₮ in the capital city, a rise of 66.7% of the prior year. However, in the local area, it decreased by 19,591 million.₮ or 3.9% from the previous year.

Within the framework of the Sustainable Development Goals, the Government of Mongolia approved the National Road Safety Program by Resolution No. 163 of 2019. Comparing the actual performance of the National Road Safety Program (NTSP) with the targets of the NTSP in 2024, the following are the results:

Table 64. 2024 ACHIEVEMENTS OF THE CENTRAL BANK

д/д	Indicators	Basic level	Reach level 2024*	ZTO's 2024 performance
1	Number of registered ZTOs nationwide	29474	15000	26056
2	Amount of material damage caused by the ZTO (billion.₮)	19.2	10	49.28
3	Deaths from CVD (per 10,000 people)	1.7	0.85	2.1
	Number of people injured due to road traffic accidents (per 10,000 people)	56.4	28	11.7

National Road Safety Program

The program sets a target of "reducing the number of registered road accidents nationwide by 50% to 15,000 by 2024, and reducing the amount of material damage caused by road accidents to 10.0 billion tugriks or $186." However, in actual implementation, the amount of material damage caused by road accidents per road accident has increased by 2.8 times to $529, which is 2.8 times higher than the target level.

Accidents Costs

	Costs in Dollars
Average Cost per Accident	529
OR	
Costs per Accident Type:	
With Fatality	0
With Injury	0
Damage Only	0

Figure 89. ROAD AND TRANSPORT ACCIDENT COSTS

It is believed that the implementation of this project will make a significant contribution to the implementation of the National Road Safety Program implemented by the Government of Mongolia. In the economic analysis, road safety is expressed in terms of indicators that meet international standards and future planning is carried out. Based on this, the ZTO per 100 million kilometres of Ulaanbaatar city's road network was calculated, and a plan was developed to reduce it by 50% in future years.

6.6. The energy of movement and its planning

The Economic Analysis (EA) has classified the traffic intensity of the project according to international standards as follows:

Current traffic:

Typical

Extreme traffic:

Prospective typical traffic

Initial traffic

Local economic growth-induced traffic

6.6.1. Normal movement

The traffic flow on the existing road is called normal traffic. Normal traffic was considered in the project EIA and planned based on the average daily traffic intensity (ADTI).
The project engineering team conducted a 72-hour traffic intensity count and OD study for the Trass1 and Trass2 options, and the results of the study were processed using TransCAD software and presented in the project feasibility study engineering report.

According to the study, the planned route route traffic volume is 87,083 vehicles/day as of 2025, and considering its traffic pattern, 83% or 72,278 vehicles/day are passenger and freight vehicles, and 17% or 14,805 vehicles/day are freight vehicles. Of the passenger and freight vehicles, 70,536 vehicles/day or 81% are passenger cars, and 1,742 vehicles/day or 2% are passenger buses. However, 17% or 14,805 vehicles/day are freight vehicles, and 10% or 9,031 vehicles/day are small trucks.

Normal Traffic				
Dry Season				
	Daily Traffic	Composition	Daily Traffic	Composition
	2025 (veh/day)	2025 (%)	2044 (veh/day)	2044 (%)
Car Medium	42322	49%	116469	51%
Jeep4WD	28214	32%	77644	34%
Bus Light	958	1%	2636	1%
Bus Medium	105	0%	289	0%
Bus Heavy	679	1%	1869	1%
Truck Light	9031	10%	20738	9%
Truck Medium	3109	4%	7139	3%
Truck Heavy	1924	2%	364	0%
Truck Articulated	741	1%	1200	1%
Total	87083	100%	228349	100%

Figure 90. NORMAL MOVEMENT ON THE PROJECT ROAD

The project engineering team developed the project road traffic forecast using TransCAD software based on the results of the OD study. The forecast project road traffic forecast (TPT) is expected to increase 2.6 times to 228,349 vehicles per day in 2044. The forecast, based on local economic growth, served as a basis for calculating the traffic volume of the project road, including the number of vehicles per day.

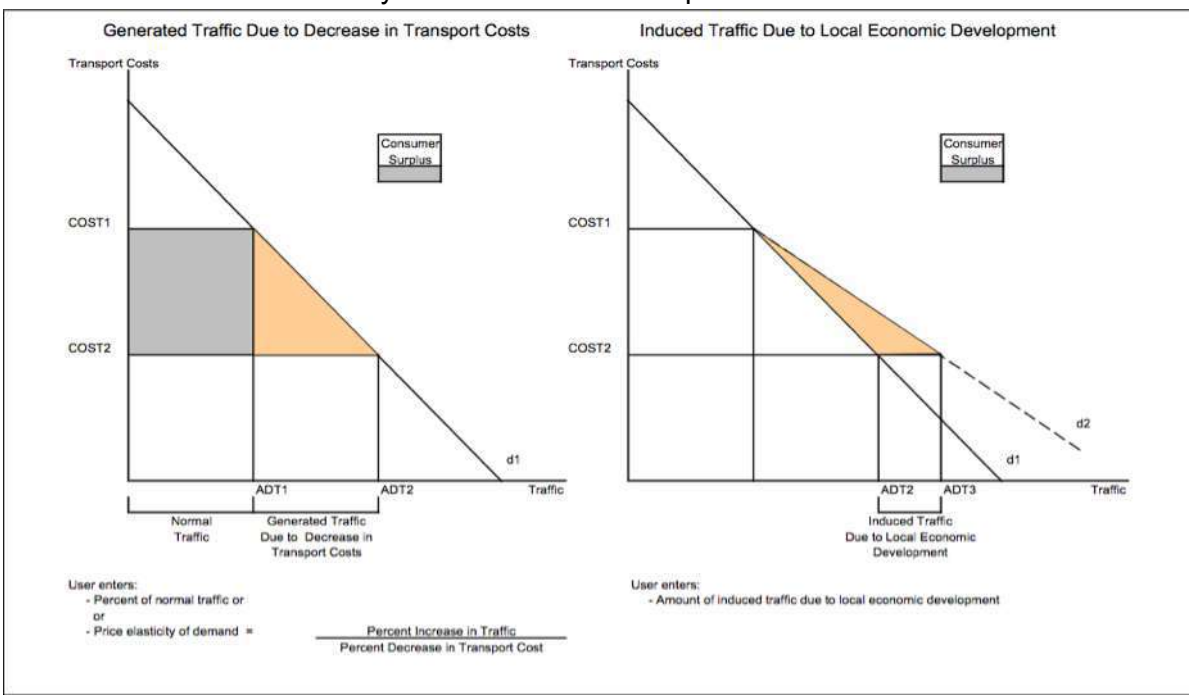
6.6.2. First and second movements

According to international standards, the traffic generated due to the reduction of transportation costs after the construction and commissioning of the road is considered to be the primary traffic. However, the traffic generated due to local economic growth is considered to be the traffic generated in connection with the growth of socio-economic development on the road, which includes the movement of traffic from other roads to the road due to the change in the starting and ending points.
Also, the forward traffic is considered to be the movement of traffic that continues its journey from other roads even though the starting and ending points of the transport do not change due to the construction of the road as the primary traffic.

In calculating the forward traffic of the road, it is important to determine the index of price elasticity of transport demand (IEp) or income elasticity of transport demand (TEHOM).

ТЭХОМ = Хөдөлгөөний өсөлтийн хувь
Тээврийн зардлын бууралтын хувь (4)

Онол арга зүйн хувьд Нэгдүгээрэр нэмэгдэх болон эдийн засгийн өсөлтөөс үүсэх хэтийн хөдөлгөөн дараах байдлаар илэрдэг. Үүнд :
Chart -1: The first generation of traffic is generated by a reduction in transportation costs, and in this case, it is assumed that the percentage of traffic growth increases for every percentage reduction in transportation costs.
Chart -2: However, for inbound and outbound traffic resulting from local economic growth, the growth in traffic is determined by the difference in transportation costs.



Source:RED, HDM-4 manual

Figure 91. FIRST, THE MOVEMENT THAT IS ARISING FROM INCREASED AND ECONOMIC GROWTH

The growth of road traffic is directly related to the growth of all social and economic activities. Therefore, the projected growth of passenger and freight transport is calculated as follows.
For passenger transport:
GRPT = [{(GDPpc * IEp)/100 + 1 } * (PGR/100 + 1) – 1]* 100 (10)
Where:
GRPT - Growth rate of passenger transport traffic;
GDPpc - Growth rate of gross domestic product per capita;
IEp - Income sensitivity of passenger transport demand;
PGR - Annual population growth
For freight transport:
GRFT = GDP * IEf
Where:
GRFT - Average annual growth rate of freight transport;
GDP - Average annual growth rate of GDP, %;

IEf - Income sensitivity of freight transport demand

For Ulaanbaatar, the income elasticity of demand for freight transport is IEf =7, while for passenger transport (Iep) it is not possible to determine the EER. This indicates, on the one hand, the lack of basic traffic intensity data on the capital's road network according to international standards, and on the other hand, the lack of passenger transport services that could meet the demand of road users, except for the modernization of the national passenger transport park in recent years.

For developing countries, the income elasticity of demand for passenger transport is 1.5-2.0, while for freight transport it is 1.2-1.5. In the past, the World Bank (Transport Rehabilitation Project - Partial Improvement of the Road Network, 1997) and the ADB (Road Development Project II, 1998) projects implemented in Mongolia, when considering the GNP growth in passenger transport, estimated it to be 1.8-1.4 and 1.5-1 for freight transport.

Judging from the economic growth of the Republic of Mongolia, mining and its related transport sector activities are driving the country's economy in general. The growth of the transport sector is supported by the development of the road network, as evidenced by the increase in traffic on the Republic of Mongolia's road network.

For example:

The implementation of the Erdenet-Bulgan-Morun road project with a loan from the Kuwait Fund has increased the traffic on this route by 13-51% since 1997;

The World Bank's "Transport Rehabilitation Project" has been implemented. The implementation of the project to improve the road network in the Arvaikheer-Bayankhongor-Altai-Khovd direction has partially increased the capacity of the road network by 20-30% since 2000.

According to the 2014-2020 activity report of the Ministry of Road Transport and Highways, as a result of the implementation of state budget investments in the construction and maintenance of paved roads and the implementation of the first-class road network, the funds accumulated in the road fund at the toll collection points from vehicles have increased threefold from 2.8 to 8.8 billion in 2014-2020.

According to the study, since 1997, roads have been built in the Republic of Mongolia with the help of the state budget, foreign and domestic loans and assistance, and private sector investment, and the capacity of the road network has increased. This shows that vehicle traffic has significantly increased by 13-51%, which is several times higher than GDP growth. The traffic intensity of the ring road project planned to be implemented in Ulaanbaatar is also expected to grow at this rate in the future. The engineering study is based on transport demand modelling. Therefore, the growth of traffic on the project route, both in the first and second stages, is projected to increase as follows in the medium term:

Normal, Generated and Diverted Traffic Growth Rate

Vehicle Type	Traffic Growth Rate (%)			
	2025 - 2029	2030 - 2034	2035 - 2039	2040 - 2044
Car Medium	6.0	6.0	5.0	5.0
Jeep4WD	6.0	6.0	5.0	5.0
Bus Light	6.0	6.0	5.0	5.0
Bus Medium	6.0	6.0	5.0	5.0
Bus Heavy	6.0	6.0	5.0	5.0
Truck Light	5.0	5.0	4.0	4.0
Truck Medium	5.0	5.0	4.0	4.0
Truck Heavy	5.0	5.0	4.0	4.0
Truck Articulated	5.0	5.0	4.0	4.0

Weighted Average	5.8	5.8	4.8	4.8

Figure 92. GROWTH OF THE FIRST AND MOST TRANSITION MOVEMENT

According to the program modeling, the normal traffic outlook for the estimated period of the project analysis, i.e. 20 years from 2025 to 2044, is estimated to grow by an average of 5.2% per year to 355,381 vehicles/day. Of this, the increase in normal traffic will generate 65% or 230,218 vehicles/day, 4% or 13,477 vehicles/day will be generated by the primary traffic on the project road, and 31% or 11,685 vehicles/day will be the traffic related to the socio-economic growth of the region. Considering the typical traffic pattern and the structure and composition of the vehicles, 87% or 198,908 vehicles/day of the total normal traffic outlook will be passenger and passenger vehicles, and 13% or 29,442 vehicles/day will be freight vehicles.

Table 65. FIRST AND FORTH MOBILITY OVERSEAS

Year	Annual Normal Daily Traffic (veh/day)	Annual Generated Daily Traffic (veh/day)	Annual Induced Daily Traffic (veh/day)	Total
2025	87083	0	0	87083
2026	92160	0	0	92160
2027	97534	5689	0	103223
2028	103223	6022	92280	201525
2029	109245	6375	93903	209523
2030	115620	6748	95473	217841
2031	122368	7144	96986	226498
2032	129512	7562	98446	235520
2033	137074	8006	99850	244930
2034	145080	8475	101199	254754
2035	152104	8887	102492	263483
2036	159470	9320	103733	272523
2037	167195	9773	104920	281889
2038	175297	10249	106049	291595
2039	183793	10748	107126	301667
2040	192250	11245	108145	311640
2041	201102	11765	109116	321983
2042	210367	12310	110027	332704
2043	220066	12880	110885	343831
2044	230218	13477	111685	355381

5.2%	Growth

6.7. Project financial unit cost

The budgeted cost of all the road and road structure options proposed in this feasibility study was calculated in accordance with the relevant norms and standards and presented in the engineering report. However, in connection with the economic analysis, the financial costs of the project road (including all taxes and fees) were calculated and planned in the Project-Alternatives Main Features working document of the program at the following unit costs. These include:
Unit cost of financial investment for project construction (000$/ km ;

The financial unit cost estimate for the project is shown in Table 6.11, which is based on two alignments and three road gradient options.

Table 66. PROJECT ROADMAP

Version	Урт км	echnology solution selection	Construction costs		Repair work	
			Total cost $	Unit $/km	total cost $ (20 years)	Unit $/km/year
Truss 1	24.793	Truss1.1(4%)	918,569,840	37,049,563.97	105,570,709.69	212,904.27
		Truss1.2 (6%)	915,000,000	36,905,578	105,007,341.16	211,768.12
Truss 2	25.8	Truss2 (6%)	899,000,000	34,844,961	115,160,095.93	223,178.48

Source: Engineering calculations

6.8. Project investment planning

When comparing project alternatives in the Investment EIA, the following characteristics of the project path were taken into account:

A.) Types of construction work and similarities in technology, including:

Route 1.1 and Route 2: These options include road, bridge, and tunnel structures.
Route 1.2 and Route 1.1: Although no tunnel structures are planned for Route 1.2, these two options are included in the same route.

B) The following plans are the same for all project route options. These include::

Compare all planned road alternatives with the “do nothing” scenario of the current road without the project.
The project implementation period will be 2 years, i.e. 2026-2027;
The road will be operational by 2028;
The investment financing schedule will be planned as 50% in the first year and 50% in the second year;
The projected traffic on the project road will be the same in all scenarios;

C) Plan the unit costs of the project road construction and maintenance work planned for the budget year at the amounts calculated in Table 6.11;

D) When evaluating the results of the EIA for the project's road investment, the following impacts should be considered when comparing and selecting road routes and alternatives. These include:
The project's impact on ensuring road safety and reducing road accidents;
The impact on reducing road congestion, or the benefits to road users through travel time savings;
The impact on green economic planning, or the project's ability to create an environmentally

friendly, healthy, and safe living environment for the population;
The total net benefit to road users from the project's roads;
The total investment needs and economic benefits and returns of the project

CHAPTER 7. ECONOMIC ANALYSIS AND RESULTS

Төлөвлөж Comparison and Selection of Alternatives
The analysis of the planned road alternatives compared to the non-project scenario was based on the “Project-Alternatives Solution” work report developed by the program. The main results of the report can be summarized as follows:

Table 67. PROJECT EIA RESULTS

Трасс 1.1 ба Трасс 2

Summary of the solution	Solution Summary	Alternative 1	Alternative 2	Alternative 3
		Non	Trass-2(6%)	Trass-1.1(4%)
Net present value (millions of dollars) Assuming a discount rate of 12%	Net Present Value (million $) at 12% Dicount Rate	0.00 #N/A	99.001	233.086
Internal rate of return (%)	Internal Rate of Return (%) IRR	0.00 #N/A	13%	14%
Total financial cost of project investment (millions of dollars)	Financial Investment Costs (million $)	0.00	899.0	918.83
Total operating costs PV in today's prices (millions of dollars)	PV of Economic Agency Costs (million $)	0.00	754.89	768.22
Road user cost savings during normal traffic (millions of dollars)	PV of Economic Normal Traffic User Costs (million $)	3481.12	2603.50	2472.71
Road user cost savings during the first generation of traffic (millions of dollars)	PV of Economic Generated Traffic User Costs (million $)	1509.24	1770.57	1701.95
Socioeconomic cost savings of the project (millions of dollars)	PV of Economic Society Costs (million $)	4990.37	5128.96	4942.88
Project investment per population of the affected area ($/person)	Investment per Population Served ($/person)	0	499.444	510.4460
Population of the area of influence per investment (person/1000$)	Population Served per Investment (persons/1000$)	0.0	2.0	2.0

Эх үүсвэр: Зөвлөхийн тооцоо

Трасс1.1 ба Трасс 1.2

Summary of the solution	Solution Summary	Alternative 1	Alternative 2	Alternative 3
		Non	Trass-1.2(6%)	Trass-1.1(4%)
Net present value (millions of dollars) Assuming a discount rate of 12%	Net Present Value (million $) at 12% Dicount Rate	0.00 #N/A	236.113	233.086
Internal rate of return (%)	Internal Rate of Return (%) IRR	0.00 #N/A	14%	14%
Total financial cost of project investment (millions of dollars)	Financial Investment Costs (million $)	0.00	915.26	918.83

Total operating costs PV in today's prices (millions of dollars)	PV of Economic Agency Costs (million $)	0.00	765.19	768.22
Road user cost savings during normal traffic (millions of dollars)	PV of Economic Normal Traffic User Costs (million $)	3481.12	2472.71	2472.76
Road user cost savings during the first generation of traffic (millions of dollars)	PV of Economic Generated Traffic User Costs (million $)	1509.24	1701.95	1701.95
Socioeconomic cost savings of the project (millions of dollars)	PV of Economic Society Costs (million $)	4990.37	4939.85	4942.88
Project investment per population of the affected area ($/person)	Investment per Population Served ($/person)	0	508.476	510.460
Population of the area of influence per investment (person/1000$)	Population Served per Investment (persons/1000$)	0.0	2.0	2.0

Source: Consultant's estimate

To summarise the results of the EHS:

A. *In terms of return on investment:*

All the proposed road project options are economically viable in terms of investment.
Comparison of Truss 1.1 (4%) and Truss 2 (6%): Comparing the options with similar construction characteristics, Truss 1 is $19.83 million higher than Truss 2 in terms of total investment needs or financial costs. However, the net present value (NPV $233.086 million) and internal rate of return (IRR 14%) at a discount rate of 12% indicate that it is a more viable option than Truss 2.
Comparison of Truss 1.1 (4%) and Truss 1.2 (6%). Because one of these options is planned for the same route, the financial costs of Truss 1.1 are $3.57 million higher. This is because the tunnel construction is scheduled for Truss 1.1. However, the net present value (NPV 211.729 million) and internal rate of return (IRR 14%) of the Truss 1.2 option are lower than those of the Truss 1.1 option.
Summarising the above comparison, Truss 1.1 (4%) has higher financial costs than Truss 1.2 (6%) and Truss 2 (6%). Still, its net present value (NPV 233.086 million) and internal rate of return (IRR 14%) indicate that it is a more efficient project.
B. Environmental impact of the project:
Air pollution in the capital city of Ulaanbaatar is a pressing issue not only in the area of influence of the project road, but also in the focus of attention of Mongolia and the World Health Organisation.
Therefore, in the project investment plan, the environmental impact of the road project was considered as an essential criterion in the selection of project implementation options. In this context:
During the EIA, ecological and economic calculations were made for the land and soil erosion that will occur during the project implementation for all route options, and air pollution caused by fuel consumption of road construction machinery during construction.
According to the calculations, there is a risk of -318.8 million. $ per year in the implementation of the planned tunnel construction options of Route 1.1 (4%) and Route 2 (6%), and -291.0 million. $ in the implementation of Route 1.2 (6%).
62% of this risk is related to soil pollution during construction, and 38% is related to air pollution caused by fuel consumption during the operation of road construction machinery.
To mitigate these risks, the consulting company has proposed a green development plan with a total budget of 2,641. $ for environmental protection within the scope of the project road.
This will have a significant impact on the environment and the quality of life of the population, and will create a healthy and safe green environment in the project's impact area. For example, the area of lawns that was 14.5 thousand m2 before the project was implemented will be increased by 16.6 times to 256.4 thousand m2 within the project. The impact of green facilities on the project's roads will be increased by 23.3 times, air purification by 1053.9 times, noise reduction by 25.9 times, dust reduction by 240 times, soil moisture by 10 times, air humidity by 10 times, water over-discharge by 21.5 times, soil erosion by 40.2 times, and waste transportation by 6.7 times.
This indicates that the environmental lost opportunity cost of the project will be compensated in the future, potentially turning it into a benefit. On the other hand, the land and soil degradation used in the project's implementation will be put into economic circulation for road construction purposes, which will affect road users' transportation use, travel time, and traffic safety.
The potential losses to the environment during the construction work and the impact of the green development planning proposed by the Consulting Company have been reflected in the EIA as follows.

Table 68. PLAN TO REPLACE ENVIRONMENTAL LOSS (MILLION$)

Year	Enviromental Impact	
	Trass-1.2(6%)	Trass-1.1(4%),Trass-2(6%),
2025	0	
2026	-291	-318.8
2027	-291	-318.8
2028	5	5
2029	5	5
2030	10	10
2031	10	10
2032	10	10
2033	20	20
2034	20	20
2035	20	20
2036	20	20
2037	30	30
2038	30	30
2039	30	30
2040	30	30
2041	40	40
2042	40	40
2043	40	40
2044	40	40

Д/Д	Үзүүлэлт	Хэмжих нэгж	Төсөл хэрэгжихээс		Гарах үр дүн (дахин их)
			өмнө	хойно	
			Тоо хэмжээ	Тоо хэмжээ	
1	Зүлэгжүүлэх талбай	m²	15459	256376	16.6
2	Мод тарих	ш	364	18731	51.5
3	бут сөөг	m²	4732	211115	44.6
4	Ногоон байгууламжийн төслийн замд үзүүлэх нөлөө	%	3%	70%	23.3
5	Агаар цэвэршүүлэлт	m³ өдөр	36531.9	38500000	1053.9
6	Агаарын бохирдол шингээх	kg/өдөр	16	23577	1473.6
7	Дуу чимээ бууруулах	dB	1140	29470	25.9
8	Тоос шороог бууруулах	kg/өдөр	35.9	8590	239.3
9	Хөрсний халалт хөрөлтийг бууруулах	m³	3265.25	80679.4	24.7
10	Хөрсөнд чийг шингээх	m³/өдөр	122.6	4211	34.3
11	Агаарт чийгшил өгөх	rh%	1~3%	10~30%	10.0
12	Нарны хэт туяанлтийг бууруулах	m²	13795	555102	40.2
13	Хөрсний элэгдлийг бууруулах	t/жил	195.6	4200	21.5
14	Хог хаягдал зөөвөрлөлтийг нэмэгдүүлэх	t/жил	300	2000	6.7

B) *Impact of the project on road safety:*

Section 5.6 of this report presents a study of road safety in the Mongolian Autonomous Region and the capital city. The study identified road accidents as the most vulnerable socio-economic problem facing the road network of Ulaanbaatar.

Ensuring road safety within the scope of the project road, thereby reducing the number of road accidents, reducing the economic losses incurred by road users related to road accidents to a certain level, and creating a healthy and safe living environment for road users, has been given special attention and has been made the main criterion for selecting project road alternatives in the EIA.

In the EIA of the project investment, the cost of damage per road accident in Ulaanbaatar city is estimated at US$529 according to the program data requirements, and the relevant analysis was conducted using the "Accident Rate" or Accidents per 100 million vehicle-km.

The calculation of the "Accident Rate" was based on the calculation of the slope along the road and the traffic safety planning included in the design, and the recommendations made by the Consulting Company in this regard.

According to the results of the EIA, the Trass1.1(4%) option is better than the other road options in terms of traffic safety planning requirements, which is proven by the fact that if the Trass1.1(4%) option is implemented, the road users will have the opportunity to receive a net benefit of $ 74.8 million per year from the provision of road safety. In other words, Trass1.1 (4%) will provide more economic opportunities to road users by $30.0 million than Trass2 (4%) and by $24.4 million than Trass1.2 (6%) .2

Table 69. NET BENEFITS TO ROAD USERS, by road option

Alternative: Trass-1.1 (4%)								
Agency Benefits		User Benefits						
Investment	Maintenance	Normal Traffic		Generated Traffic		Road	Other	
Costs	Costs	VOC	Time	VOC	Time	Safety	Benefits	Total
(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)
-739.165	-29.050	520.673	378.661	183.991	133.218	74.773	-290.013	233.086
-768.215		1001.302						233.086
User Benefits Percent		52%	38%	18%	13%	7%	-29%	IRR=14%
Alternative: Trass-1.2 (6%)								
Agency Benefits		User Benefits						
Investment	Maintenance	Normal Traffic		Generated Traffic		Road	Other	NPV
Costs	Costs	VOC	Time	VOC	Time	Safety	Benefits	Total
(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)
-736.292	-28.896	520.673	378.661	183.991	133.218	50.389	-290.013	211.729
-765.188		976.917						211.729
User Benefits Percent		53%	39%	19%	14%	5%	-30%	IRR=15%

Alternative: Trass-2 (6%)								
Agency Benefits		User Benefits						
Investment	Maintenance	Normal Traffic		Generated Traffic		Road	Other	NPV
Costs	Costs	VOC	Time	VOC	Time	Safety	Benefits	Total
(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)
-723.213	-31.681	455.491	357.108	160.945	125.626	44.738	-290.013	99.001
-754.894		853.895						99.001
User Benefits Percent		53%	42%	19%	15%	5%	-34%	IRR=13%

C) Benefits to road users from the project road

Internationally, the investment efficiency of a road project is determined by the following costs, which are called Road User Costs (RUC). These include:

Transportation operating costs;

Travel time costs;

Road accident costs;

Other costs, i.e. costs arising from other social, economic and environmental impacts;

In other words, the savings in road user costs resulting from the implementation of the project and the improvement of the road create the road efficiency of the project.

For example, for Trass-1.1 (4%), the net benefit to road users is 1001.302 million.$ per year. If we consider this in detail by each source (Table 7.3):

The benefit from reduced transportation operating costs is $704.664 million. This is 71% of the total net profit and is generated by the following results:

Savings of TAZ due to the increase in regular traffic -520.673 million.$;

TAZ savings from the increase in traffic of the first generation - 183.991 million.$;

The profit from travel time savings is 511.878 million or 52% of the total net profit of the project. This is due to the following sources. These include:

Travel time savings from the increase in regular traffic - 378.661 million.$;

Travel time savings from the increase in traffic of the first generation - 133.218 million;

Savings from the implementation of the project and ensuring road safety - 74. 735 million.$;

However, for the project, other benefits, i.e., the benefits from the economic growth of the project region, are estimated at $30.40 million per year. The potential benefits from the environmental impact are estimated at $23.5 million per year. Still, there is a risk of a loss of -$318.8 million due to the wear and tear, soil erosion, and air pollution caused by the fuel consumption of machinery during the construction period. This affects other benefits to road users, creating a risk of -$290.013 million per year in the two years of construction. Although this loss is expected to be compensated for in the future by the project's green development planning and will have a positive effect, it is not possible to evaluate their benefits in monetary terms (air, moisture exchange, dust

absorption, etc.) in the project's environment, so the costs spent on green development planning have been analyzed as benefits that will increase in the future.
D) To select the project road option, the above-mentioned results of the EIA conducted on the project road are summarized:
The Truss-1.1(4%) option is higher than the other options in terms of investment financial needs, but the net present value (NPV= 233.086 million.$) is the highest under the condition of discount of 12% than Truss-2(6%) and Truss-1.2(6%), and the internal rate of return IRR= 14%, which shows that the project option is more efficient.
The Truss-1.1(4%) option will allow road users to receive a higher net benefit (1001.302 million.$ per year) than the other options.
The Truss-1.1(4%) option will provide road users with a net benefit of 74.8 million. $ per year due to the provision of road safety, which shows the highest results compared to the other options.
If the project is implemented under the Truss-1.1(4%) option, there will be a loss of -318.8 million.$ to the environment (during the construction period only), but with its rehabilitation (implementation of green economy planning), there is an opportunity to compensate for this loss 16-50 times in the future years.
Also, if the project is implemented under this option, the road users will be able to receive other benefits of 30.40 million.$ per year from human development and socio-economic growth, and an average of 23.5 million.$ per year from the effects of environmental restoration.
Therefore, Truss-1.1(4%) is considered to be the most technically and economically feasible option for implementing the project road.

CHAPTER 8. PROJECT RISK ANALYSIS

8.1. Risk criteria

The investment risks that may occur during the project were developed based on the RED program's Sensitivity Analysis model.
The project sensitivity analysis considered the probability of the following 5 factors of investment risk. These include:

Increase the project investment cost by 25%, (A)
Reduce the project investment efficiency by 25% (B)
Reduce the project cost and efficiency together by 25% (A&B)
Propose the design, construction, construction, and technological alternative plans for the project road and change the project cost (For this project, the slope along the road was planned as Trass 1.1 (4%), Trass 1.2 (6%), Trass 2. (6%) and compared with the budget cost)
Change the project implementation period to 2 and 3 years

8.2. Risk analysis results

The sensitivity analysis of the program for all project route options was calculated to show that the basic and (A) options of the Trass 1.1 (4%) option are economically viable, and that the project is unviable for all other options. The results of the analysis are presented below:

Table 70. RISK ANALYSIS-VERSION 1.1

Provided that the project implementation period is 2 years:

Indicator	Total	A	B	A&B
Net Present Value (million $) at 9% Discount Rate	233.086	41.033	-17.239	-209.293
Investment rate of return IRR (%)Internal Rate of Return (%)	14%	12%	12%	10%

Provided that the project implementation period is 3 years:

Indicator	Total	A	B	A&B
Net present value of investment NPV (millions of $) Net Present Value (million $) at 9% Discount Rate	178. 838	-4.6284	-49.335	-232.799
Investment rate of return IRR (%) Internal Rate of Return (%)	14%	12%	11%	9%

Source: Consultant's estimate

According to the risk analysis, the Truss 1.1 option will be a loss if implemented in 2 years under the investment risk probabilities (B) and (A&B) and in 3 years under all probabilities.
However, under the “A” option, i.e. under the condition that the investment cost of the project increases by 25%, the slope along the road is planned to be 4% and if the Truss 1.1 option is implemented in 2 years, the NPV will decrease to $41.033 million and IRR =12%. This probability indicates that the project will not generate any profit or loss if it is implemented under these conditions.

Summarising the risk analysis, the Truss 1.1 option is quite sensitive to the risk probabilities considered in the sensitivity analysis. Therefore, when implementing the project, it is necessary to carefully prepare the execution plan, financing, and preparatory work for the start of construction, organize the relocation activities promptly, and implement the project within 2 years without increasing the initial planned investment amount under the basic conditions proposed by this economic analysis, and the project's efficiency will be IRR =14%.

Conclusion:
It has been determined that if the project route is implemented within 2 years under the basic scenario considered in the economic analysis, without incurring any additional costs, under the Truss 1.1 option, it will not incur any financial or investment risks and will be an economically efficient project.

CHAPTER 9. SOCIO-ECONOMIC IMPACT AND SIGNIFICANCE

9.1. Impact of the project on the workforce and household income

Workforce. The impact of the project on the workforce and household income was calculated by comparing the number of jobs, employees, and wages and equivalent income that will be created directly and indirectly during the project implementation.

According to the human resource planning for the project implementation, a total of 3,540 jobs will be created directly during the construction of the road, bridge, and tunnel, of which 85% or 3,000 people are planned to be hired from the local community.

Considering the structure of the employees at the workplace:

Management officials and ITA 7% or 240 people, of which 50% or 120 people are planned to be hired from the local community

Technical equipment operators 8% or 300 people, of which 60% or 180 people are planned to be hired from the local community

Contractual workers 85% or 3,000 people, of which 80% or 2,400 people are planned to be hired from the local community

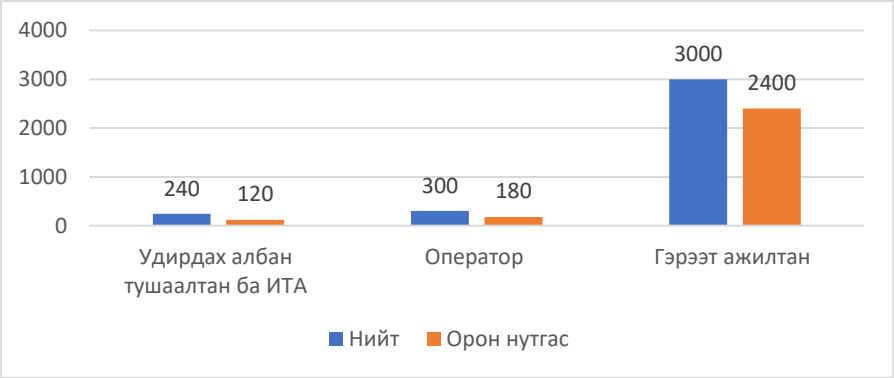


Figure 93.IMMEDIATE JOB OPPORTUNITIES

Table 71. HUMAN RESOURCE PLANNING

Manpower classification		Total		Эзлэх %
		Number of employees required (persons)	From the local area	
Manager and ITA	Key management personnel	30	0	
	Middle managers	90	30	33%
	Project site managers	120	90	75%
	Score	240	120	50%
Equipment operators	Special equipment operator	30	0	0%
	Large/major equipment operators	90	30	33%
	Small and medium equipment operators	180	150	83%
	Score	300	180	60%
Contract workers	Technical staff	900	300	33%
	Semi-skilled workers/regular workers	2100	2100	100%

	Score	3000	2400	80%
IMMEDIATE JOB OPPORTUNITIES		3540	3000	85%
DIRECT OR INDIRECT JOB POSITION		10620	9000	85%
TOTAL		14160	12000	85%

The development of road infrastructure leads to socio-economic (SEO) development, which is internationally recognized as supporting the activities of other economic sectors (such as trade, manufacturing, services, hotels, public catering establishments, hospitals, schools, kindergartens, offices, small and medium-sized businesses, etc.) in a ratio of 1:3, creating additional jobs. Based on this, approximately 10,620 indirect jobs will be created in connection with the implementation of the project. In other words, a total of 14,160 jobs can be created in the locality directly and indirectly due to the SEO effect of the project implementation.
This will have the following effects on the country and the capital.
Increase in the workforce
-1% nationwide,
- 2% in the capital city
Reduction in underutilization of labor
- 12% nationwide,
- 26% in the capital city
Reduction in unemployment
- 17% nationwide,
- 37% in the capital city

Table 72. workforce effectiveness

Indicator	Unit of measurement	Location	2024	ШШБ workplace	+, - %
Workforce	person	State results	1,441,091	1455251	1%
		Ulaanbaatar	666,135	680295	2%
Total labor underutilization	person	State results	113,957	99,797	-12%
		Ulaanbaatar	53,547	39,387	-26%
Unemployed person	person	State results	85,424	71,264	-17%
		Ulaanbaatar	38,620	24,460	-37%

Household income. If the project is implemented, the total planned wage budget for the project is 203,153.29 million tugriks, which will increase the net household income of the workers. Of this, 18,109.49 (9%) million tugriks will be the basic salary income of road construction workers, 92,377.73 (45%) million tugriks will be the bridge construction workers, and 92,666.08 (46%) million tugriks will be the tunnel construction workers, while the additional salary (relocation work wages) is estimated to be 23,223.04 million ₮. From this, the average monthly salary of one worker is 2.9 million ₮ or $ 803.

Table 73. LABOR SALARY PLAN

№	**Workforce**	**Number of employees**	**Salary**						**Average monthly salary per employee**	
			Highway	**Bridge**	**Tunnel**	**TOTAL**	**Addition**	**all**	**₮**	**$**

1	Workers	3000	7,813.57	64,493.11	65,602.74	137,909.42	19,680.54	157,589.96	2.63	734.89
2	Transport drive	180	2,842.64	293.08	258.19	3,393.90	1,180.83	4,574.74	1.27	355.56
3	operators	120	3,052.46	5,143.25	4,287.51	12,483.22	787.22	13,270.44	5.53	1,547.10
4	engineer/technical worker	240	2,330.47	11,888.01	11,925.23	26,143.71	1,574.44	27,718.16	5.77	1,615.73
5	Employee additional salary	3540	2,070.35	10,560.28	10,592.41	23,223.04	-	-	-	-
6	All	0	18,109.49	92,377.73	92,666.08	203,153.29	-	203,153.29	2.87	802.85

Compared to the national and capital city average monthly nominal salaries presented in Table 3.7 of Chapter 3 of this report, the average salary of project workers is 23% or 537.0 thousand ₮ higher than the national average and 20% or 478.7 thousand ₮ higher than the capital city average.

Table 74. IMPACT ON AVERAGE MONTHLY SALARY, by country and capital city

Location	**Unit of measurement**	**2024**	**Average salary of project workers**	**Growth**	**Growth rate**
State results	thousand.₮	2,332.40	2,869.40	537.00	23%
Ulaanbaatar	thousand.₮₮	2,390.70	2,869.40	478.70	20%

The fact that 85% of the project's total workforce is local will have a significant impact on increasing their household income.

Table 3.15 of Chapter 3 of this report presents a survey of the average monthly household income in the capital city. If the project is implemented, the net cash income of the household salary, which is the main source of household income for domestic workers, will increase by 1% or 36,100 ₮.

Table 75. IMPACT ON HOUSEHOLD INCOME,

Type of income	Capital city	Project	Growth	%
income	2833261	2,869,396.76	36,135.76	1%

9.2. Impact of the project on national and local budgets

Suppose the impact of the project on the state and local budgets is calculated based on the amount of taxes and fees paid to the state and local governments during the 2 years of project implementation. In that case, it is estimated that a total of 104.4 billion ₮ will be concentrated in the state and capital city budgets. In other words, the implementation of this project will concentrate 52.2 billion ₮ (14.6 thousand $) in the state and capital city budgets annually. This indicates that for every 1 km of road and road structure construction, the state and local budget revenue can be 4.2 billion ₮ or 1.178 million. $.

Table 76. IMPACT ON STATE AND CAPITAL BUDGETS

Type of income	Total revenue to be included in the budget, ₮	Per year	
		₮	$
Social insurance contributions	16,173,843,637	8,086,921,818	2,262,709
Value Added Tax	88,237,389,105	44,118,694,552	12,344,347
Score	104,411,232,742	52,205,616,371	14,607,056

Source: Budget Estimates

9.3. Impact of the project on infrastructure

With the implementation of this road project, the capital city will have a paved road network of 13.679 km, a reinforced concrete bridge capacity of 9.034 m2, and a 2.08 km tunnel structure for the first time in Mongolia. The social impact can be attributed to the following results. These include:

Road users who lack adequate infrastructure in Ulaanbaatar will be able to quickly access social and economic services;

The implementation of the project will significantly reduce traffic congestion on the main roads of Ulaanbaatar by reducing the traffic flow outside and inside the ring road in a ratio of (2:8). This will allow road users to benefit from travel time savings of $511.878 million per year, or 52% of the total net profit of the project.

In Ulaanbaatar, 35.9 kg of dust is generated per day due to traffic congestion when the project is not implemented, but this project will provide an opportunity to reduce this amount by 239 times by implementing green economy planning within the project.

This project attaches special importance to implementing green development policy planning in the construction of the capital's road infrastructure. This planning will have a significant impact on the environment and the quality of life of the population, and will provide them with a healthy and safe green environment in addition to comprehensive infrastructure facilities in the project's impact area. For example, suppose the area of lawns before the project was 14.5 thousand m2 and increased by 16.6 times to 256.4 thousand m2 within the project. In that case, the impact of the green facilities implemented by the project on the environment and project roads will increase by 23.3 times, air quality will increase by 1053.9 times, noise will decrease by 25.9 times, dust will decrease by 240 times, soil moisture will increase by 10 times, air humidity will increase by 10 times, soil erosion will decrease by 21.5 times, and waste transportation will increase by 40.2 times.

This also provides an opportunity to manage and develop the capital's road investment policy and planning with environmentally friendly green economic management at the policy level.

Table 77. CAPITAL HIGHWAY NETWORK

Type	Current capacity (km)	First-class construction capacity (km)	Total capacity (km)	Growth rate
Highway	1064.6	13.679	1078.279	101.3%
TB bridge (length/m)	7325.71	9.034	7334.744	100.1%
Tunnel (km)		2.08	2.08	

Engineering: Engineering calculations

By Resolution No. 24/29 of the Citizens' Representative Khural of the Capital City dated December 4, 2024, the "Capital Road Toll Amount" was established as follows.

Table 78. Capital highway toll rates

д/д	Vehicle category		Payment amount (in tog)		
			From vehicles registered in the capital once a year	Every time you travel in a vehicle that is not registered in the capital	
				Within 48 hours	After 48 hours Every 24 hours
1	Seat car	Taxi	150,000	1,000	5,000
2		Other (up to 2000cm3)	100,000		
3		2001-3000cm3	150,000		
4		3001-4000cm3	200,000		
5		4001 cm3 and above	250,000		
6	Freight transport (capacity, tons)	Up to 1 ton	200,000	1,000	5,000
7		1-2 tons	225,000		
8		2-3 tons	250,000		
9		3-5 tons	275,000	2,000	5,000
10		5-8 tons	300,000		
11		8-10 tons	325,000		
12		10-18 tons	350,000		
13		18-24 tons	400,000	3,000	5,000
14		Over 24 tons	500,000	5,000	5,000
15	Bus	Seats up to 15 people	200,000	0	0
16		Seats more than 15 people	300,000	0	0
17	Tanker		250,000	3,000	5,000
18	Special		200,000	3,000	5,000
19	Trailer		150,000	0	0
20	Mechanism	Transportation services	300,000	5,000	5,000
21		Technological	300,000		

	22		Small	150,000		
	23	Motorcycle, moped	2 wheels	50,000	0	0
	24		3 wheels	50,000	0	0

If the project is implemented, the annual cost of road maintenance work for the project is financed from the revenue accumulated in the Road Fund, which is $4.6 million, approximately $31.0 million will remain, which is considered by the ERC as other benefits for road users.

Considering that the number of registered vehicles in the capital is growing by 7.1% annually, this source of the Capital Road Fund is likely to increase. This will provide a source for maintaining the capital's road network in a technically operational state and carrying out regular maintenance in accordance with norms and standards in the long term, and will also have a significant impact on increasing the project's road safety.

Some statistics examined in Chapter 3 regarding the project's road safety are mentioned here again: in 2024, 30,977 road accidents were registered nationwide, an increase of 22.8% compared to the same period of the previous year. Of these, 26,056 traffic accidents were registered in the capital, an increase of 23.8% from the same period last year, accounting for 84% of the total traffic accidents nationwide.

The number of people injured in road accidents increased by 27.6% compared to the same period last year.

Road accidents are consistently among the top 10 causes of death in the world, and Mongolia is the focus of the most attention here. Statistics show that on average, more than 500-600 people die from road accidents every year, and approximately 1-2 people die from road accidents every day.

The main cause of road accidents and violations is drunk driving, which is 178 violations per 10,000 people.
The total cost of road accidents in Ulaanbaatar is estimated at 529 US dollars per accident. This is planned to be reduced by 50% with the project's road design solutions. This will allow road users to receive a net benefit of 74.8 million US dollars per year from improved road safety.

Table 79. ESTIMATION OF FINANCIAL SOURCES FOR PROJECT ROAD MAINTENANCE

Type of transport	Number of registered transport vehicles	Highway toll payment	Total tax (₮)	Total tax ($)
Bus	13,145	250,000	3,286,250,000	919,488
Truck	125,094	300,000	37,528,200,000	10,500,336
Seat	580,220	100,000	58,022,000,000	16,234,471
Special	8,097	300,000	2,429,100,000	679,659
Mechanism	15,026	500,000	7,513,000,000	2,102,126
Trailer	45,007	400,000	18,002,800,000	5,037,157
Motorcycle	10,400	50,000	520,000,000	145,495
Total	796,989		127,301,350,000	35,618,733
Annual need of the ZA				4,600,000
Savings				31,018,733

9.4. Environmental impact of the project

In the EIA, more attention was paid to aligning the project's environmental impact with international standards and the specifics of Mongolia and the project.
In this analysis, the "Methodology for Assessing Environmental Damage" and the "Economics and Audit of Natural Resource Utilization" developed by the Mongolian Association of Environmental Assessors, which are valid in the field, were used as a basis.
Here, the environmental impact of roads and vehicles was considered in relation to the following factors. These include:
Lack of arable land
Damage to soil
Air pollution:
-Dust pollution
-Noxious gas pollution

9.4.1. Land shortage

It is estimated that the post-construction activities of the project will have an impact on the nature and environment, and it will occupy an area of 70.1 hectares.

Table 80. TOTAL AREA OF LAND COVERED BY THE PROJECT

	Indicator		Unit of measurement	Too
1	Total area where road construction will take place		м2	701,461
2	Extent of earthworks	Cut slope	м3	4,204,252
		Dam	м3	3,457,096
3	Paving work	Crushed stone base	м3	264,099
		Cement reinforced foundation	м3	245,534
4	Paving work	Bitumen spraying and coating	м2	1,199,154
		Asphalt pavement	м3	62,737
5	Average distance to construction material factories and quarries (15-20 km)		км	15-20
Total			м3	10,134,333

Source: Budget estimate

The shortage of arable land was calculated as follows.

$Xхомс_0$ = Sнө x(Zмал + Z тат)(9.1)

	$S_{нө}$ 0	Directly affected area, ha	70.15
	$Z_{тат}$	Opportunity cost lost from tax on 1.0 ha of land, ₮	0.45
	Z мал	Loss of income from livestock for herding households, ₮	12000
	$X_{хомс\ 0}$	Estimated damage to land used for grazing if the project had not been implemented, in tons/year;	841,784.77

Soil damage

The following formula was used to calculate the damage to the road surface based on the soil humus content:

Es_0 = ORs * Kp * Kq * Ks * S * He (9.2)

Here:

Es0 – Ecological economic assessment of soil, tg

ORs - Soil humus reserves, kg/ha

Kp - Coefficient of soil characteristics,

Kq - Coefficient of natural geographical indicators

Ks - Soil typology coefficient

S - Soil area, ha
He – Price of 1.0 kg of humus, tg/kg

The ecological economic assessment of soil will be carried out by professional organizations that develop detailed assessments of the natural environment, and in this calculation, the basic ecological economic assessment of soil per 1 ha, determined by the Institute of Geography of the Mongolian Academy of Sciences in different natural zones, was used as a reference. For example:
Steppe brown soil 18-23 million.tug;
If we calculate the damage to the soil during the project implementation:

$S_{нө}$ 0	Directly affected area, ha	70.15
ЭЭЗҮ	EER of steppe brown soil ₮	20,000,000.00
Es0	Total assessment of damage caused to the soil by the road strip	1,402,922,000.00

9.4.3. Damage caused by air pollution

Air pollution occurs from the following sources during road and transportation operations. These include:
Dust generated during road and bridge construction and during the preparation and transportation of construction materials;
Dust generated from the ground when vehicles travel on gravel and dirt roads;
Or dust generated from loose soil on gravel and dirt roads by wind;
Noxious fumes emitted by vehicles using all types of roads;

9.4.3.1. Dust pollution

The dust pollution in the air and environment due to the wind blowing loose soil and causing dust explosions was calculated to be as follows:
During the first soil removal – 0.54 mg/m2s;
3 months after soil removal – 0.32 mg/m2s;
1 year after soil removal – 0.032 mg/m2s

The dust emission from the road (P) was calculated using the following formula.
$П = S \wedge W_c \wedge \gamma$ (9.3)

S0	Dust generation area, m2	701,461.00
$W_c = 0.1 \times 10^{-6}$ kg/(m2.s)	Dust percentage depending on wind speed	0.0000001
(g » 0.1)	Rock mass fragmentation coefficient	0.10
(П) kg/s	Dust from the road	0.01
(П) kg/hour	According to the St. data, there were a total of 5 days of strong winds in 2024 in UB.	25.25
(П) tons/year		3.03

Toxic gas pollution

The amount of toxic gases and smoke in the air varies throughout the four seasons of the year, and the period of air pollution and the acceptable concentration and quality indicators of pollution are determined by the MNS 4585:2007 standard.
The composition of the exhaust from internal combustion engines contains more than 200 chemical compounds and toxic substances, and during the operation of the vehicle, 15% of the fuel is consumed in motion, and the remaining 85% is lost to the air.
When 1 ton of fuel is burned, substances such as CO, CH, NO2, SO2, soot, and benzopyrene are emitted into the air, and their permissible levels are as follows:
CO - 0,1 g
CH – 0,03 g
NO_2 – 0,04 g
SO_2 – 0,02 g
Carbon black – 15.5 g
Benzopyrine – 0.32 g
The amount of damage to the environment from air pollution was calculated using the following formula:
$У_{аг\ 1,2} = T_{аг} * G * f * M_a$ (29)

$У_{a0}$	Assessment of environmental damage from air pollution (₮)	
T_{ar0}	A standard measure used to assess the amount of pollutants emitted into the air per year. For fuel, this figure is 2 tg/kg, or converted to tons - 2000 tg/t.	2,000.00
G	Relative risk indicators of air pollution, depending on local characteristics. In road conditions, this indicator is 0.3	0.30
F	The correction coefficient, depending on the nature of the damage in the air, is calculated as -2.5 for road conditions, due to the emission of dust and mixed gases, and 0.5 for the pollution zone.	0.50
M_{a0}	The weight of waste released into the air per year	

Table 81. FUEL CONSUMPTION AND DISTRIBUTION OF TOXIC SUBSTANCES

	Unit of measurement	Unit	Total
Fuel and lubricants to be used	tons		14
Amount of toxic gases emitted into the air:			
CO	g	0.10000	1.4
CH	g	0.03000	0.42
NO2	g	0.04000	0.56
SO2	g	0.02000	0.28
Soot	tons	15.50	217
Benzapyrine	tons	0.32	4.48

The estimated environmental damage from air pollution during the construction of the project road is:

Table 82. ENVIRONMENTAL IMPACT (without tunnel construction)

Indicator	Damages incurred during project implementation		Occupancy %
	₮	$	
Damage to the land	841,784.77	235.53	0%
Soil damage	1,402,922,000	392,535.53	67%
Damage caused by air pollution	682,916,573.11	191,079.06	33%
All	2,086,680,357.88	583,850.13	100%
Per year	1,043,340,178.94	291,925.06	

Source: Consultant's estimate

According to the calculations, during the implementation of the project, or 2 years, a total of 583.8 thousand.$ will be incurred in the environment, and 291.9 thousand.$ per year.
Within the framework of this project, in order to protect the environment and support the horticultural economy, a total of 9.4 billion.₮ or 2.6 million.$ of green facilities are planned along the project's roads and road structures. The consulting company conducted a study of green facilities when the project was not implemented, and assessed and determined the risks and damages that may arise in the environment during the implementation of the project, and the effects that may arise from it.

If the green development policy and planning are fully implemented in the construction of the project's road infrastructure, it will have a significant impact on the environment and the quality of life of the population, and create a healthy and safe green environment in the project's impact area. For example, in Ulaanbaatar, 35.9 kg of dust was generated per day due to traffic congestion before the project was implemented, but by implementing green economic planning within the project, this amount will be reduced by 239 times. The area of lawns, which was 14.5 thousand m2 before the project was implemented, will be increased by 16.6 times to 256.4 thousand m2 under the project. The impact of green spaces on the project road will be increased by 23.3 times, air purification by 1053.9 times, noise reduction by 25.9 times, soil moisture by 10 times, air humidity by 10 times, water over-discharge by 21.5 times, soil erosion by 40.2 times, and waste transportation by 6.7 times.

Table 83. SUMMARY OF FINANCIAL INVESTMENT CALCULATIONS

Year	Number of vehicles/per flow Time	Number of vehicles/per flow Time	Total vehicles Per day
2027	3,533	2,890	90,602
2030	3,722	3,046	95,473
2035	3,966	3,270	102,492
2040	4,217	3,450	108,149
2044	4,355	3,563	111,685

General calculation data

https://www.mongolbank.mn/mn/currency-rates			**Parameter**	**Value**
	USD 1= MNT 3,580.71		Investment	918 million USD
			Toll per vehicle	2 USD
			Vehicles per day (Year 0)	90,000
			Annual traffic growth (g)	0.5-2%
			Discount rate (i)	9% (real)
			Exchange rate	1 USD = 3,580.94 MNT

Control Data

Country Name	Mongolia
Project Name	Ulanbaatar-I toirog road
Road Identification Code	**UB-I Trass1.1**
Road Name	UB-I TOIROG
Currency Name	Dollars
Currency Symbol	$

Duration of the Wet Season (days)	90
Evaluation Date	jun 10-2025
Road Agency Economic Costs Factor	0.85
Discount Rate (%)	12%
Evaluation Period (years)	20
Initial Calendar Year	2025
Population Served (persons)	1,800,000

Setup Data

	Name of Each Vehicle Type (two words max.)
Vehicle Type 1	Car Medium
Vehicle Type 2	Jeep4WD
Vehicle Type 3	Bus Light
Vehicle Type 4	Bus Medium
Vehicle Type 5	Bus Heavy
Vehicle Type 6	Truck Light
Vehicle Type 7	Truck Medium
Vehicle Type 8	Truck Heavy
Vehicle Type 9	Truck Articulated

	Name of Each Terrain Type
Terrain Type A	Flat
Terrain Type B	Rolling
Terrain Type C	Mountainous

Project-Alternatives Solution

	Alternative 2	Alternative 3
	Trass-2(6%)	Trass-1.1(4%)-T
Net Present Value (million $) at 12% Discount Rate	54.977	178.838
Internal Rate of Return (%)	13%	14%
Equivalent Annual Net Benefits ($/km) at 12% Discount Rate	254715	861990
Modified Rate of Return at 12% Reinvestment Rate (%)	12%	13%
Net Present Value per Financial Investment Costs (ratio)	0.07	0.23
Net Present Value per PV of Economic Agency Costs (ratio)	0.08	0.24
First-Year Benefits per Economic Investment Cost (ratio)	0.20	0.22
Financial Investment Costs (million $)	899.00	918.83
PV of Economic Agency Costs (million $)	720.87	733.86
PV of Economic Normal Traffic User Costs (million $)	2657.02	2523.52
PV of Economic Generated Traffic User Costs (million $)	1968.88	1892.57
PV of Economic Society Costs (million $)	5346.77	5149.94
Number of Fatalities per km-year After Investment	0.0000	0.0000
Investment per Population Served ($/person)	499.444441	510.4606044
Population Served per Investment (persons/1000$)	2.0	2.0

Economic Feasibility: Trass-1.1(4%)-T

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-1.1(4%)-T	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration (days/year)
Without Project	non	C: Mountainous	Z: Earth	90
Project	Trass-1.1(4%)-T	C: Mountainous	X: Paved	

	Dry Season		Wet Season		Car	Jeep4WD	Bus	Bus	Bus	Truck	Truck	Truck	Truck
	Length	Roughness	Length	Roughness	Medium		Light	Medium	Heavy	Light	Medium	Heavy	Articulated
Alternatives	(km)	(IRI)	(km)	(IRI)	Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	24.8	10.3	24.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
	Eco. Investment		E. Maintenance	Accidents	49%	32%	1%	0%	1%	10%	4%	2%	1%
Alternatives	(years)	('000$/km)	('000$/km/year)	(#/m veh-km)	Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	3	31492.13	180.97	13.41	00:25	00:26	00:27	00:28	00:29	00:30	00:30	00:28	00:33

	Annual Normal Daily Traffic	Annual Generated Daily Traffic	Annual Induced Daily Traffic	Net Economic Benefits									Sensitivity Analysis		
				Agency Benefits		User Benefits							A	B	A & B
				Investment	Maintenance	Normal Traffic		Generated Traffic		Road	Other		Agency *	User *	
				Costs	Costs	VOC	Time	VOC	Time	Safety	Benefits	Total	1.25	0.75	
Year	(veh/day)	(veh/day)	(veh/day)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)
2025	87083	0	0	-312.402	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-312.402	-390.502	-312.402	-390.502
2026	92160	0	0	-234.301	0.000	0.000	0.000	0.000	0.000	0.000	-318.800	-553.101	-611.677	-473.401	-531.977
2027	97534	0	0	-234.301	0.000	0.000	0.000	0.000	0.000	0.000	-318.800	-553.101	-611.677	-473.401	-531.977
2028	103223	6022	92280	0.000	-4.488	61.324	44.426	29.277	21.185	8.732	5.000	165.456	164.334	122.970	121.848
2029	109245	6375	93903	0.000	-4.488	64.803	46.978	29.861	21.608	9.241	35.400	203.403	202.281	151.430	150.308
2030	115620	6748	95473	0.000	-4.488	68.480	49.677	30.435	22.027	9.780	40.400	216.312	215.190	161.112	159.990
2031	122368	7144	96986	0.000	-4.488	72.367	52.533	30.997	22.435	10.351	40.400	224.594	223.472	167.324	166.202
2032	129512	7562	98446	0.000	-4.488	76.476	55.553	31.551	22.838	10.955	40.400	233.286	232.164	173.842	172.720
2033	137074	8006	99850	0.000	-4.488	80.820	58.748	32.094	23.233	11.595	50.400	252.401	251.279	188.179	187.057
2034	145080	8475	101199	0.000	-4.488	85.413	62.127	32.628	23.623	12.272	50.400	261.975	260.853	195.359	194.237
2035	152104	8887	102492	0.000	-4.488	89.414	65.081	33.127	23.985	12.866	50.400	270.386	269.264	201.668	200.546
2036	159470	9320	103733	0.000	-4.488	93.604	68.177	33.618	24.343	13.490	50.400	279.143	278.021	208.236	207.114
2037	167195	9773	104920	0.000	-4.488	97.993	71.421	34.099	24.694	14.143	60.400	298.261	297.139	222.574	221.452
2038	175297	10249	106049	0.000	-4.488	102.589	74.820	34.566	25.034	14.828	60.400	307.750	306.628	229.691	228.569
2039	183793	10748	107126	0.000	-4.488	107.403	78.383	35.026	25.371	15.547	60.400	317.642	316.520	237.109	235.987
2040	192250	11245	108145	0.000	-4.488	112.231	81.952	35.465	25.692	16.262	60.400	327.514	326.392	244.514	243.392
2041	201102	11765	109116	0.000	-4.488	117.279	85.687	35.905	26.014	17.011	70.400	347.809	346.687	259.734	258.613
2042	210367	12310	110027	0.000	-4.488	122.559	89.595	36.328	26.323	17.795	70.400	358.511	357.389	267.761	266.639
2043	220066	12880	110885	0.000	-4.488	128.080	93.684	36.742	26.627	18.615	70.400	369.660	368.538	276.123	275.001
2044	230218	13477	111685	0.000	-4.488	133.855	97.962	37.147	26.922	19.474	70.400	381.273	380.151	284.833	283.711

5.2% Growth

Evaluation Period (years)
20

Net Present Value (million $) at 12% Discount Rate	178.838	-4.626	-49.335	-232.799
Internal Rate of Return (%)	14%	12%	11%	9%
Equivalent Annual Net Benefits ($/km) at 12% Discount Rate	861990	-22296	-237793	-1122079
Modified Rate of Return at 12% Reinvestment Rate (%)	13%	12%	12%	11%
Net Present Value per Financial Investment Costs (ratio)	0.23	-0.01	-0.06	-0.30
First-Year Benefits per Economic Investment Cost (ratio)	0.22	0.17	0.16	0.13

User Impact: Trass-1.1(4%)-T

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-1.1(4%)-T	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration (days/year)
Without Project	non	C: Mountainous	Z: Earth	90
Project	Trass-1.1(4%)-T	C: Mountainous	X: Paved	

	Dry Season		Wet Season		Car	Jeep4WD	Bus	Bus	Bus	Truck	Truck	Truck	Truck
	Length	Roughness	Length	Roughness	Medium		Light	Medium	Heavy	Light	Medium	Heavy	Articulated
Alternatives	(km)	(IRI)	(km)	(IRI)	Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	24.8	10.3	24.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Compositon in 2025 (%)								
	Eco. Investment		E. Maintenance	Accidents	49%	32%	1%	0%	1%	10%	4%	2%	1%
Alternatives	(years)	('000$/km)	('000$/km/year)	(#/m veh-km)	Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	3	31492.13	180.97	13.41	00:25	00:26	00:27	00:28	00:29	00:30	00:30	00:28	00:33

	Economic R.U.C Savings	Financial Unit Trip Costs (2025 Dollars)											
		Without Project			With Project			Variation					
		VOC	TIME	TOTAL	VOC	TIME	TOTAL	VOC	TIME	TOTAL	VOC	TIME	TOTAL
	(%)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	(%)	(%)	(%)
Car Medium	-31%	5.60	2.40	8.00	4.26	1.39	5.65	-1.34	-1.01	-2.35	-24%	-42%	-29%
Jeep4WD	-32%	7.08	3.06	10.14	5.30	1.77	7.08	-1.78	-1.28	-3.06	-25%	-42%	-30%
Bus Light	-33%	7.59	6.28	13.88	5.82	3.72	9.55	-1.77	-2.56	-4.33	-23%	-41%	-31%
Bus Medium	-35%	10.81	12.82	23.63	8.05	7.71	15.76	-2.76	-5.11	-7.87	-26%	-40%	-33%
Bus Heavy	-38%	15.57	26.98	42.54	11.56	15.79	27.35	-4.00	-11.19	-15.19	-26%	-41%	-36%
Truck Light	-28%	11.41	1.39	12.79	8.55	0.86	9.41	-2.85	-0.53	-3.38	-25%	-38%	-26%
Truck Medium	-26%	16.75	3.88	20.62	13.11	2.41	15.52	-3.64	-1.46	-5.10	-22%	-38%	-25%
Truck Heavy	-34%	25.41	21.19	46.59	19.19	12.43	31.63	-6.21	-8.75	-14.97	-24%	-41%	-32%
Truck Articulated	-31%	38.23	18.33	56.55	28.85	10.85	39.70	-9.38	-7.47	-16.86	-25%	-41%	-30%

	2025 Daily Traffic	Financial Annual Trip Costs (M Dollars)											
		Without Project			With Project			Variation					
		VOC	TIME	TOTAL	VOC	TIME	TOTAL	VOC		TIME		TOTAL	
	(veh/day)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(%)	(M$/year)	(%)	(M$/year)	(%)
Car Medium	42322	86.447	37.058	123.505	65.801	21.478	87.279	-20.646	34%	-15.580	35%	-36.226	34%
Jeep4WD	28214	72.961	31.471	104.432	54.613	18.270	72.883	-18.348	30%	-13.201	30%	-31.549	30%
Bus Light	958	2.654	2.198	4.852	2.037	1.302	3.339	-0.618	1%	-0.895	2%	-1.513	1%
Bus Medium	105	0.414	0.491	0.906	0.309	0.296	0.604	-0.106	0%	-0.196	0%	-0.302	0%
Bus Heavy	679	3.858	6.686	10.544	2.866	3.913	6.779	-0.992	2%	-2.773	6%	-3.765	4%
Truck Light	9031	37.596	4.566	42.163	28.190	2.832	31.022	-9.407	15%	-1.735	4%	-11.141	11%
Truck Medium	3109	19.003	4.399	23.402	14.872	2.738	17.610	-4.132	7%	-1.661	4%	-5.792	5%
Truck Heavy	1924	17.844	14.877	32.721	13.480	8.731	22.211	-4.364	7%	-6.146	14%	-10.510	10%
Truck Articulated	741	10.340	4.956	15.296	7.803	2.935	10.737	-2.537	4%	-2.022	5%	-4.559	4%
Total	87083	251.117	106.702	357.820	189.969	62.494	252.463	-61.148	100%	-44.208	100%	-105.356	100%

Benefits Distribution: Trass-1.1(4%)-T

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-1.1(4%)-T	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration
Without Project	non	C: Mountainous	Z: Earth	(days/year) 90
Project	Trass-1.1(4%)-T	C: Mountainous	X: Paved	

	Dry Season		Wet Season		Car	Jeep4WD	Bus	Bus	Bus	Truck	Truck	Truck	Truck
	Length	Roughness	Length	Roughness	Medium		Light	Medium	Heavy	Light	Medium	Heavy	Articulated
Alternatives	(km)	(IRI)	(km)	(IRI)	Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	24.8	10.3	24.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
	E. Investment		E. Maintenance	Accidents	49%	32%	1%	0%	1%	10%	4%	2%	1%
Alternatives	(years)	('000$/km)	('000$/km/year)	(#/m veh-km)	Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	3	31492.13	180.97	13.41	00:25	00:26	00:27	00:28	00:29	00:30	00:30	00:28	00:33

	Net Economic Benefits								
	Agency Benefits		User Benefits						
	Investment	Maintenance	Normal Traffic		Generated Traffic		Road	Other	
	Costs	Costs	VOC	Time	VOC	Time	Safety	Benefits	Total
	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)
Present Value (million $) at 12%	-708.383	-25.472	474.409	345.167	182.679	132.256	68.196	-290.013	178.838
	-733.856		912.694						178.838

Total User Benefits	912.694					
User Benefits Components	474.409	345.167	182.679	132.256	68.196	-290.013
User Benefits Percent	52%	38%	20%	14%	7%	-32%

User Benefits Components	474.409	345.167	182.679	132.256	68.196	-290.013
Car Medium	206.859	156.097	77.867	58.760	33.545	-142.655
Jeep4WD	183.839	132.267	69.202	49.791	22.363	-95.102
Bus Light	6.187	8.970	2.329	3.376	0.759	-3.229
Bus Medium	1.060	1.962	0.397	0.735	0.083	-0.353
Bus Heavy	9.939	27.782	3.743	10.463	0.538	-2.289
Truck Light	86.159	15.887	34.802	6.418	6.654	-28.295
Truck Medium	37.845	15.208	15.286	6.143	2.291	-9.741
Truck Heavy	39.972	56.290	16.150	22.744	1.418	-6.029
Truck Articulated	23.238	18.516	9.376	7.471	0.546	-2.320
Car Medium	44%	45%	43%	44%	49%	49%
Jeep4WD	39%	38%	38%	38%	33%	33%
Bus Light	1%	3%	1%	3%	1%	1%
Bus Medium	0%	1%	0%	1%	0%	0%
Bus Heavy	2%	8%	2%	8%	1%	1%
Truck Light	18%	5%	19%	5%	10%	10%
Truck Medium	8%	4%	8%	5%	3%	3%
Truck Heavy	8%	16%	9%	17%	2%	2%
Truck Articulated	5%	5%	5%	6%	1%	1%

Sensitivity: Trass-1.1(4%)-T

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-1.1(4%)-T	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration
Without Project	non	C: Mountainous	Z: Earth	(days/year) 90
Project	Trass-1.1(4%)-T	C: Mountainous	X: Paved	

	Dry Season		Wet Season		Car	Jeep4WD	Bus	Bus	Bus	Truck	Truck	Truck	Truck
	Length	Roughness	Length	Roughness	Medium		Light	Medium	Heavy	Light	Medium	Heavy	Articulated
Alternatives	(km)	(IRI)	(km)	(IRI)	Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	24.8	10.3	24.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Compostion in 2025 (%)								
	E. Investment		E. Maintenance	Accidents	49%	32%	1%	0%	1%	10%	4%	2%	1%
Alternatives	(years)	('000$/km)	('000$/km/year)	(#/m veh-km)	Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	3	31492.13	180.97	13.41	00:25	00:26	00:27	00:28	00:29	00:30	00:30	00:28	00:33

	Multiplier Factor	Net Present Value (million $)	Internal Rate of Return (%)	Equivalent Annual Net Benefits ($/km)	Modified Internal Rate of Return (%)	Multiplier Factor	Net Present Value (million $)	Internal Rate of Return (%)	Equivalent Annual Net Benefits ($/km)	Modified Internal Rate of Return (%)
Base Case		178.838	14%	861990	13%		178.838	14%	861990	13%
Sensitivity Cases:										
Normal Traffic (vpd)	0.75	-0.274	9%	-3278	11%	1.25	0.247	15%	2951	13%
Normal Traffic Growth Rate (%)	0.75	-0.070	11%	-838	12%	1.25	0.047	13%	562	12%
Generated Traffic (vpd)	0.75	-0.045	11%	-540	12%	1.25	0.018	12%	213	12%
Induced Traffic (vpd)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Passenger Time Costs ($/hr)	0.75	-0.045	11%	-536	12%	1.25	0.017	12%	209	12%
Cargo Time Costs ($/hr)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Wet Season Duration (days)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Without Project Dry Season Length (km)	0.75	-0.899	-2%	-10749	5%	1.25	0.956	22%	11428	15%
Without Project Dry Season Roughness (IRI)	0.75	-0.359	7%	-4296	10%	1.25	0.388	16%	4642	14%
Without Project Wet Season Length (km)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Without Project Wet Season Roughness (IRI)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Without Project Accidents Rate (#/m veh-km)	0.75	-0.051	11%	-615	12%	1.25	0.024	12%	288	12%
Without Project Investment Costs (000$/km)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Without Project Maintenance Costs (000/km/yr)	0.75	-0.104	11%	-1238	12%	1.25	0.076	13%	911	12%
Project Dry Season Road Length (km)	0.75	0.967	25%	15418	16%	1.25	-0.916	2%	-8758	7%
Project Dry Season Roughness (IRI)	0.75	0.025	12%	296	12%	1.25	-0.054	11%	-646	12%
Project Wet Season Road Length (km)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Project Wet Season Roughness (IRI)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Project Accidents Rate (#/m veh-km)	0.75	0.004	12%	43	12%	1.25	-0.031	12%	-371	12%
Project Investment Costs (000$/km)	0.75	0.305	17%	3647	14%	1.25	-0.332	9%	-3974	11%
Project Maintenance Costs (000/km/yr)	0.75	0.010	12%	117	12%	1.25	-0.037	12%	-444	12%

Table 85. ECONOMIC ANALYSIS OF THE OPTION

“RED”, HDM-4 VOC PROGRAM ANALYSIS RESULTS

Control Data

Country Name	Mongolia
Project Name	Ulanbaatar-I toirog road
Road Identification Code	**UB-I Trass1.2**
Road Name	UB-I TOIROG
Currency Name	Dollars
Currency Symbol	$

Duration of the Wet Season (days)	90
Evaluation Date	jun 10-2025
Road Agency Economic Costs Factor	0.85
Discount Rate (%)	12%
Evaluation Period (years)	20
Initial Calendar Year	2025
Population Served (persons)	1,800,000

Setup Data

	Name of Each Vehicle Type (two words max.)
Vehicle Type 1	Car Medium
Vehicle Type 2	Jeep4WD
Vehicle Type 3	Bus Light
Vehicle Type 4	Bus Medium
Vehicle Type 5	Bus Heavy
Vehicle Type 6	Truck Light
Vehicle Type 7	Truck Medium
Vehicle Type 8	Truck Heavy
Vehicle Type 9	Truck Articulated

	Name of Each Terrain Type
Terrain Type A	Flat
Terrain Type B	Rolling
Terrain Type C	Mountainous

	Name of Each Road Type
Road Type X	Paved
Road Type Y	Gravel
Road Type Z	Earth

Road Condition Indicator Option	○ Roughness ● Speed of a Reference Vehicle ○ Both Roughness and Speeds of Vehicle Fleet

Project-Alternatives Solution

Country
Project
Road

	Without Project Alternative		
	Alternative 0	Alternative 2	Alternative 3
	non	Trass-1.1(4%)	Trass-1.2(6%)-T
Net Present Value (million $) at 12% Discount Rate Internal Rate of Return (%)	0.000 #N/A	233.086 14%	211.729 14%
Equivalent Annual Net Benefits ($/km) at 12% Discount Rate Modified Rate of Return at 12% Reinvestment Rate (%)	0 #N/A	1123460 13%	1020522 13%
Net Present Value per Financial Investment Costs (ratio) Net Present Value per PV of Economic Agency Costs (ratio) First-Year Benefits per Economic Investment Cost (ratio)	0.00 #DIV/0! 0.00	0.30 0.30 -0.27	0.27 0.28 -0.27
Financial Investment Costs (million $)	0.00	918.83	915.26
PV of Economic Agency Costs (million $) PV of Economic Normal Traffic User Costs (million $) PV of Economic Generated Traffic User Costs (million $) PV of Economic Society Costs (million $)	0.00 3481.12 1509.24 4990.37	768.22 2472.71 1701.95 4942.88	765.19 2500.02 1701.95 4967.16
Number of Fatalities per km-year After Investment	0.0000	0.0000	0.0000
Investment per Population Served ($/person) Population Served per Investment (persons/1000$)	0 0.0	510.4606044 2.0	508.4767422 2.0

Economic Feasibility: Trass-1.2(6%)-T

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-1.2(6%)-T	

Alternatives	Description	Terrain Type	Road Type
Without Project	non	C: Mountainous	Z: Earth
Project	Trass-1.2(6%)-T	C: Mountainous	X: Paved

Wet Season Duration	
(days/year)	90

	Dry Season		Wet Season		Car	Jeep4WD	Bus	Bus	Bus	Truck	Truck	Truck	Truck
	Length	Roughness	Length	Roughness	Medium		Light	Medium	Heavy	Light	Medium	Heavy	Articulated
Alternatives	(km)	(IRI)	(km)	(IRI)	Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	24.8	10.3	24.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
	Eco. Investment		E. Maintenance	Accidents	49%	32%	1%	0%	1%	10%	4%	2%	1%
Alternatives	(years)	('000$/km)	('000$/km/year)	(#/m veh-km)	Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	2	31369.73	180.00	19.17	00:25	00:26	00:27	00:28	00:29	00:30	00:30	00:28	00:33

	Annual Normal Daily Traffic	Annual Generated Daily Traffic	Annual Induced Daily Traffic	Net Economic Benefits									Sensitivity Analysis		
				Agency Benefits		User Benefits							A	B	A & B
				Investment	Maintenance	Normal Traffic		Generated Traffic		Road	Other		Agency *	User *	
				Costs	Costs	VOC	Time	VOC	Time	Safety	Benefits	Total	1.25	0.75	
Year	(veh/day)	(veh/day)	(veh/day)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)
2025	87083	0	0	-388.985	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-388.985	-486.231	-388.985	-486.231
2026	92160	0	0	-388.985	0.000	0.000	0.000	0.000	0.000	0.000	-318.800	-707.785	-805.031	-628.085	-725.331
2027	97534	5689	0	0.000	-4.464	58.034	42.014	1.645	1.206	5.560	-318.800	-214.805	-215.921	-162.220	-163.336
2028	103223	6022	92280	0.000	-4.464	61.324	44.426	29.277	21.185	5.884	5.000	162.633	161.517	120.859	119.743
2029	109245	6375	93903	0.000	-4.464	64.803	46.978	29.861	21.608	6.227	35.400	200.413	199.297	149.194	148.078
2030	115620	6748	95473	0.000	-4.464	68.480	49.677	30.435	22.027	6.591	40.400	213.147	212.031	158.744	157.628
2031	122368	7144	96986	0.000	-4.464	72.367	52.533	30.997	22.435	6.976	40.400	221.242	220.126	164.816	163.700
2032	129512	7562	98446	0.000	-4.464	76.476	55.553	31.551	22.838	7.383	40.400	229.737	228.621	171.187	170.070
2033	137074	8006	99850	0.000	-4.464	80.820	58.748	32.094	23.233	7.814	50.400	248.644	247.528	185.367	184.251
2034	145080	8475	101199	0.000	-4.464	85.413	62.127	32.628	23.623	8.270	50.400	257.996	256.880	192.381	191.265
2035	152104	8887	102492	0.000	-4.464	89.414	65.081	33.127	23.985	8.671	50.400	266.214	265.098	198.544	197.428
2036	159470	9320	103733	0.000	-4.464	93.604	68.177	33.618	24.343	9.091	50.400	274.768	273.652	204.960	203.844
2037	167195	9773	104920	0.000	-4.464	97.993	71.421	34.099	24.694	9.531	60.400	293.673	292.557	219.139	218.022
2038	175297	10249	106049	0.000	-4.464	102.589	74.820	34.566	25.034	9.993	60.400	302.938	301.822	226.088	224.972
2039	183793	10748	107126	0.000	-4.464	107.403	78.383	35.026	25.371	10.477	60.400	312.596	311.480	233.331	232.215
2040	192250	11245	108145	0.000	-4.464	112.231	81.952	35.465	25.692	10.959	60.400	322.234	321.118	240.560	239.444
2041	201102	11765	109116	0.000	-4.464	117.279	85.687	35.905	26.014	11.464	70.400	342.285	341.169	255.598	254.482
2042	210367	12310	110027	0.000	-4.464	122.559	89.595	36.328	26.323	11.992	70.400	352.732	351.616	263.433	262.317
2043	220066	12880	110885	0.000	-4.464	128.080	93.684	36.742	26.627	12.545	70.400	363.614	362.498	271.594	270.478
2044	230218	13477	111685	0.000	-4.464	133.855	97.962	37.147	26.922	13.124	70.400	374.946	373.830	280.093	278.977

5.2% Growth

Evaluation Period (years)
20

Net Present Value (million $) at 12% Discount Rate	211.729	20.432	-32.500	-223.797
Internal Rate of Return (%)	14%	12%	12%	10%
Equivalent Annual Net Benefits ($/km) at 12% Discount Rate	1020522	98481	-156649	-1078691
Modified Rate of Return at 12% Reinvestment Rate (%)	13%	12%	12%	11%
Net Present Value per Financial Investment Costs (ratio)	0.27	0.03	-0.04	-0.29
First-Year Benefits per Economic Investment Cost (ratio)	-0.27	-0.22	-0.20	-0.16

User Impact: Trass-1.2(6%)-T

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-1.2(6%)-T	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration (days/year)
Without Project	non	C: Mountainous	Z: Earth	90
Project	Trass-1.2(6%)-T	C: Mountainous	X: Paved	

	Dry Season		Wet Season		Car	Jeep4WD	Bus	Bus	Bus	Truck	Truck	Truck	Truck
	Length	Roughness	Length	Roughness	Medium		Light	Medium	Heavy	Light	Medium	Heavy	Articulated
Alternatives	(km)	(IRI)	(km)	(IRI)	Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	24.8	10.3	24.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
	Eco. Investment		E. Maintenance	Accidents	49%	32%	1%	0%	1%	10%	4%	2%	1%
Alternatives	(years)	('000$/km)	('000$/km/year)	(#/m veh-km)	Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	2	31369.73	180.00	19.17	00:25	00:26	00:27	00:28	00:29	00:30	00:30	00:28	00:33

	Economic R.U.C. Savings (%)	Financial Unit Trip Costs (2025 Dollars)											
		Without Project			With Project			Variation					
		VOC ($/veh-trip)	TIME ($/veh-trip)	TOTAL ($/veh-trip)	VOC ($/veh-trip)	TIME ($/veh-trip)	TOTAL ($/veh-trip)	VOC ($/veh-trip)	TIME ($/veh-trip)	TOTAL ($/veh-trip)	VOC (%)	TIME (%)	TOTAL (%)
Car Medium	-31%	5.60	2.40	8.00	4.26	1.39	5.65	-1.34	-1.01	-2.35	-24%	-42%	-29%
Jeep4WD	-32%	7.08	3.06	10.14	5.30	1.77	7.08	-1.78	-1.28	-3.06	-25%	-42%	-30%
Bus Light	-33%	7.59	6.28	13.86	5.82	3.72	9.55	-1.77	-2.56	-4.33	-23%	-41%	-31%
Bus Medium	-35%	10.81	12.82	23.63	8.05	7.71	15.76	-2.76	-5.11	-7.87	-26%	-40%	-33%
Bus Heavy	-38%	15.57	26.98	42.54	11.56	15.79	27.35	-4.00	-11.19	-15.19	-26%	-41%	-36%
Truck Light	-28%	11.41	1.39	12.79	8.55	0.86	9.41	-2.85	-0.53	-3.38	-25%	-38%	-26%
Truck Medium	-26%	16.75	3.88	20.62	13.11	2.41	15.52	-3.64	-1.46	-5.10	-22%	-38%	-25%
Truck Heavy	-34%	25.41	21.19	46.59	19.19	12.43	31.63	-6.21	-8.75	-14.97	-24%	-41%	-32%
Truck Articulated	-31%	38.23	18.33	56.55	28.85	10.85	39.70	-9.38	-7.47	-16.86	-25%	-41%	-30%

	2025 Daily Traffic (veh/day)	Financial Annual Trip Costs (M Dollars)											
		Without Project			With Project			Variation					
		VOC (M$/year)	TIME (M$/year)	TOTAL (M$/year)	VOC (M$/year)	TIME (M$/year)	TOTAL (M$/year)	VOC (M$/year)	(%)	TIME (M$/year)	(%)	TOTAL (M$/year)	(%)
Car Medium	42322	86.447	37.058	123.505	65.801	21.478	87.279	-20.646	34%	-15.580	35%	-36.226	34%
Jeep4WD	28214	72.961	31.471	104.432	54.613	18.270	72.883	-18.348	30%	-13.201	30%	-31.549	30%
Bus Light	958	2.654	2.198	4.852	2.037	1.302	3.339	-0.618	1%	-0.895	2%	-1.513	1%
Bus Medium	105	0.414	0.491	0.906	0.309	0.296	0.604	-0.106	0%	-0.196	0%	-0.302	0%
Bus Heavy	679	3.858	6.686	10.544	2.866	3.913	6.779	-0.992	2%	-2.773	6%	-3.765	4%
Truck Light	9031	37.596	4.566	42.163	28.190	2.832	31.022	-9.407	15%	-1.735	4%	-11.141	11%
Truck Medium	3109	19.003	4.399	23.402	14.872	2.738	17.610	-4.132	7%	-1.661	4%	-5.792	5%
Truck Heavy	1924	17.844	14.877	32.721	13.480	8.731	22.211	-4.364	7%	-6.146	14%	-10.510	10%
Truck Articulated	741	10.340	4.956	15.296	7.803	2.935	10.737	-2.537	4%	-2.022	5%	-4.559	4%
Total	87083	251.117	106.702	357.820	189.969	62.494	252.463	-61.148	100%	-44.208	100%	-105.356	100%

Benefits Distribution: Trass-1.2(6%)-T

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-1.2(6%)-T	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration (days/year)
Without Project	non	C: Mountainous	Z: Earth	90
Project	Trass-1.2(6%)-T	C: Mountainous	X: Paved	

	Dry Season		Wet Season		Car	Jeep4WD	Bus	Bus	Bus	Truck	Truck	Truck	Truck
	Length	Roughness	Length	Roughness	Medium		Light	Medium	Heavy	Light	Medium	Heavy	Articulated
Alternatives	(km)	(IRI)	(km)	(IRI)	Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	24.8	10.3	24.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
	E. Investment		E. Maintenance	Accidents	49%	32%	1%	0%	1%	10%	4%	2%	1%
Alternatives	(years)	('000$/km)	('000$/km/year)	(#/m veh-km)	Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	2	31369.73	180.00	19.17	00:25	00:26	00:27	00:28	00:29	00:30	00:30	00:28	00:33

	Net Economic Benefits							
	Agency Benefits		User Benefits					
	Investment Costs	Maintenance Costs	Normal Traffic		Generated Traffic		Road Safety	Other Benefits	Total
	(M$/year)	(M$/year)	VOC (M$/year)	Time (M$/year)	VOC (M$/year)	Time (M$/year)	(M$/year)	(M$/year)	(M$/year)
Present Value (million $) at 12%	-736.292	-28.896	520.673	378.661	183.991	133.218	50.389	-290.013	211.729
	-765.188		976.917						211.729

Total User Benefits	976.917					
User Benefits Components	520.673	378.661	183.991	133.218	50.389	-290.013
User Benefits Percent	53%	39%	19%	14%	5%	-30%

User Benefits Components	520.673	378.661	183.991	133.218	50.389	-290.013
Car Medium	202.301	152.657	70.052	52.863	24.786	-142.655
Jeep4WD	179.788	129.352	62.257	44.794	16.524	-95.102
Bus Light	6.051	8.773	2.095	3.037	0.561	-3.229
Bus Medium	1.037	1.919	0.357	0.662	0.061	-0.353
Bus Heavy	9.720	27.170	3.367	9.413	0.398	-2.289
Truck Light	84.708	15.636	31.270	5.766	4.016	-28.295
Truck Medium	37.247	14.958	13.735	5.520	1.692	-9.741
Truck Heavy	39.341	55.401	14.511	20.436	1.047	-6.029
Truck Articulated	22.871	18.224	8.424	6.713	0.403	-2.320
Car Medium	39%	40%	38%	40%	49%	-49%
Jeep4WD	35%	34%	34%	34%	33%	33%
Bus Light	1%	2%	1%	2%	1%	1%
Bus Medium	0%	1%	0%	0%	0%	0%
Bus Heavy	2%	7%	2%	7%	1%	1%
Truck Light	16%	4%	17%	4%	10%	10%
Truck Medium	7%	4%	7%	4%	3%	3%
Truck Heavy	8%	15%	8%	15%	2%	2%
Truck Articulated	4%	5%	5%	5%	1%	1%

Sensitivity: Trass-1.2(6%)-T

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-1.2(6%)-T	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration (days/year) 90
Without Project	non	C: Mountainous	Z: Earth	
Project	Trass-1.2(6%)-T	C: Mountainous	X: Paved	

	Dry Season		Wet Season		Car	Jeep4WD	Bus	Bus	Bus	Truck	Truck	Truck	Truck
	Length	Roughness	Length	Roughness	Medium		Light	Medium	Heavy	Light	Medium	Heavy	Articulated
Alternatives	(km)	(IRI)	(km)	(IRI)	Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	24.8	10.3	24.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
	E. Investment		E. Maintenance	Accidents	49%	32%	1%	0%	1%	10%	4%	2%	1%
Alternatives	(years)	('000$/km)	('000$/km/year)	(#/m veh-km)	Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	2	31369.73	180.00	19.17	00:25	00:26	00:27	00:28	00:29	00:30	00:30	00:28	00:33

	Multiplier Factor	Net Present Value (million $)	Internal Rate of Return (%)	Equivalent Annual Net Benefits ($/km)	Modified Internal Rate of Return (%)	Multiplier Factor	Net Present Value (million $)	Internal Rate of Return (%)	Equivalent Annual Net Benefits ($/km)	Modified Internal Rate of Return (%)
Base Case		211.729	14%	1020522	13%		211.729	14%	1020522	13%
Sensitivity Cases:										
Normal Traffic (vpd)	0.75	-0.274	9%	-3278	11%	1.25	0.247	15%	2951	13%
Normal Traffic Growth Rate (%)	0.75	-0.070	11%	-838	12%	1.25	0.047	13%	562	12%
Generated Traffic (vpd)	0.75	-0.045	11%	-540	12%	1.25	0.018	12%	213	12%
Induced Traffic (vpd)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Passenger Time Costs ($/hr)	0.75	-0.045	11%	-536	12%	1.25	0.017	12%	209	12%
Cargo Time Costs ($/hr)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Wet Season Duration (days)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Without Project Dry Season Length (km)	0.75	-0.899	-2%	-10749	5%	1.25	0.956	22%	11428	15%
Without Project Dry Season Roughness (IRI)	0.75	-0.359	7%	-4296	10%	1.25	0.388	16%	4642	14%
Without Project Wet Season Length (km)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Without Project Wet Season Roughness (IRI)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Without Project Accidents Rate (#/m veh-km)	0.75	-0.051	11%	-615	12%	1.25	0.024	12%	288	12%
Without Project Investment Costs (000$/km)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Without Project Maintenance Costs (000/km/yr)	0.75	-0.104	11%	-1238	12%	1.25	0.076	13%	911	12%
Project Dry Season Road Length (km)	0.75	0.967	25%	15418	16%	1.25	-0.916	2%	-8758	7%
Project Dry Season Roughness (IRI)	0.75	0.025	12%	296	12%	1.25	-0.054	11%	-646	12%
Project Wet Season Road Length (km)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Project Wet Season Roughness (IRI)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Project Accidents Rate (#/m veh-km)	0.75	0.004	12%	43	12%	1.25	-0.031	12%	-371	12%
Project Investment Costs (000$/km)	0.75	0.305	17%	3647	14%	1.25	-0.332	9%	-3974	11%
Project Maintenance Costs (000/km/yr)	0.75	0.010	12%	117	12%	1.25	-0.037	12%	-444	12%

Table 86. ECONOMIC ANALYSIS OF TRASS-2 VERSION

"RED", HDM-4 VOC PROGRAM ANALYSIS RESULTS

Control Data

Country Name	Mongolia
Project Name	Ulanbaatar-I toirog road
Road Identification Code	**UB-I Trass2**
Road Name	UB-I TOIROG
Currency Name	Dollars
Currency Symbol	$

Duration of the Wet Season (days)	90
Evaluation Date	jun 10-2025
Road Agency Economic Costs Factor	0.85
Discount Rate (%)	12%
Evaluation Period (years)	20
Initial Calendar Year	2025
Population Served (persons)	1,800,000

Setup Data

	Name of Each Vehicle Type (two words max.)
Vehicle Type 1	Car Medium
Vehicle Type 2	Jeep4WD
Vehicle Type 3	Bus Light
Vehicle Type 4	Bus Medium
Vehicle Type 5	Bus Heavy
Vehicle Type 6	Truck Light
Vehicle Type 7	Truck Medium
Vehicle Type 8	Truck Heavy
Vehicle Type 9	Truck Articulated

	Name of Each Terrain Type
Terrain Type A	Flat
Terrain Type B	Rolling
Terrain Type C	Mountainous

	Name of Each Road Type
Road Type X	Paved
Road Type Y	Gravel
Road Type Z	Earth

Road Condition Indicator Option	○ Roughness ● Speed of a Reference Vehicle ○ Both Roughness and Speeds of Vehicle Fleet

Project-Alternatives Solution

	Alternative 2	Alternative 3
	Trass-2(6%)	Trass-1.1(4%)-T
Net Present Value (million $) at 12% Discount Rate	54.977	178.838
Internal Rate of Return (%)	13%	14%
Equivalent Annual Net Benefits ($/km) at 12% Discount Rate	254715	861990
Modified Rate of Return at 12% Reinvestment Rate (%)	12%	13%
Net Present Value per Financial Investment Costs (ratio)	0.07	0.23
Net Present Value per PV of Economic Agency Costs (ratio)	0.08	0.24
First-Year Benefits per Economic Investment Cost (ratio)	0.20	0.22
Financial Investment Costs (million $)	899.00	918.83
PV of Economic Agency Costs (million $)	720.87	733.86
PV of Economic Normal Traffic User Costs (million $)	2657.02	2523.52
PV of Economic Generated Traffic User Costs (million $)	1968.88	1892.57
PV of Economic Society Costs (million $)	5346.77	5149.94
Number of Fatalities per km-year After Investment	0.0000	0.0000
Investment per Population Served ($/person)	499.444441	510.4606044
Population Served per Investment (persons/1000$)	2.0	2.0

Economic Feasibility: Trass-2(6%)

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-2(6%)	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration (days/year)
Without Project	non	C: Mountainous	Z: Earth	90
Project	Trass-2(6%)	C: Mountainous	X: Paved	

Alternatives	Dry Season Length (km)	Dry Season Roughness (IRI)	Wet Season Length (km)	Wet Season Roughness (IRI)	Car Medium	Jeep4WD	Bus Light	Bus Medium	Bus Heavy	Truck Light	Truck Medium	Truck Heavy	Truck Articulated
					Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	25.8	10.3	25.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
Alternatives	Eco. Investment (years)	Eco. Investment ('000$/km)	E. Maintenance ('000$/km/year)	Accidents (#/m veh-km)	49%	32%	1%	0%	1%	10%	4%	2%	1%
					Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	3	29618.22	189.70	19.71	00:26	00:27	00:28	00:29	00:30	00:31	00:31	00:29	00:35

Year	Annual Normal Daily Traffic (veh/day)	Annual Generated Daily Traffic (veh/day)	Annual Induced Daily Traffic (veh/day)	Agency Benefits: Investment Costs (M$/year)	Agency Benefits: Maintenance Costs (M$/year)	User Benefits: Normal Traffic VOC (M$/year)	Normal Traffic Time (M$/year)	Generated Traffic VOC (M$/year)	Generated Traffic Time (M$/year)	Road Safety (M$/year)	Other Benefits (M$/year)	Total (M$/year)	Sensitivity Analysis A Agency * 1.25 (M$/year)	B User * 0.75 (M$/year)	A & B (M$/year)
2025	87083	0	0	-305.660	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-305.660	-382.075	-305.660	-382.075
2026	92160	0	0	-229.245	0.000	0.000	0.000	0.000	0.000	0.000	-318.800	-548.045	-605.356	-468.345	-525.656
2027	97534	0	0	-229.245	0.000	0.000	0.000	0.000	0.000	0.000	-318.800	-548.045	-605.356	-468.345	-525.656
2028	103223	6022	92280	0.000	-4.894	53.643	41.895	25.610	19.978	5.224	5.000	146.456	145.232	108.618	107.395
2029	109245	6375	93903	0.000	-4.894	56.686	44.302	26.120	20.377	5.529	35.400	183.520	182.296	136.416	135.193
2030	115620	6748	95473	0.000	-4.894	59.903	46.848	26.623	20.772	5.852	40.400	195.503	194.280	145.404	144.180
2031	122368	7144	96986	0.000	-4.894	63.304	49.541	27.114	21.156	6.193	40.400	202.813	201.590	150.886	149.663
2032	129512	7562	98446	0.000	-4.894	66.899	52.389	27.599	21.537	6.555	40.400	210.484	209.260	156.639	155.416
2033	137074	8006	99850	0.000	-4.894	70.699	55.403	28.074	21.909	6.938	50.400	228.527	227.303	170.172	168.948
2034	145080	8475	101199	0.000	-4.894	74.717	58.590	28.541	22.276	7.343	50.400	236.973	235.749	176.506	175.283
2035	152104	8887	102492	0.000	-4.894	78.217	61.376	28.978	22.618	7.698	50.400	244.394	243.171	182.072	180.848
2036	159470	9320	103733	0.000	-4.894	81.884	64.296	29.407	22.956	8.071	50.400	252.119	250.896	187.866	186.642
2037	167195	9773	104920	0.000	-4.894	85.723	67.356	29.828	23.286	8.462	60.400	270.161	268.938	201.397	200.174
2038	175297	10249	106049	0.000	-4.894	89.745	70.563	30.236	23.608	8.872	60.400	278.529	277.306	207.673	206.450
2039	183793	10748	107126	0.000	-4.894	93.957	73.923	30.639	23.925	9.302	60.400	287.251	286.028	214.215	212.991
2040	192250	11245	108145	0.000	-4.894	98.189	77.293	31.023	24.228	9.730	60.400	295.968	294.744	220.752	219.529
2041	201102	11765	109116	0.000	-4.894	102.615	80.819	31.409	24.532	10.178	70.400	315.058	313.834	235.070	233.846
2042	210367	12310	110027	0.000	-4.894	107.244	84.508	31.778	24.823	10.647	70.400	324.506	323.283	242.156	240.932
2043	220066	12880	110885	0.000	-4.894	112.085	88.369	32.141	25.110	11.138	70.400	334.349	333.125	249.538	248.314
2044	230218	13477	111685	0.000	-4.894	117.149	92.409	32.495	25.389	11.652	70.400	344.600	343.376	257.226	256.003

5.2% Growth

Evaluation Period (years)
20

Net Economic Benefits				
Net Present Value (million $) at 12% Discount Rate	54.977	-125.242	-138.986	-319.205
Internal Rate of Return (%)	13%	11%	10%	8%
Equivalent Annual Net Benefits ($/km) at 12% Discount Rate	254715	-580261	-643940	-1478915
Modified Rate of Return at 12% Reinvestment Rate (%)	12%	11%	11%	10%
Net Present Value per Financial Investment Costs (ratio)	0.07	-0.16	-0.18	-0.42
First-Year Benefits per Economic Investment Cost (ratio)	0.20	0.16	0.15	0.12

User Impact: Trass-2(6%)

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-2(6%)	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration (days/year)
Without Project	non	C: Mountainous	Z: Earth	90
Project	Trass-2(6%)	C: Mountainous	X: Paved	

Alternatives	Dry Season Length (km)	Dry Season Roughness (IRI)	Wet Season Length (km)	Wet Season Roughness (IRI)	Car Medium	Jeep4WD	Bus Light	Bus Medium	Bus Heavy	Truck Light	Truck Medium	Truck Heavy	Truck Articulated
					Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	25.8	10.3	25.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
Alternatives	Eco. Investment (years)	Eco. Investment ('000$/km)	E. Maintenance ('000$/km/year)	Accidents (#/m veh-km)	49%	32%	1%	0%	1%	10%	4%	2%	1%
					Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	3	29618.22	189.70	19.71	00:26	00:27	00:28	00:29	00:30	00:31	00:31	00:29	00:35

	Economic R.U.C. Savings (%)	Financial Unit Trip Costs (2025 Dollars): Without Project VOC ($/veh-trip)	Without Project TIME ($/veh-trip)	Without Project TOTAL ($/veh-trip)	With Project VOC ($/veh-trip)	With Project TIME ($/veh-trip)	With Project TOTAL ($/veh-trip)	Variation VOC ($/veh-trip)	Variation TIME ($/veh-trip)	Variation TOTAL ($/veh-trip)	Variation VOC (%)	Variation TIME (%)	Variation TOTAL (%)
Car Medium	-28%	5.60	2.40	8.00	4.43	1.45	5.88	-1.16	-0.95	-2.12	-21%	-40%	-26%
Jeep4WD	-29%	7.08	3.06	10.14	5.52	1.85	7.36	-1.57	-1.21	-2.78	-22%	-40%	-27%
Bus Light	-30%	7.59	6.28	13.88	6.06	3.87	9.93	-1.53	-2.41	-3.94	-20%	-38%	-28%
Bus Medium	-32%	10.81	12.82	23.63	8.37	8.02	16.40	-2.44	-4.80	-7.23	-23%	-37%	-31%
Bus Heavy	-35%	15.57	26.98	42.54	12.03	16.42	28.46	-3.54	-10.55	-14.09	-23%	-39%	-33%
Truck Light	-25%	11.41	1.39	12.79	8.90	0.89	9.79	-2.51	-0.49	-3.00	-22%	-35%	-23%
Truck Medium	-23%	16.75	3.88	20.62	13.63	2.51	16.14	-3.11	-1.37	-4.48	-19%	-35%	-22%
Truck Heavy	-31%	25.41	21.19	46.59	19.97	12.93	32.90	-5.44	-8.25	-13.69	-21%	-39%	-29%
Truck Articulated	-29%	38.23	18.33	56.55	30.01	11.29	41.30	-8.22	-7.04	-15.25	-21%	-38%	-27%

	2025 Daily Traffic (veh/day)	Financial Annual Trip Costs (M Dollars): Without Project VOC (M$/year)	Without Project TIME (M$/year)	Without Project TOTAL (M$/year)	With Project VOC (M$/year)	With Project TIME (M$/year)	With Project TOTAL (M$/year)	Variation VOC (M$/year)	VOC (%)	Variation TIME (M$/year)	TIME (%)	Variation TOTAL (M$/year)	TOTAL (%)
Car Medium	42322	86.447	37.058	123.505	68.454	22.344	90.798	-17.992	34%	-14.714	35%	-32.706	34%
Jeep4WD	28214	72.961	31.471	104.432	56.815	19.006	75.822	-16.146	30%	-12.465	30%	-28.611	30%
Bus Light	958	2.654	2.198	4.852	2.119	1.355	3.474	-0.535	1%	-0.843	2%	-1.378	1%
Bus Medium	105	0.414	0.491	0.906	0.321	0.308	0.628	-0.093	0%	-0.184	0%	-0.277	0%
Bus Heavy	679	3.858	6.686	10.544	2.982	4.071	7.052	-0.876	2%	-2.615	6%	-3.491	4%
Truck Light	9031	37.596	4.566	42.163	29.327	2.946	32.272	-8.270	15%	-1.620	4%	-9.890	10%
Truck Medium	3109	19.003	4.399	23.402	15.471	2.848	18.320	-3.532	7%	-1.550	4%	-5.082	5%
Truck Heavy	1924	17.844	14.877	32.721	14.023	9.084	23.107	-3.821	7%	-5.794	14%	-9.614	10%
Truck Articulated	741	10.340	4.956	15.296	8.117	3.053	11.170	-2.223	4%	-1.903	5%	-4.126	4%
Total	87083	251.117	106.702	357.820	197.629	65.014	262.643	-53.488	100%	-41.688	100%	-95.177	100%

Benefits Distribution: Trass-2(6%)

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-2(6%)	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration (days/year)
Without Project	non	C: Mountainous	Z: Earth	90
Project	Trass-2(6%)	C: Mountainous	X: Paved	

	Dry Season		Wet Season		Car	Jeep4WD	Bus	Bus	Bus	Truck	Truck	Truck	Truck
	Length	Roughness	Length	Roughness	Medium		Light	Medium	Heavy	Light	Medium	Heavy	Articulated
Alternatives	(km)	(IRI)	(km)	(IRI)	Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	25.8	10.3	25.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
	Eco. Investment		E. Maintenance	Accidents	49%	32%	1%	0%	1%	10%	4%	2%	1%
Alternatives	(years)	('000$/km)	('000$/km/year)	(#/m veh-km)	Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	3	29618.22	189.70	19.71	00:26	00:27	00:28	00:29	00:30	00:31	00:31	00:29	00:35

	Net Economic Benefits								
	Agency Benefits		User Benefits						
	Investment	Maintenance	Normal Traffic		Generated Traffic		Road	Other	
	Costs	Costs	VOC	Time	VOC	Time	Safety	Benefits	Total
	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)
Present Value (million $) at 12%	-693.096	-27.779	415.022	325.523	159.797	124.719	40.803	-290.013	54.977
	-720.875		775.852						54.977

Total User Benefits	775.852					
User Benefits Components	415.022	325.523	159.797	124.719	40.803	-290.013
User Benefits Percent	53%	42%	21%	16%	5%	-37%

User Benefits Components	415.022	325.523	159.797	124.719	40.803	-290.013
Car Medium	180.283	147.422	67.860	55.494	20.071	-142.655
Jeep4WD	161.782	124.888	60.897	47.013	13.380	-95.102
Bus Light	5.365	8.444	2.019	3.178	0.454	-3.229
Bus Medium	0.935	1.843	0.351	0.691	0.050	-0.353
Bus Heavy	8.781	26.202	3.307	9.867	0.322	-2.289
Truck Light	75.751	14.841	30.597	5.995	3.981	-28.295
Truck Medium	32.354	14.197	13.068	5.735	1.370	-9.741
Truck Heavy	34.996	53.066	14.139	21.441	0.848	-6.029
Truck Articulated	20.358	17.432	8.213	7.034	0.326	-2.320
Car Medium	43%	45%	42%	44%	49%	49%
Jeep4WD	39%	38%	38%	38%	33%	33%
Bus Light	1%	3%	1%	3%	1%	1%
Bus Medium	0%	1%	0%	1%	0%	0%
Bus Heavy	2%	8%	2%	8%	1%	1%
Truck Light	18%	5%	19%	5%	10%	10%
Truck Medium	8%	4%	8%	5%	3%	3%
Truck Heavy	8%	16%	9%	17%	2%	2%
Truck Articulated	5%	5%	5%	6%	1%	1%

Sensitivity: Trass-2(6%)

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-2(6%)	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration (days/year)
Without Project	non	C: Mountainous	Z: Earth	90
Project	Trass-2(6%)	C: Mountainous	X: Paved	

	Dry Season		Wet Season		Car	Jeep4WD	Bus	Bus	Bus	Truck	Truck	Truck	Truck
	Length	Roughness	Length	Roughness	Medium		Light	Medium	Heavy	Light	Medium	Heavy	Articulated
Alternatives	(km)	(IRI)	(km)	(IRI)	Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	25.8	10.3	25.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
	Eco. Investment		E. Maintenance	Accidents	49%	32%	1%	0%	1%	10%	4%	2%	1%
Alternatives	(years)	('000$/km)	('000$/km/year)	(#/m veh-km)	Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	3	29618.22	189.70	19.71	00:26	00:27	00:28	00:29	00:30	00:31	00:31	00:29	00:35

	Multiplier Factor	Net Present Value (million $)	Internal Rate of Return (%)	Equivalent Annual Net Benefits ($/km)	Modified Internal Rate of Return (%)	Multiplier Factor	Net Present Value (million $)	Internal Rate of Return (%)	Equivalent Annual Net Benefits ($/km)	Modified Internal Rate of Return (%)
Base Case		54.977	13%	254715	12%		54.977	13%	254715	12%
Sensitivity Cases:										
Normal Traffic (vpd)	0.75	-0.143	9%	-1707	11%	1.25	0.337	17%	4028	14%
Normal Traffic Growth Rate (%)	0.75	0.045	13%	540	12%	1.25	0.153	14%	1828	13%
Generated Traffic (vpd)	0.75	0.070	13%	842	12%	1.25	0.124	14%	1478	13%
Induced Traffic (vpd)	0.75	0.097	14%	1160	13%	1.25	0.097	14%	1160	13%
Passenger Time Costs ($/hr)	0.75	0.068	13%	811	12%	1.25	0.126	14%	1509	13%
Cargo Time Costs ($/hr)	0.75	0.097	14%	1160	13%	1.25	0.097	14%	1160	13%
Wet Season Duration (days)	0.75	0.097	14%	1160	13%	1.25	0.097	14%	1160	13%
Without Project Dry Season Length (km)	0.75	-0.773	#NUM!	-9245	-1%	1.25	1.058	28%	12643	17%
Without Project Dry Season Roughness (IRI)	0.75	-0.243	7%	-2906	10%	1.25	0.494	20%	5907	15%
Without Project Wet Season Length (km)	0.75	0.097	14%	1160	13%	1.25	0.097	14%	1160	13%
Without Project Wet Season Roughness (IRI)	0.75	0.097	14%	1160	13%	1.25	0.097	14%	1160	13%
Without Project Accidents Rate (#/m veh-km)	0.75	0.059	13%	709	12%	1.25	0.135	14%	1611	13%
Without Project Investment Costs (000$/km)	0.75	0.097	14%	1160	13%	1.25	0.097	14%	1160	13%
Without Project Maintenance Costs (000/km/yr)	0.75	0.007	12%	86	12%	1.25	0.187	15%	2234	13%
Project Dry Season Road Length (km)	0.75	1.042	33%	16606	18%	1.25	-0.763	-2%	-7298	5%
Project Dry Season Roughness (IRI)	0.75	0.160	15%	1909	13%	1.25	0.031	13%	365	12%
Project Wet Season Road Length (km)	0.75	0.097	14%	1160	13%	1.25	0.097	14%	1160	13%
Project Wet Season Roughness (IRI)	0.75	0.097	14%	1160	13%	1.25	0.097	14%	1160	13%
Project Accidents Rate (#/m veh-km)	0.75	0.114	14%	1367	13%	1.25	0.080	13%	953	13%
Project Investment Costs (000$/km)	0.75	0.310	19%	3700	14%	1.25	-0.115	10%	-1380	11%
Project Maintenance Costs (000/km/yr)	0.75	0.178	15%	2133	13%	1.25	0.016	12%	187	12%

Economic Feasibility: Trass-1.1(4%)-T

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-1.1(4%)-T	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration (days/year)
Without Project	non	C: Mountainous	Z: Earth	90
Project	Trass-1.1(4%)-T	C: Mountainous	X: Paved	

	Dry Season		Wet Season		Car Medium	Jeep4WD	Bus Light	Bus Medium	Bus Heavy	Truck Light	Truck Medium	Truck Heavy	Truck Articulated
Alternatives	Length (km)	Roughness (IRI)	Length (km)	Roughness (IRI)	Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	24.8	10.3	24.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
	Eco. Investment		E. Maintenance	Accidents	49%	32%	1%	0%	1%	10%	4%	2%	1%
Alternatives	(years)	('000$/km)	('000$/km/year)	(#/m veh-km)	Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	2	32123.99	185.40	13.42	00:25	00:26	00:27	00:28	00:29	00:30	00:30	00:28	00:33

	Annual Normal Daily Traffic	Annual Generated Daily Traffic	Annual Induced Daily Traffic	Net Economic Benefits									Sensitivity Analysis		
				Agency Benefits		User Benefits							A	B	A & B
				Investment Costs	Maintenance Costs	Normal Traffic		Generated Traffic		Road Safety	Other Benefits	Total	Agency * 1.25	User * 0.75	
Year	(veh/day)	(veh/day)	(veh/day)	(M$/year)	(M$/year)	VOC (M$/year)	Time (M$/year)	VOC (M$/year)	Time (M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)
2025	87083	0	0	-398.337	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-398.337	-497.922	-398.337	-497.922
2026	92160	0	0	-398.337	0.000	0.000	0.000	0.000	0.000	0.000	-318.800	-717.137	-816.722	-637.437	-737.022
2027	97534	5689	0	0.000	-4.598	58.034	42.014	1.645	1.206	8.246	-318.800	-212.253	-213.402	-160.339	-161.488
2028	103223	6022	92280	0.000	-4.598	61.324	44.426	29.277	21.185	8.727	2.600	162.942	161.792	121.057	119.907
2029	109245	6375	93903	0.000	-4.598	64.803	46.978	29.861	21.608	9.236	33.000	200.888	199.739	149.517	148.367
2030	115620	6748	95473	0.000	-4.598	68.480	49.677	30.435	22.027	9.775	35.400	211.197	210.048	157.248	156.099
2031	122368	7144	96986	0.000	-4.598	72.367	52.533	30.997	22.435	10.346	35.400	219.479	218.329	163.459	162.310
2032	129512	7562	98446	0.000	-4.598	76.476	55.553	31.551	22.838	10.950	35.400	228.170	227.020	169.978	168.828
2033	137074	8006	99850	0.000	-4.598	80.820	58.748	32.094	23.233	11.589	40.400	242.285	241.136	180.564	179.415
2034	145080	8475	101199	0.000	-4.598	85.413	62.127	32.628	23.623	12.266	40.400	251.858	250.709	187.744	186.595
2035	152104	8887	102492	0.000	-4.598	89.414	65.081	33.127	23.985	12.860	40.400	260.269	259.120	194.053	192.903
2036	159470	9320	103733	0.000	-4.598	93.604	68.177	33.618	24.343	13.483	40.400	269.026	267.877	200.620	199.471
2037	167195	9773	104920	0.000	-4.598	97.993	71.421	34.099	24.694	14.136	40.400	278.144	276.994	207.458	206.309
2038	175297	10249	106049	0.000	-4.598	102.589	74.820	34.566	25.034	14.821	40.400	287.633	286.483	214.575	213.425
2039	183793	10748	107126	0.000	-4.598	107.403	78.383	35.026	25.371	15.539	40.400	297.524	296.374	221.993	220.844
2040	192250	11245	108145	0.000	-4.598	112.231	81.952	35.465	25.692	16.254	40.400	307.396	306.246	229.397	228.248
2041	201102	11765	109116	0.000	-4.598	117.279	85.687	35.905	26.014	17.003	40.400	317.690	316.540	237.118	235.968
2042	210367	12310	110027	0.000	-4.598	122.559	89.595	36.328	26.323	17.786	40.400	328.392	327.242	245.144	243.995
2043	220066	12880	110885	0.000	-4.598	128.080	93.684	36.742	26.627	18.606	40.400	339.541	338.391	253.506	252.357
2044	230218	13477	111685	0.000	-4.598	133.855	97.962	37.147	26.922	19.464	40.400	351.153	350.003	262.215	261.066

5.2% Growth

Evaluation Period (years)
20

Net Present Value (million $) at 12% Discount Rate	158.789	-37.151	-76.848	-272.787
Internal Rate of Return (%)	14%	12%	11%	9%
Equivalent Annual Net Benefits ($/km) at 12% Discount Rate	765355	-179064	-370402	-1314821
Modified Rate of Return at 12% Reinvestment Rate (%)	13%	12%	12%	11%
Net Present Value per Financial Investment Costs (ratio)	0.20	-0.05	-0.10	-0.34
First-Year Benefits per Economic Investment Cost (ratio)	-0.26	-0.21	-0.20	-0.16

User Impact: Trass-1.1(4%)-T

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-1.1(4%)-T	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration (days/year)
Without Project	non	C: Mountainous	Z: Earth	90
Project	Trass-1.1(4%)-T	C: Mountainous	X: Paved	

	Dry Season		Wet Season		Car	Jeep4WD	Bus	Bus	Bus	Truck	Truck	Truck	Truck
	Length	Roughness	Length	Roughness	Medium		Light	Medium	Heavy	Light	Medium	Heavy	Articulated
Alternatives	(km)	(IRI)	(km)	(IRI)	Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	24.8	10.3	24.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
	Eco. Investment		E. Maintenance	Accidents	49%	32%	1%	0%	1%	10%	4%	2%	1%
Alternatives	(years)	('000$/km)	('000$/km/year)	(#/m veh-km)	Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	2	32123.99	185.40	13.42	00:25	00:26	00:27	00:28	00:29	00:30	00:30	00:28	00:33

	Economic R.U.C. Savings	Financial Unit Trip Costs (2025 Dollars)											
		Without Project			With Project			Variation					
		VOC	TIME	TOTAL	VOC	TIME	TOTAL	VOC	TIME	TOTAL	VOC	TIME	TOTAL
	(%)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	(%)	(%)	(%)
Car Medium	-31%	5.60	2.40	8.00	4.26	1.39	5.65	-1.34	-1.01	-2.35	-24%	-42%	-29%
Jeep4WD	-32%	7.08	3.06	10.14	5.30	1.77	7.08	-1.78	-1.28	-3.06	-25%	-42%	-30%
Bus Light	-33%	7.59	6.28	13.88	5.82	3.72	9.55	-1.77	-2.56	-4.33	-23%	-41%	-31%
Bus Medium	-35%	10.81	12.82	23.63	8.05	7.71	15.76	-2.76	-5.11	-7.87	-26%	-40%	-33%
Bus Heavy	-38%	15.57	26.98	42.54	11.56	15.79	27.35	-4.00	-11.19	-15.19	-26%	-41%	-36%
Truck Light	-28%	11.41	1.39	12.79	8.55	0.86	9.41	-2.85	-0.53	-3.38	-25%	-38%	-26%
Truck Medium	-26%	16.75	3.88	20.62	13.11	2.41	15.52	-3.64	-1.46	-5.10	-22%	-38%	-25%
Truck Heavy	-34%	25.41	21.19	46.59	19.19	12.43	31.63	-6.21	-8.75	-14.97	-24%	-41%	-32%
Truck Articulated	-31%	38.23	18.33	56.55	28.85	10.85	39.70	-9.38	-7.47	-16.86	-25%	-41%	-30%

	2025 Daily Traffic	Financial Annual Trip Costs (M Dollars)											
		Without Project			With Project			Variation					
		VOC	TIME	TOTAL	VOC	TIME	TOTAL	VOC		TIME		TOTAL	
	(veh/day)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(%)	(M$/year)	(%)	(M$/year)	(%)
Car Medium	42322	86.447	37.058	123.505	65.801	21.478	87.279	-20.646	34%	-15.580	35%	-36.226	34%
Jeep4WD	28214	72.961	31.471	104.432	54.613	18.270	72.883	-18.348	30%	-13.201	30%	-31.549	30%
Bus Light	958	2.654	2.198	4.852	2.037	1.302	3.339	-0.618	1%	-0.895	2%	-1.513	1%
Bus Medium	105	0.414	0.491	0.906	0.309	0.296	0.604	-0.106	0%	-0.196	0%	-0.302	0%
Bus Heavy	679	3.858	6.686	10.544	2.866	3.913	6.779	-0.992	2%	-2.773	6%	-3.765	4%
Truck Light	9031	37.596	4.566	42.163	28.190	2.832	31.022	-9.407	15%	-1.735	4%	-11.141	11%
Truck Medium	3109	19.003	4.399	23.402	14.872	2.738	17.610	-4.132	7%	-1.661	4%	-5.792	5%
Truck Heavy	1924	17.844	14.877	32.721	13.480	8.731	22.211	-4.364	7%	-6.146	14%	-10.510	10%
Truck Articulated	741	10.340	4.956	15.296	7.803	2.935	10.737	-2.537	4%	-2.022	5%	-4.559	4%
Total	87083	251.117	106.702	357.820	189.969	62.494	252.463	-61.148	100%	-44.208	100%	-105.356	100%

Benefits Distribution: Trass-1.1(4%)-T

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-1.1(4%)-T	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration (days/year)
Without Project	non	C: Mountainous	Z: Earth	90
Project	Trass-1.1(4%)-T	C: Mountainous	X: Paved	

	Dry Season		Wet Season		Car Medium	Jeep4WD	Bus Light	Bus Medium	Bus Heavy	Truck Light	Truck Medium	Truck Heavy	Truck Articulated
Alternatives	Length (km)	Roughness (IRI)	Length (km)	Roughness (IRI)	Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	24.8	10.3	24.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
	E. Investment		E. Maintenance	Accidents	49%	32%	1%	0%	1%	10%	4%	2%	1%
Alternatives	(years)	('000$/km)	('000$/km/year)	(#/m veh-km)	Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	2	32123.99	185.40	13.42	00:25	00:26	00:27	00:28	00:29	00:30	00:30	00:28	00:33

	Net Economic Benefits								
	Agency Benefits		User Benefits						
	Investment Costs	Maintenance Costs	Normal Traffic		Generated Traffic		Road Safety	Other Benefits	Total
			VOC	Time	VOC	Time			
	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)
Present Value (million $) at 12%	-753.996	-29.763	520.673	378.661	183.991	133.218	74.735	-348.729	158.789
	-783.759		942.548						158.789

Total User Benefits	942.548					
User Benefits Components	520.673	378.661	183.991	133.218	74.735	-348.729
User Benefits Percent	55%	40%	20%	14%	8%	-37%

User Benefits Components	520.673	378.661	183.991	133.218	74.735	-348.729
Car Medium	202.301	152.657	70.052	52.863	36.761	-171.537
Jeep4WD	179.788	129.352	62.257	44.794	24.507	-114.356
Bus Light	6.051	8.773	2.095	3.037	0.832	-3.883
Bus Medium	1.037	1.919	0.357	0.662	0.091	-0.425
Bus Heavy	9.720	27.170	3.367	9.413	0.590	-2.752
Truck Light	84.798	15.636	31.270	5.766	7.291	-34.024
Truck Medium	37.247	14.968	13.735	5.520	2.510	-11.713
Truck Heavy	39.341	55.401	14.511	20.436	1.554	-7.249
Truck Articulated	22.871	18.224	8.424	6.713	0.598	-2.790
Car Medium	39%	40%	38%	40%	49%	49%
Jeep4WD	35%	34%	34%	34%	33%	33%
Bus Light	1%	2%	1%	2%	1%	1%
Bus Medium	0%	1%	0%	0%	0%	0%
Bus Heavy	2%	7%	2%	7%	1%	1%
Truck Light	16%	4%	17%	4%	10%	10%
Truck Medium	7%	4%	7%	4%	3%	3%
Truck Heavy	8%	15%	8%	15%	2%	2%
Truck Articulated	4%	5%	5%	5%	1%	1%

Sensitivity: Trass-1.1(4%)-T

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-1.1(4%)-T	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration (days/year)
Without Project	non	C: Mountainous	Z: Earth	90
Project	Trass-1.1(4%)-T	C: Mountainous	X: Paved	

	Dry Season		Wet Season		Car Medium	Jeep4WD	Bus Light	Bus Medium	Bus Heavy	Truck Light	Truck Medium	Truck Heavy	Truck Articulated
Alternatives	Length (km)	Roughness (IRI)	Length (km)	Roughness (IRI)	Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	24.8	10.3	24.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
	E. Investment		E. Maintenance	Accidents	49%	32%	1%	0%	1%	10%	4%	2%	1%
Alternatives	(years)	('000$/km)	('000$/km/year)	(#/m veh-km)	Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	2	32123.99	185.40	13.42	00:25	00:26	00:27	00:28	00:29	00:30	00:30	00:28	00:33

	Multiplier Factor	Net Present Value (million $)	Internal Rate of Return (%)	Equivalent Annual Net Benefits ($/km)	Modified Internal Rate of Return (%)	Multiplier Factor	Net Present Value (million $)	Internal Rate of Return (%)	Equivalent Annual Net Benefits ($/km)	Modified Internal Rate of Return (%)
Base Case		158.789	14%	765355	13%		158.789	14%	765355	13%
Sensitivity Cases:										
Normal Traffic (vpd)	0.75	-0.274	9%	-3278	11%	1.25	0.247	15%	2951	13%
Normal Traffic Growth Rate (%)	0.75	-0.070	11%	-838	12%	1.25	0.047	13%	562	12%
Generated Traffic (vpd)	0.75	-0.045	11%	-540	12%	1.25	0.018	12%	213	12%
Induced Traffic (vpd)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Passenger Time Costs ($/hr)	0.75	-0.045	11%	-536	12%	1.25	0.017	12%	209	12%
Cargo Time Costs ($/hr)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Wet Season Duration (days)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Without Project Dry Season Length (km)	0.75	-0.899	-2%	-10749	5%	1.25	0.956	22%	11428	15%
Without Project Dry Season Roughness (IRI)	0.75	-0.359	7%	-4296	10%	1.25	0.388	16%	4642	14%
Without Project Wet Season Length (km)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Without Project Wet Season Roughness (IRI)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Without Project Accidents Rate (#/m veh-km)	0.75	-0.051	11%	-615	12%	1.25	0.024	12%	288	12%
Without Project Investment Costs (000$/km)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Without Project Maintenance Costs (000/km/yr)	0.75	-0.104	11%	-1238	12%	1.25	0.076	13%	911	12%
Project Dry Season Road Length (km)	0.75	0.967	25%	15418	16%	1.25	-0.916	2%	-8758	7%
Project Dry Season Roughness (IRI)	0.75	0.025	12%	296	12%	1.25	-0.054	11%	-646	12%
Project Wet Season Road Length (km)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Project Wet Season Roughness (IRI)	0.75	-0.014	12%	-164	12%	1.25	-0.014	12%	-164	12%
Project Accidents Rate (#/m veh-km)	0.75	0.004	12%	43	12%	1.25	-0.031	12%	-371	12%
Project Investment Costs (000$/km)	0.75	0.305	17%	3647	14%	1.25	-0.332	9%	-3974	11%
Project Maintenance Costs (000/km/yr)	0.75	0.010	12%	117	12%	1.25	-0.037	12%	-444	12%

Economic Feasibility: Trass-2(6%)

Mongolia	
UB-I TOIROG	

Project	Ulanbaatar-I toirog road	jun 10-2025
Alternative	Trass-2(6%)	

Description	Terrain Type	Road Type
non	C: Mountainous	Z: Earth
Trass-2(6%)	C: Mountainous	X: Paved

Wet Season Duration	
(days/year)	90

	Dry Season		Wet Season		Car	Jeep4WD	Bus	Bus	Bus	Truck	Truck	Truck	Truck
	Length	Roughness	Length	Roughness	Medium		Light	Medium	Heavy	Light	Medium	Heavy	Articulated
	(km)	(IRI)	(km)	(IRI)	Average Speeds (km/hr)								
	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
	25.8	10.3	25.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
	Eco. Investment		E. Maintenance	Accidents	49%	32%	1%	0%	1%	10%	4%	2%	1%
	(years)	('000$/km)	('000$/km/year)	(#/m veh-km)	Average Travel Time (hours)								
	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
	2	29618.22	189.70	19.71	00:26	00:27	00:28	00:29	00:30	00:31	00:31	00:29	00:35

Annual Generated Daily Traffic (veh/day)	Annual Induced Daily Traffic (veh/day)	Net Economic Benefits: Agency Benefits: Investment Costs (M$/year)	Agency Benefits: Maintenance Costs (M$/year)	User Benefits: Normal Traffic: VOC (M$/year)	Normal Traffic: Time (M$/year)	Generated Traffic: VOC (M$/year)	Generated Traffic: Time (M$/year)	Road Safety (M$/year)	Other Benefits (M$/year)	Total (M$/year)	Sensitivity Analysis: A Agency * 1.25 (M$/year)	B User * 0.75 (M$/year)	A & B (M$/year)
0	0	-382.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-382.075	-477.594	-382.075	-477.594
0	0	-382.075	0.000	0.000	0.000	0.000	0.000	0.000	-318.800	-700.875	-796.394	-621.175	-716.694
5689	0	0.000	-4.894	50.765	39.620	1.439	1.138	4.936	-318.800	-225.797	-227.020	-170.571	-171.795
6022	92280	0.000	-4.894	53.643	41.895	25.610	19.978	5.224	2.600	144.056	142.832	106.818	105.595
6375	93903	0.000	-4.894	56.686	44.302	26.120	20.377	5.529	33.000	181.120	179.896	134.616	133.393
6748	95473	0.000	-4.894	59.903	46.848	26.623	20.772	5.852	35.400	190.503	189.280	141.654	140.430
7144	96986	0.000	-4.894	63.304	49.541	27.114	21.156	6.193	35.400	197.813	196.590	147.136	145.913
7562	98446	0.000	-4.894	66.899	52.389	27.599	21.537	6.555	35.400	205.484	204.260	152.889	151.666
8006	99850	0.000	-4.894	70.699	55.403	28.074	21.909	6.938	40.400	218.527	217.303	162.672	161.448
8475	101199	0.000	-4.894	74.717	58.590	28.541	22.276	7.343	40.400	226.973	225.749	169.006	167.783
8887	102492	0.000	-4.894	78.217	61.376	28.978	22.618	7.698	40.400	234.394	233.171	174.572	173.348
9320	103733	0.000	-4.894	81.884	64.296	29.407	22.956	8.071	40.400	242.119	240.896	180.366	179.142
9773	104920	0.000	-4.894	85.723	67.356	29.828	23.286	8.462	40.400	250.161	248.938	186.397	185.174
10249	106049	0.000	-4.894	89.745	70.563	30.236	23.608	8.872	40.400	258.529	257.306	192.673	191.450
10748	107126	0.000	-4.894	93.957	73.923	30.639	23.925	9.302	40.400	267.251	266.028	199.215	197.991
11245	108145	0.000	-4.894	98.189	77.293	31.023	24.228	9.730	40.400	275.968	274.744	205.752	204.529
11765	109116	0.000	-4.894	102.615	80.819	31.409	24.532	10.178	40.400	285.058	283.834	212.570	211.346
12310	110027	0.000	-4.894	107.244	84.508	31.778	24.823	10.647	40.400	294.506	293.283	219.656	218.432
12880	110885	0.000	-4.894	112.085	88.369	32.141	25.110	11.138	40.400	304.349	303.125	227.038	225.814
13477	111685	0.000	-4.894	117.149	92.409	32.495	25.389	11.652	40.400	314.600	313.376	234.726	233.503

Growth	Evaluation Period (years)
	20

	Total	A	B	A & B
Net Present Value (million $) at 12% Discount Rate	40.285	-148.438	-158.510	-347.233
Internal Rate of Return (%)	12%	11%	10%	8%
Equivalent Annual Net Benefits ($/km) at 12% Discount Rate	186647	-687733	-734395	-1608774
Modified Rate of Return at 12% Reinvestment Rate (%)	12%	11%	11%	10%
Net Present Value per Financial Investment Costs (ratio)	0.05	-0.19	-0.21	-0.45
First-Year Benefits per Economic Investment Cost (ratio)	-0.29	-0.23	-0.22	-0.17

User Impact: Trass-2(6%)

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-2(6%)	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration (days/year)
Without Project	non	C: Mountainous	Z: Earth	90
Project	Trass-2(6%)	C: Mountainous	X: Paved	

	Dry Season		Wet Season		Car	Jeep4WD	Bus	Bus	Bus	Truck	Truck	Truck	Truck
	Length	Roughness	Length	Roughness	Medium		Light	Medium	Heavy	Light	Medium	Heavy	Articulated
Alternatives	(km)	(IRI)	(km)	(IRI)	Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	25.8	10.3	25.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
	Eco. Investment		E. Maintenance	Accidents	49%	32%	1%	0%	1%	10%	4%	2%	1%
Alternatives	(years)	('000$/km)	('000$/km/year)	(#/m veh-km)	Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	2	29618.22	189.70	19.71	00:26	00:27	00:28	00:29	00:30	00:31	00:31	00:29	00:35

	Economic R.U.C. Savings	Financial Unit Trip Costs (2025 Dollars)											
		Without Project			With Project			Variation					
		VOC	TIME	TOTAL	VOC	TIME	TOTAL	VOC	TIME	TOTAL	VOC	TIME	TOTAL
	(%)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	($/veh-trip)	(%)	(%)	(%)
Car Medium	-28%	5.60	2.40	8.00	4.43	1.45	5.88	-1.16	-0.95	-2.12	-21%	-40%	-26%
Jeep4WD	-29%	7.08	3.06	10.14	5.52	1.85	7.36	-1.57	-1.21	-2.78	-22%	-40%	-27%
Bus Light	-30%	7.59	6.28	13.88	6.06	3.87	9.93	-1.53	-2.41	-3.94	-20%	-38%	-28%
Bus Medium	-32%	10.81	12.82	23.63	8.37	8.02	16.40	-2.44	-4.80	-7.23	-23%	-37%	-31%
Bus Heavy	-35%	15.57	26.98	42.54	12.03	16.42	28.46	-3.54	-10.55	-14.09	-23%	-39%	-33%
Truck Light	-25%	11.41	1.39	12.79	8.90	0.89	9.79	-2.51	-0.49	-3.00	-22%	-35%	-23%
Truck Medium	-23%	16.75	3.88	20.62	13.63	2.51	16.14	-3.11	-1.37	-4.48	-19%	-35%	-22%
Truck Heavy	-31%	25.41	21.19	46.59	19.97	12.93	32.90	-5.44	-8.25	-13.69	-21%	-39%	-29%
Truck Articulated	-29%	38.23	18.33	56.55	30.01	11.29	41.30	-8.22	-7.04	-15.25	-21%	-38%	-27%

	2025 Daily Traffic	Financial Annual Trip Costs (M Dollars)											
		Without Project			With Project			Variation					
		VOC	TIME	TOTAL	VOC	TIME	TOTAL	VOC		TIME		TOTAL	
	(veh/day)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(%)	(M$/year)	(%)	(M$/year)	(%)
Car Medium	42322	86.447	37.058	123.505	68.454	22.344	90.798	-17.992	34%	-14.714	35%	-32.706	34%
Jeep4WD	28214	72.961	31.471	104.432	56.815	19.006	75.822	-16.146	30%	-12.465	30%	-28.611	30%
Bus Light	958	2.654	2.198	4.852	2.119	1.355	3.474	-0.535	1%	-0.843	2%	-1.378	1%
Bus Medium	105	0.414	0.491	0.906	0.321	0.308	0.628	-0.093	0%	-0.184	0%	-0.277	0%
Bus Heavy	679	3.858	6.686	10.544	2.982	4.071	7.052	-0.876	2%	-2.615	6%	-3.491	4%
Truck Light	9031	37.596	4.566	42.163	29.327	2.946	32.272	-8.270	15%	-1.620	4%	-9.890	10%
Truck Medium	3109	19.003	4.399	23.402	15.471	2.848	18.320	-3.532	7%	-1.550	4%	-5.082	5%
Truck Heavy	1924	17.844	14.877	32.721	14.023	9.084	23.107	-3.821	7%	-5.794	14%	-9.614	10%
Truck Articulated	741	10.340	4.956	15.296	8.117	3.053	11.170	-2.223	4%	-1.903	5%	-4.126	4%
Total	87083	251.117	106.702	357.820	197.629	65.014	262.643	-53.488	100%	-41.688	100%	-95.177	100%

Benefits Distribution: Trass-2(6%)

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-2(6%)	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration
Without Project	non	C: Mountainous	Z: Earth	(days/year) 90
Project	Trass-2(6%)	C: Mountainous	X: Paved	

	Dry Season		Wet Season		Car Medium	Jeep4WD	Bus Light	Bus Medium	Bus Heavy	Truck Light	Truck Medium	Truck Heavy	Truck Articulated
Alternatives	Length (km)	Roughness (IRI)	Length (km)	Roughness (IRI)	Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	25.8	10.3	25.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
	Eco. Investment		E. Maintenance	Accidents	49%	32%	1%	0%	1%	10%	4%	2%	1%
Alternatives	(years)	('000$/km)	('000$/km/year)	(#/m veh-km)	Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	2	29618.22	189.70	19.71	00:26	00:27	00:28	00:29	00:30	00:31	00:31	00:29	00:35

	Net Economic Benefits								
	Agency Benefits		User Benefits						
	Investment Costs	Maintenance Costs	Normal Traffic		Generated Traffic		Road Safety	Other Benefits	Total
			VOC	Time	VOC	Time			
	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)	(M$/year)
Present Value (million $) at 12%	-723.213	-31.681	455.491	357.108	160.945	125.626	44.738	-348.729	40.285
	-754.894		795.179						40.285

Total User Benefits	795.179					
User Benefits Components	455.491	357.108	160.945	125.626	44.738	-348.729
User Benefits Percent	57%	45%	20%	16%	6%	-44%

User Benefits Components	455.491	357.108	160.945	125.626	44.738	-348.729
Car Medium	176.310	144.174	61.050	49.925	22.006	-171.537
Jeep4WD	158.216	122.136	54.785	42.295	14.671	-114.356
Bus Light	5.247	8.258	1.816	2.859	0.498	-3.883
Bus Medium	0.915	1.802	0.315	0.621	0.054	-0.425
Bus Heavy	8.588	25.624	2.975	8.877	0.353	-2.752
Truck Light	74.554	14.607	27.492	5.387	4.365	-34.024
Truck Medium	31.843	13.973	11.741	5.153	1.503	-11.713
Truck Heavy	34.443	52.228	12.704	19.265	0.930	-7.249
Truck Articulated	20.036	17.157	7.380	6.320	0.358	-2.790
Car Medium	39%	40%	38%	40%	49%	49%
Jeep4WD	35%	34%	34%	34%	33%	33%
Bus Light	1%	2%	1%	2%	1%	1%
Bus Medium	0%	1%	0%	0%	0%	0%
Bus Heavy	2%	7%	2%	7%	1%	1%
Truck Light	16%	4%	17%	4%	10%	10%
Truck Medium	7%	4%	7%	4%	3%	3%
Truck Heavy	8%	15%	8%	15%	2%	2%
Truck Articulated	4%	5%	5%	5%	1%	1%

Sensitivity: Trass-2(6%)

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-2(6%)	

Alternatives	Description	Terrain Type	Road Type	Wet Season Duration (days/year)
Without Project	non	C: Mountainous	Z: Earth	90
Project	Trass-2(6%)	C: Mountainous	X: Paved	

Alternatives	Dry Season Length (km)	Dry Season Roughness (IRI)	Wet Season Length (km)	Wet Season Roughness (IRI)	Car Medium	Jeep4WD	Bus Light	Bus Medium	Bus Heavy	Truck Light	Truck Medium	Truck Heavy	Truck Articulated
					Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	25.8	10.3	25.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
					49%	32%	1%	0%	1%	10%	4%	2%	1%
Alternatives	Eco. Investment (years)	Eco. Investment ('000$/km)	E. Maintenance ('000$/km/year)	Accidents (#/m veh-km)	Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	2	29618.22	189.70	19.71	00:26	00:27	00:28	00:29	00:30	00:31	00:31	00:29	00:35

	Multiplier Factor	Net Present Value (million $)	Internal Rate of Return (%)	Equivalent Annual Net Benefits ($/km)	Modified Internal Rate of Return (%)	Multiplier Factor	Net Present Value (million $)	Internal Rate of Return (%)	Equivalent Annual Net Benefits ($/km)	Modified Internal Rate of Return (%)
Base Case		40.285	12%	186647	12%		40.285	12%	186647	12%
Sensitivity Cases:										
Normal Traffic (vpd)	0.75	-0.143	9%	-1707	11%	1.25	0.337	17%	4028	14%
Normal Traffic Growth Rate (%)	0.75	0.045	13%	540	12%	1.25	0.153	14%	1828	13%
Generated Traffic (vpd)	0.75	0.070	13%	842	12%	1.25	0.124	14%	1478	13%
Induced Traffic (vpd)	0.75	0.097	14%	1160	13%	1.25	0.097	14%	1160	13%
Passenger Time Costs ($/hr)	0.75	0.068	13%	811	12%	1.25	0.126	14%	1509	13%
Cargo Time Costs ($/hr)	0.75	0.097	14%	1160	13%	1.25	0.097	14%	1160	13%
Wet Season Duration (days)	0.75	0.097	14%	1160	13%	1.25	0.097	14%	1160	13%
Without Project Dry Season Length (km)	0.75	-0.773	#NUM!	-9245	-1%	1.25	1.058	28%	12643	17%
Without Project Dry Season Roughness (IRI)	0.75	-0.243	7%	-2906	10%	1.25	0.494	20%	5907	15%
Without Project Wet Season Length (km)	0.75	0.097	14%	1160	13%	1.25	0.097	14%	1160	13%
Without Project Wet Season Roughness (IRI)	0.75	0.097	14%	1160	13%	1.25	0.097	14%	1160	13%
Without Project Accidents Rate (#/m veh-km)	0.75	0.059	13%	709	12%	1.25	0.135	14%	1611	13%
Without Project Investment Costs (000$/km)	0.75	0.097	14%	1160	13%	1.25	0.097	14%	1160	13%
Without Project Maintenance Costs (000/km/yr)	0.75	0.007	12%	86	12%	1.25	0.187	15%	2234	13%
Project Dry Season Road Length (km)	0.75	1.042	33%	16606	18%	1.25	-0.763	-2%	-7298	5%
Project Dry Season Roughness (IRI)	0.75	0.160	15%	1909	13%	1.25	0.031	13%	365	12%
Project Wet Season Road Length (km)	0.75	0.097	14%	1160	13%	1.25	0.097	14%	1160	13%
Project Wet Season Roughness (IRI)	0.75	0.097	14%	1160	13%	1.25	0.097	14%	1160	13%
Project Accidents Rate (#/m veh-km)	0.75	0.114	14%	1367	13%	1.25	0.080	13%	953	13%
Project Investment Costs (000$/km)	0.75	0.310	19%	3700	14%	1.25	-0.115	10%	-1380	11%
Project Maintenance Costs (000/km/yr)	0.75	0.178	15%	2133	13%	1.25	0.016	12%	187	12%

Economic Feasibility: Trass-2(6%)

Country	Mongolia	Project	Ulanbaatar-I toirog road	jun 10-2025
Road	UB-I TOIROG	Alternative	Trass-2(6%)	

Alternatives	Description	Terrain Type	Road Type
Without Project	non	C: Mountainous	Z: Earth
Project	Trass-2(6%)	C: Mountainous	X: Paved

Wet Season Duration	
(days/year)	90

Alternatives	Dry Season Length (km)	Dry Season Roughness (IRI)	Wet Season Length (km)	Wet Season Roughness (IRI)	Car Medium	Jeep4WD	Bus Light	Bus Medium	Bus Heavy	Truck Light	Truck Medium	Truck Heavy	Truck Articulated
					Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	25.8	10.3	25.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
					49%	32%	1%	0%	1%	10%	4%	2%	1%

Alternatives	Eco. Investment (years)	Eco. Investment ('000$/km)	E. Maintenance ('000$/km/year)	Accidents (#/m veh-km)	Car Medium	Jeep4WD	Bus Light	Bus Medium	Bus Heavy	Truck Light	Truck Medium	Truck Heavy	Truck Articulated
					Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	2	29618.22	189.70	19.71	00:26	00:27	00:28	00:29	00:30	00:31	00:31	00:29	00:35

Year	Annual Normal Daily Traffic (veh/day)	Annual Generated Daily Traffic (veh/day)	Annual Induced Daily Traffic (veh/day)	Net Economic Benefits: Agency Benefits: Investment Costs (M$/year)	Agency Benefits: Maintenance Costs (M$/year)	User Benefits: Normal Traffic: VOC (M$/year)	Normal Traffic: Time (M$/year)	Generated Traffic: VOC (M$/year)	Generated Traffic: Time (M$/year)	Road Safety (M$/year)	Other Benefits (M$/year)	Total (M$/year)	Sensitivity Analysis: A Agency * 1.25 (M$/year)	B User * 0.75 (M$/year)	A & B (M$/year)
2025	87083	0	0	-382.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-382.075	-477.594	-382.075	-477.594
2026	92160	0	0	-382.075	0.000	0.000	0.000	0.000	0.000	0.000	-318.800	-700.875	-796.394	-621.175	-716.694
2027	97534	5689	0	0.000	-4.894	50.765	39.620	1.439	1.138	4.936	-318.800	-225.797	-227.020	-170.571	-171.795
2028	103223	6022	92280	0.000	-4.894	53.643	41.895	25.610	19.978	5.224	5.000	146.456	145.232	108.618	107.395
2029	109245	6375	93903	0.000	-4.894	56.686	44.302	26.120	20.377	5.529	35.400	183.520	182.296	136.416	135.193
2030	115620	6748	95473	0.000	-4.894	59.903	46.848	26.623	20.772	5.852	40.400	195.503	194.280	145.404	144.180
2031	122368	7144	96986	0.000	-4.894	63.304	49.541	27.114	21.156	6.193	40.400	202.813	201.590	150.886	149.663
2032	129512	7562	98446	0.000	-4.894	66.899	52.389	27.599	21.537	6.555	40.400	210.484	209.260	156.639	155.416
2033	137074	8006	99850	0.000	-4.894	70.699	55.403	28.074	21.909	6.938	50.400	228.527	227.303	170.172	168.948
2034	145080	8475	101199	0.000	-4.894	74.717	58.590	28.541	22.276	7.343	50.400	236.973	235.749	176.506	175.283
2035	152104	8887	102492	0.000	-4.894	78.217	61.376	28.978	22.618	7.698	50.400	244.394	243.171	182.072	180.848
2036	159470	9320	103733	0.000	-4.894	81.884	64.296	29.407	22.956	8.071	50.400	252.119	250.896	187.866	186.642
2037	167195	9773	104920	0.000	-4.894	85.723	67.356	29.828	23.286	8.462	60.400	270.161	268.938	201.397	200.174
2038	175297	10249	106049	0.000	-4.894	89.745	70.563	30.236	23.608	8.872	60.400	278.529	277.306	207.673	206.450
2039	183793	10748	107126	0.000	-4.894	93.957	73.923	30.639	23.925	9.302	60.400	287.251	286.028	214.215	212.991
2040	192250	11245	108145	0.000	-4.894	98.189	77.293	31.023	24.228	9.730	60.400	295.968	294.744	220.752	219.529
2041	201102	11765	109116	0.000	-4.894	102.615	80.819	31.409	24.532	10.178	70.400	315.058	313.834	235.070	233.846
2042	210367	12310	110027	0.000	-4.894	107.244	84.508	31.778	24.823	10.647	70.400	324.506	323.283	242.156	240.932
2043	220066	12880	110885	0.000	-4.894	112.085	88.369	32.141	25.110	11.138	70.400	334.349	333.125	249.538	248.314
2044	230218	13477	111685	0.000	-4.894	117.149	92.409	32.495	25.389	11.652	70.400	344.600	343.376	257.226	256.003

Net Present Value (million $) at 12% Discount Rate	99.001	-89.723	-114.473	-303.196
Internal Rate of Return (%)	13%	11%	11%	9%
Equivalent Annual Net Benefits ($/km) at 12% Discount Rate	458684	-415696	-530367	-1404746
Modified Rate of Return at 12% Reinvestment Rate (%)	12%	12%	11%	10%
Net Present Value per Financial Investment Costs (ratio)	0.13	-0.12	-0.15	-0.40
First-Year Benefits per Economic Investment Cost (ratio)	-0.29	-0.23	-0.22	-0.17

5.2% Growth

Evaluation Period (years)
20

Economic Feasibility: Trass-2(6%)

Country	Mongolia
Road	UB-I TOIROG

Project	Ulanbaatar-I toirog road
Alternative	Trass-2(6%)

jun 10-2025

Alternatives	Description	Terrain Type	Road Type
Without Project	non	C: Mountainous	Z: Earth
Project	Trass-2(6%)	C: Mountainous	X: Paved

Wet Season Duration	
(days/year)	90

Alternatives	Dry Season Length (km)	Dry Season Roughness (IRI)	Wet Season Length (km)	Wet Season Roughness (IRI)	Car Medium	Jeep4WD	Bus Light	Bus Medium	Bus Heavy	Truck Light	Truck Medium	Truck Heavy	Truck Articulated
					Average Speeds (km/hr)								
Without Project	20.1	25.2	20.1	25.2	27.2	26.7	26.0	25.4	24.2	24.8	24.8	24.5	21.1
Project	25.8	10.3	25.8	12.5	58.1	56.9	54.2	52.3	51.2	49.3	49.3	51.7	44.2
					Traffic Composition in 2025 (%)								
					49%	32%	1%	0%	1%	10%	4%	2%	1%

Alternatives	Eco. Investment (years)	Eco. Investment ('000$/km)	E. Maintenance ('000$/km/year)	Accidents (#/m veh-km)	Car Medium	Jeep4WD	Bus Light	Bus Medium	Bus Heavy	Truck Light	Truck Medium	Truck Heavy	Truck Articulated
					Average Travel Time (hours)								
Without Project	0	0.00	0.00	38.34	00:44	00:45	00:46	00:47	00:49	00:48	00:48	00:49	00:57
Project	2	29618.22	189.70	19.71	00:26	00:27	00:28	00:29	00:30	00:31	00:31	00:29	00:35

Year	Annual Normal Daily Traffic (veh/day)	Annual Generated Daily Traffic (veh/day)	Annual Induced Daily Traffic (veh/day)	Net Economic Benefits: Agency Benefits: Investment Costs (M$/year)	Agency Benefits: Maintenance Costs (M$/year)	User Benefits: Normal Traffic: VOC (M$/year)	Normal Traffic: Time (M$/year)	Generated Traffic: VOC (M$/year)	Generated Traffic: Time (M$/year)	Road Safety (M$/year)	Other Benefits (M$/year)	Total (M$/year)	Sensitivity Analysis: A Agency * 1.25 (M$/year)	B User * 0.75 (M$/year)	A & B (M$/year)
2025	87083	0	0	-382.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-382.075	-477.594	-382.075	-477.594
2026	92160	0	0	-382.075	0.000	0.000	0.000	0.000	0.000	0.000	-318.800	-700.875	-796.394	-621.175	-716.694
2027	97534	5689	0	0.000	-4.894	50.765	39.620	1.439	1.138	4.936	-318.800	-225.797	-227.020	-170.571	-171.795
2028	103223	6022	92280	0.000	-4.894	53.643	41.895	25.610	19.978	5.224	5.000	146.456	145.232	108.618	107.395
2029	109245	6375	93903	0.000	-4.894	56.686	44.302	26.120	20.377	5.529	35.400	183.520	182.296	136.416	135.193
2030	115620	6748	95473	0.000	-4.894	59.903	46.848	26.623	20.772	5.852	40.400	195.503	194.280	145.404	144.180
2031	122368	7144	96986	0.000	-4.894	63.304	49.541	27.114	21.156	6.193	40.400	202.813	201.590	150.886	149.663
2032	129512	7562	98446	0.000	-4.894	66.899	52.389	27.599	21.537	6.555	40.400	210.484	209.260	156.639	155.416
2033	137074	8006	99850	0.000	-4.894	70.699	55.403	28.074	21.909	6.938	50.400	228.527	227.303	170.172	168.948
2034	145080	8475	101199	0.000	-4.894	74.717	58.590	28.541	22.276	7.343	50.400	236.973	235.749	176.506	175.283
2035	152104	8887	102492	0.000	-4.894	78.217	61.376	28.978	22.618	7.698	50.400	244.394	243.171	182.072	180.848
2036	159470	9320	103733	0.000	-4.894	81.884	64.296	29.407	22.956	8.071	50.400	252.119	250.896	187.866	186.642
2037	167195	9773	104920	0.000	-4.894	85.723	67.356	29.828	23.286	8.462	60.400	270.161	268.938	201.397	200.174
2038	175297	10249	106049	0.000	-4.894	89.745	70.563	30.236	23.608	8.872	60.400	278.529	277.306	207.673	206.450
2039	183793	10748	107126	0.000	-4.894	93.957	73.923	30.639	23.925	9.302	60.400	287.251	286.028	214.215	212.991
2040	192250	11245	108145	0.000	-4.894	98.189	77.293	31.023	24.228	9.730	60.400	295.968	294.744	220.752	219.529
2041	201102	11765	109116	0.000	-4.894	102.615	80.819	31.409	24.532	10.178	70.400	315.058	313.834	235.070	233.846
2042	210367	12310	110027	0.000	-4.894	107.244	84.508	31.778	24.823	10.647	70.400	324.506	323.283	242.156	240.932
2043	220066	12880	110885	0.000	-4.894	112.085	88.369	32.141	25.110	11.138	70.400	334.349	333.125	249.538	248.314
2044	230218	13477	111685	0.000	-4.894	117.149	92.409	32.495	25.389	11.652	70.400	344.600	343.376	257.226	256.003

5.2% Growth

Evaluation Period (years)
20

	Total	A	B	A & B
Net Present Value (million $) at 12% Discount Rate	99.001	-89.723	-114.473	-303.196
Internal Rate of Return (%)	13%	11%	11%	9%
Equivalent Annual Net Benefits ($/km) at 12% Discount Rate	458684	-415696	-530367	-1404746
Modified Rate of Return at 12% Reinvestment Rate (%)	12%	12%	11%	10%
Net Present Value per Financial Investment Costs (ratio)	0.13	-0.12	-0.15	-0.40
First-Year Benefits per Economic Investment Cost (ratio)	-0.29	-0.23	-0.22	-0.17

CHAPTER 10. FINANCIAL ANALYSIS

10.1 Payment system and optimal payment amount

10.1.1 Payment system

The compatibility of payment systems with the project was assessed based on the following 6 requirements.

Cost recovery: The project is planned to financially cover operating costs and loan repayments from sales revenue.

Affordability: Compatibility with the average monthly income of citizens.

Fairness: Equal payment based on distance, vehicle type, and usage.

Ease of Implementation: The complexity of system installation and management.

Income potential: Opportunity to increase payment income.

Suitability of 22 exits: Suitability for the characteristics of a 25 km road with 22 exits.

Table 87. Payment system comparison

Model	Expense reimbursement	Suitable for payment	Honesty	Ease of implementation	Income opportunity	22 exits suitability
Fixed payment	Middle	Middle	Junior	Height	Middle	Junior
Distance-based	Height	Height	Height	Middle	Height	Height
Vehicle type	Middle	Middle	Height	Middle	Height	Middle
Time-based	Height	Junior	Middle	Junior	Height	Middle
Order-based	Junior	Height	Middle	Middle	Junior	Middle

We propose a distance-based payment system. The rationale is shown below:

- It is fair for users to pay based on the distance traveled.
- It will provide equality for short and long distance passengers.
- It can be adapted to the income of Ulaanbaatar city residents.
- It will be suitable for a variety of travel patterns on a road with multiple entry and exit points.
- In terms of project finance, it can increase revenue to cover operating costs and loan repayments.
- It can increase user demand.
- RFID and ANPR systems will be introduced, which will be cost-effective in the long run, although the initial cost is high.
- It will increase revenue and reduce cost burden.

Incompatibility with other payment systems:

- The flat-rate system is unfair because it does not offer distance-based pricing, is suitable for short-distance routes, and is difficult to adapt to the affordability of citizens.
- The system based on vehicle type is not optimal because commercial vehicles account for a small percentage of total traffic on the route. It is also difficult to classify vehicles.
- When introducing a time-based system, it is optimal to implement it based on real data, and it is not optimal to introduce it at the first stage for a first-time project. In the future, it is optimal to use the system in combination with a distance-based system.
- The disadvantage of a subscription-based system is that it creates limited revenue.

10.1.2 Optimal payment amount

The optimal fare was developed based on a distance-based fare system. The average distance traveled on the project route is 6.5 km, which is expected to be short trips. Therefore, the fare system is based on a base fare for the first 5 km and a fee for each additional km.

The following 15 scenarios were considered in the calculation. Daily demand, revenue, average fare per trip, average trip distance, and maximum fare were analyzed based on the price scenario.

Table 88. Demand forecast based on payment (2030)

Version	Base price Within 5 km	Additional Every 1 km	Daily demand	Daily income (million tugriks)	Average fare per trip	Average distance per trip	High fees
1-a	3,000	300	279,725	1,047.5	3,744.9	6.54	8,700
1-b	3,000	400	272,106	1,086.6	3,993.2	6.54	10,600
1-c	3,000	500	263,924	1,119.4	4,241.4	6.55	12,500
2-a	3,500	300	262,624	1,114.8	4,244.9	6.55	9,200
2-b	3,500	400	254,727	1,144.5	4,493.2	6.54	11,100
2-c	3,500	500	247,654	1,174.2	4,741.4	6.53	13,000
3-a	4,000	300	246,767	1,170.9	4,744.9	6.53	9,700
3-b	4,000	400	240,326	1,200.0	4,993.2	6.56	11,600
3-c	4,000	500	236,776	1,241.0	5,241.4	6.55	13,500
4-a	4,500	300	235,567	1,235.5	5,244.9	6.56	10,200

4-b	4,500	400	229,018	1,258.0	5,493.2	6.58	12,100
4-c	4,500	500	222,949	1,280.1	5,741.4	6.57	14,000
5-a	5,000	300	222,169	1,320.0	5,662.3	6.57	10,700
5-b	5,000	400	216,659	1,330.3	5,883.0	6.58	12,600
5-c	5,000	500	210,376	1,338.8	6,103.8	6.58	14,500

To determine the optimal payment amount, the following criteria were taken into account:

1. Financial efficiency
2. Social benefits
3. Consumer affordability

Demand represents social and economic benefits, and sales revenue represents financial efficiency. Therefore, it is estimated that the optimal price will be set at the intersection of social and financial benefits. As can be seen from the graph below, the optimal payment amount is option 3-b, i.e. 4,000 tugriks for a trip within 5 km and 400 tugriks for each additional km. In this option, the daily demand is 240,326 cars, sales revenue is 1.2 billion tugriks, and the average ticket price is 4,993 tugriks.

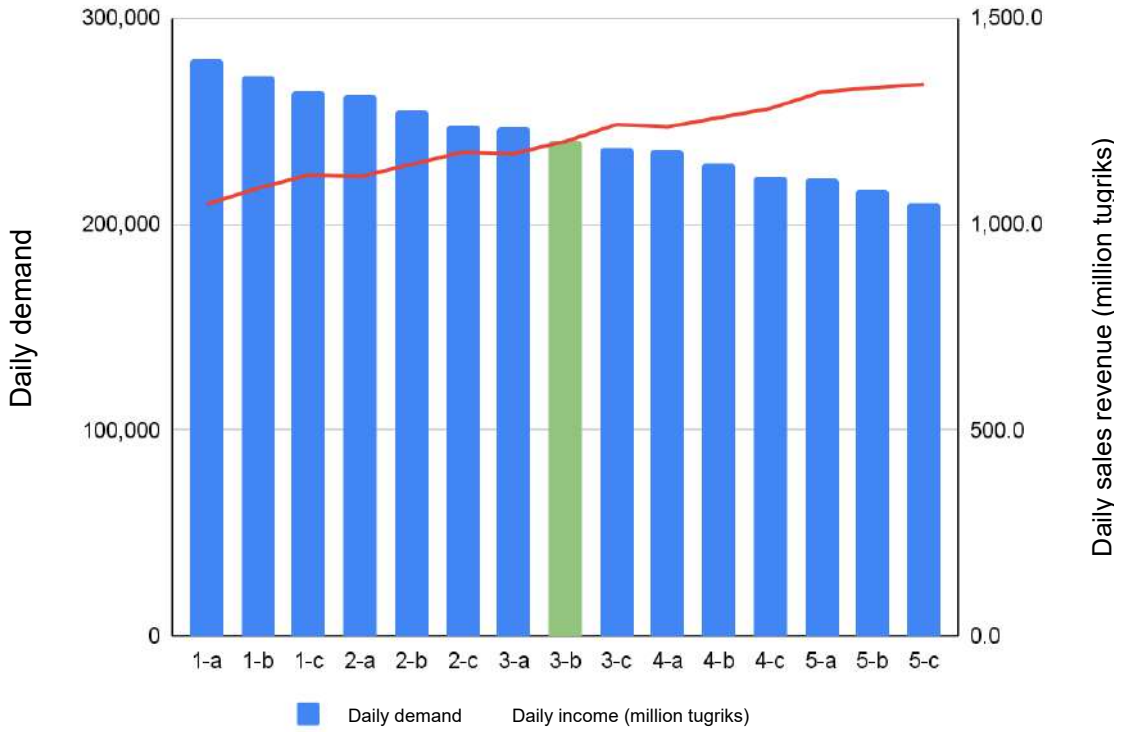


Figure 94. Demand forecast based on payment (2030)

Let's examine the compatibility of the above optimal price with the ability of the user to pay. This indicator was compared with the average cost of transportation as a percentage of household income. Internationally, the average cost of a single trip is 0.39 %of household income, while in our project it is 0.15 percent. This shows that the above optimal price is compatible with the ability to pay.

Table 89. Example of an international toll road

Country	Average fare per trip (USD)	Average monthly household income (USD)	Ratio (%)	Payment system
Japan	$20	$4,500	0.44%	Distance-dependent (Entry-Exit)
South Korea	$8	$3,800	0.20%	Distance-dependent (Entry-Exit)
France	$23	$4,000	0.56%	Distance-dependent (Entry-Exit)

Spain	$14	$3,200	0.44%	Distance-dependent (Entry-Exit)
Italy	$13	$3,000	0.42%	Distance-dependent (Entry-Exit)
United States (some states)	$4	$5,000	0.07%	Most are partial/stopover
China	$13	$1,200	1.04%	Distance-dependent (Entry-Exit)
Singapore (ERP)	$4	$8,000	0.04%	Congestion charge
Vietnam	$2	$700	0.29%	Distance-dependent (Entry-Exit)
Average	**$11**	**$3,711**	**0.39%**	**-**
Mongolia	$1	$911	0.15%	Distance-dependent (Entry-Exit)

10.1.3 Conclusion

The distance-based payment system is the most suitable for Mongolian conditions. The system is fair, meets the payment capacity of citizens, complies with international standards, and is suitable for projects with multiple inputs and outputs. It is fairer than a fixed fee, easier than a time-based system, and generates higher revenue than a subscription system, and can be combined with a time-based system based on real-time data after it is put into operation.

The optimal price at the intersection of social and financial benefits is option 3-b, i.e. 4,000 tugriks for a trip within 5 km and 400 tugriks for each additional km. In this option, the daily demand is 240,326 cars, the sales revenue is 1.2 billion tugriks, and the average ticket price is 4,993 tugriks.

Internationally, the average cost of a single trip is 0.39 %of household income, while for our project it is 0.15 percent. This shows that the above optimal price is in line with affordability.

10.2 Financing plan

“The financing of the “New Ring Road 1” project is planned as follows. It is planned to finance 15 %of the total project financing, or $137.8 million, through a 1 %tax credit for “Erdenes Mongol” LLC, and the remaining 85 %, or $780.8 million, through a loan. The Government of Mongolia will provide a guarantee for the loan financing.

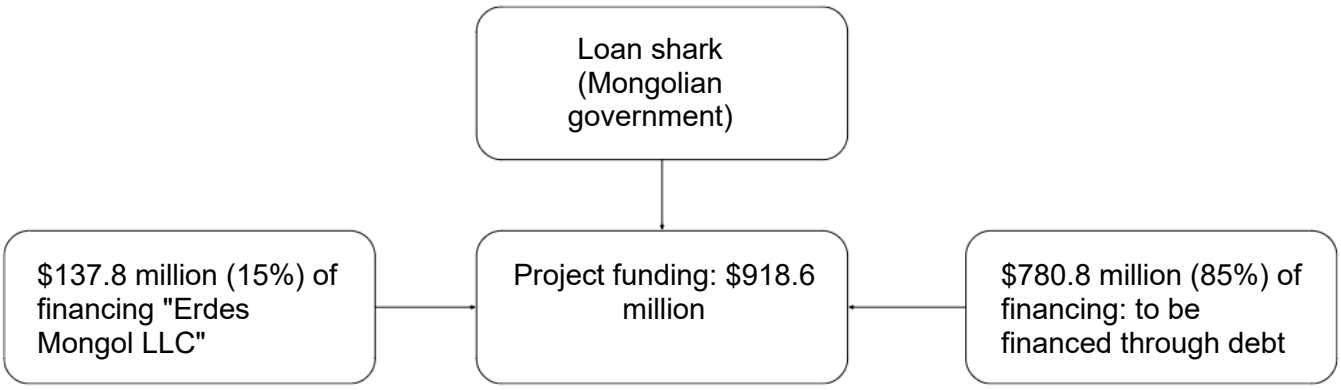


Figure 95. Financial modeling

10.3 Financial analysis

Financial analysis is the process of examining cash flows, costs, revenues, and returns to assess a project's financial performance, measure the return on investment, and identify risks. It determines the feasibility and profitability of a project by calculating indicators such as PNPV, PIRR, payback period, and DSCR.

PNPV (Project Net Present Value) – Net present value of a project: The total value of a project's future cash flows discounted to the current exchange rate using an interest rate.

PIRR (Project Internal Rate of Return) – Project Internal Rate of Return: The interest rate that makes the net present value of a project's cash flows zero. It measures the profitability of a project; the higher the PIRR, the more profitable the project.

Payback Period – Payback period: The period of time until the project investment is fully recovered through cash income.

Equity IRR – Shareholder Internal Rate of Return: An internal rate of return that measures the profitability of a project's investors' capital. It only considers the return on the capital invested by shareholders and is different from the overall PIRR of the project.

DSCR (Debt Service Coverage Ratio) – Debt coverage ratio: A ratio that shows how well a project's cash flows cover its debt payments.

Within the scope of the calculation, two types of financial analysis were performed: project financial analysis and investment-based financial analysis. The selected option from the project financial analysis will be analyzed in detail based on investment costs.

10.3.1 Project financial analysis

Analysis options

There are 3 route options proposed for the project in the analysis..

Option 1a:

- Distance-based payment system.
- Designed to provide better coverage near the city center and other sub-centers. Total length 24.79 km, 9 km of bridges, 13.67 km of embankments, 2 km of tunnels.

Option 1b:

- Fixed payment system
- Designed to provide better coverage near the city center and other sub-centers. Total length 24.79 km, 9 km of bridges, 13.67 km of embankments, and 2 km of tunnels.

Option 2:

- Distance-based payment system.
- A route option has been developed in line with existing roads. Total length 25.8 km, 10 km of bridges, 13.07 km of embankments, and 2.72 km of tunnels.

Option 3:

- Distance-based payment system.
- Developed to expand the urban space. Total length 26.75 km, 8.35 km of bridges, 13.69 km of embankments, and 4.71 km of tunnels.

Time for testing

The project start date is assumed to be 2026 and the operation date is assumed to be 2028, and the analysis period is assumed to be the construction period from 2026-2027 and the operational period from 2028-2048 for 20 years.

Total project cost

The project costs are taken from the preliminary construction budget section included in the appendix.

Table 90. Variants 1a, 1b (24.8 km, 4% gradient): Total project cost, million dollars

Number	Job content	Percentage	Total cost million dollars	2026	2027
Construction work execution stage		100.00%	918.57	466.77	451.80
1	Relocating power lines	0.49%	4.54	4.54	0.00
2	Land acquisition and relocation	15.53%	142.70	94.18	48.52
3	Project Implementation (Highway)	20.05%	184.21	92.11	92.11
4	Project Implementation (Bridge Section)	50.06%	459.86	216.14	243.73
5	Project Implementation (Tunnel Section)	13.85%	127.26	59.81	67.45

Table 91. Option 2 (25.8 km, 6% gradient): Total project cost, million dollars

Number	Job content	Percentage	Total cost million dollars	2026	2027
Construction work execution stage		100.00%	894.56	455.73	438.84
1	Relocating power lines	0.51%	4.54	4.54	0.00
2	Land acquisition and relocation	15.95%	142.70	94.18	48.52
3	Project Implementation (Highway)	21.48%	192.12	96.06	96.06
4	Project Implementation (Bridge Section)	51.33%	459.15	215.80	243.35
5	Project Implementation (Tunnel Section)	10.74%	96.05	45.15	50.91

Table 92. Option 3 (26.7 km, 6% gradient): Total project cost, million dollars

Number	Job content	Percentage	Total cost million dollars	2026	2027
Construction work execution stage		100.00%	978.65	494.24	484.41
1	Relocating power lines	0.46%	4.54	4.54	0.00
2	Land acquisition and relocation	14.05%	137.47	90.73	46.74
3	Project Implementation (Highway)	19.59%	191.69	95.85	95.85
4	Project Implementation (Bridge Section)	48.90%	478.54	224.91	253.63
5	Project Implementation (Tunnel Section)	17.00%	166.41	78.21	88.20

Operating expenses

Operating costs were calculated as outlined in Volume 1. These prices are adjusted for annual inflation.

Table 93. Variants 1a, 1b (24.8 km, 4% gradient): Operating costs, million dollars

Type		Total cost (millions of dollars)	Average cost per year
Maintenance costs	Road	38.06	1.8
	Bridge	31.22	1.5
	Tunnel	17.56	0.8
Operating expenses		38.46	1.8
Total		119.26	5.7

Table 94. Option 2 (25.8 km, 6% gradient): Operating costs, million dollars

Type		Total cost (millions of dollars)	Average cost per year
Maintenance costs	Road	38.06	1.8
	Bridge	31.22	1.5
	Tunnel	17.56	0.8
Operating expenses		53.84	2.6
Total		134.64	6.4

Table 95. Option 3 (26.7 km, 6% gradient): Operating costs, million dollars

Type		Total cost (millions of dollars)	Average cost per year
Maintenance costs	Road	38.06	1.8
	Bridge	31.22	1.5
	Tunnel	17.56	0.8
Operating expenses		55.97	2.7
Total		136.78	6.5

Sales revenue

Project demand estimates were taken and used as outlined in Volume 1.

- In Options 1a, 2, and 3, the optimal payment amount was calculated based on Option 3-b included in this report, which is 4,000 tugriks for travel within 5 km and 400 tugriks for each additional km.
- Option 1b is estimated to have a fixed fee of 5,000 tugriks.
- Other income is estimated at 3 %of toll revenue. This includes: Advertising and land rental income from rest areas along the road. Tolls are calculated using annual inflation rates.

Exchange rate

The exchange rate was calculated as 1 USD = 3574 MNT in 2025, and was increased by 4.97 %annually until 2030, and by 4 %after 2030. The average exchange rate increase of 4.97 %over the last 5 years was used in the initial years.

Inflation

The inflation rate was calculated based on World Bank data and is expected to be approximately 7.485% inflation until 2025. Therefore, a rate of 7% was assumed until 2025 and 6% was used in the calculations until 2026-2048.

Discount rate

The financial discount rate represents the required rate of return for the project implementing organization. For government-funded projects, there is no specific required rate of return because the government is not a typical business entity. Therefore, a discount rate of 12% was used in this financial analysis and in the economic analysis.

Subsidy

Therefore, this study did not consider government subsidies such as the Investment Gap Fund (VGF) and the Minimum Income Guarantee.

Terms used in financial analysis

Prerequisites for financial analysis

Type	Data	Description
Project start	2026	-
Opening year	2028	-
Calculation time	A total of 20 years from 2028 to 2048	Developed by the project team.
Total project cost	Options 1a, 1b: $918.57 million Option 2: $894.56 million Option 3: $978.65 million	Developed by the project team.
Operating expenses	Options 1a, 1b: $5.7 million Option 2: $6.4 million Option 3: $6.5 million	Developed by the project team.
Payment system and prices	Options 1a, 2, and 3 have a distance-based fare system, with a fare of 4,000 tugriks for a trip within 5 km and 400 tugriks for each additional km. The average fare is 4,993 tugriks. The fare is calculated by increasing the annual inflation rate. Option 1b has a fixed fare system, with a fare of 5,000 tugriks per trip, increasing by 1,000 tugriks per year.	Developed by the project team.
Currency	1 ам доллар = 3574 төгрөг 2030 оны хүртэл жил бүр 4.97 хувиар, 2030 оноос хойш 4 хувиар тус тус өсгөж тооцоонд ашигласан.	Developed by the project team.
Inflation	~ 2025 : 7% 2026~2048: 6%	World Bank statistics
Discount rate	12%	-

10.2 Results of the project financial analysis

According to the financial analysis, all the alternatives are financially viable because the discount rate for PIRR is higher than 12 %and the PNPV is greater than 0. However, the payback period for the alternatives is 9-10 years. Of the alternatives, option 1a is the most financially optimal.

Table 96. Financial analysis results

Type	Option 1 a	Option 1 b	Option 2	Option 3
PIRR- project internal rate of return	14.24%	14.04%	13.91%	13.29%
PNPV- net present value of the project (millions of dollars)	125.19	113.41	99.39	75.56
BCR - profit-cost ratio	1.17	1.16	1.14	1.1
Payback period	9 Year	9 Year	9 Year	10 Year

Sensitivity analysis

Sensitivity analysis was conducted on 4 scenarios within the total project cost and daily demand. The impact on financial indicators was analyzed by changing the parameters by 20%, 10%, -10%, and -20%.

For Scenarios 1a, 1b, and 2, financial performance becomes inefficient when costs exceed 20 %or demand decreases by 20 percent. However, financial performance improves when costs are saved.

Sensitivity analysis scenario 1a (24.8 km, 4% gradient)

Type	Sensitivity percentage	B/C	PNPV (million.us.dollar)	PIRR
Cost (C)	20%	1.00	-30.20	12.16%
	10%	1.08	47.49	13.13%
	0%	1.17	125.19	14.24%
	-10%	1.28	202.88	15.51%
	-20%	1.42	280.57	17.02%
Demand	-20%	0.96	-43.93	11.63%
	-10%	1.07	40.63	12.98%
	0%	1.17	125.19	14.24%
	10%	1.28	209.74	15.42%
	20%	1.38	294.30	16.56%

Table 97. Sensitivity analysis scenario 1b (24.8 km, 4% gradient)

Type	Sensitivity percentage	B/C	PNPV (millions of US dollars)	PIRR
Cost (C)	20%	0.99	-41.98	11.96%
	10%	1.07	35.71	12.93%
	0%	1.16	113.41	14.04%
	-10%	1.27	191.10	15.31%
	-20%	1.41	268.79	16.82%
Demand	-20%	0.95	-55.71	11.43%
	-10%	1.06	28.85	12.78%
	0%	1.16	113.41	14.04%
	10%	1.27	197.96	15.22%

	20%	1.37	282.52	16.36%

Table 98. Sensitivity Analysis Scenario 2 (25.8 km, 6% gradient)

Type	Sensitivity percentage	B/C	PNPV (millions of dollars)	PIRR
Cost (C)	20%	0.98	-51.96	11.81%
	10%	1.05	23.71	12.79%
	0%	1.14	99.39	13.91%
	-10%	1.25	175.06	15.21%
	-20%	1.38	250.73	16.74%
Demand	-20%	0.94	-61.44	11.25%
	-10%	1.04	18.97	12.62%
	0%	1.14	99.39	13.91%
	10%	1.24	179.80	15.13%
	20%	1.35	260.21	16.29%

Table 99. Sensitivity Analysis Scenario 3 (26.7 km, 6% gradient)

Type	Sensitivity percentage	B/C	PNPV (millions of dollars)	PIRR
Cost (C)	20%	0.95	-89.93	11.27%
	10%	1.02	-7.18	12.21%
	0%	1.1	75.56	13.29%
	-10%	1.21	158.31	14.52%
	-20%	1.34	241.06	15.98%
Demand	-20%	0.91	-93.55	10.74%

	-10%	1.01	-8.99	12.06%
	0%	1.1	75.56	13.29%
	10%	1.20	160.12	14.45%
	20%	1.30	244.68	15.55%

10.3.2 Financial analysis based on project investment

The project financing was taken from the financing plan section of this report. The feasibility and profitability of the project are determined by calculating indicators such as Equity IRR and DSCR by adding loan parameters to the financial cash flow.

Detailed loan calculations were made for 4 scenarios within the framework of the selected route option 1a from the above financial analysis.

Specifications for Option 1a:

- Close to the city center and has a large service area with other sub-centers.
- Total length 24.8 km, 9 km of bridges, 13.67 km of embankments, 2 km of tunnels.
- Total project cost 918.57 million dollars
- Average annual project operating cost - 5.7 million dollars

It is planned that 85 %of the project will be financed through loans, and the remaining 15 %will be financed by Erdes Mongol LLC. Therefore, 4 possible options for loan financing have been proposed and analyzed.

Analysis results:

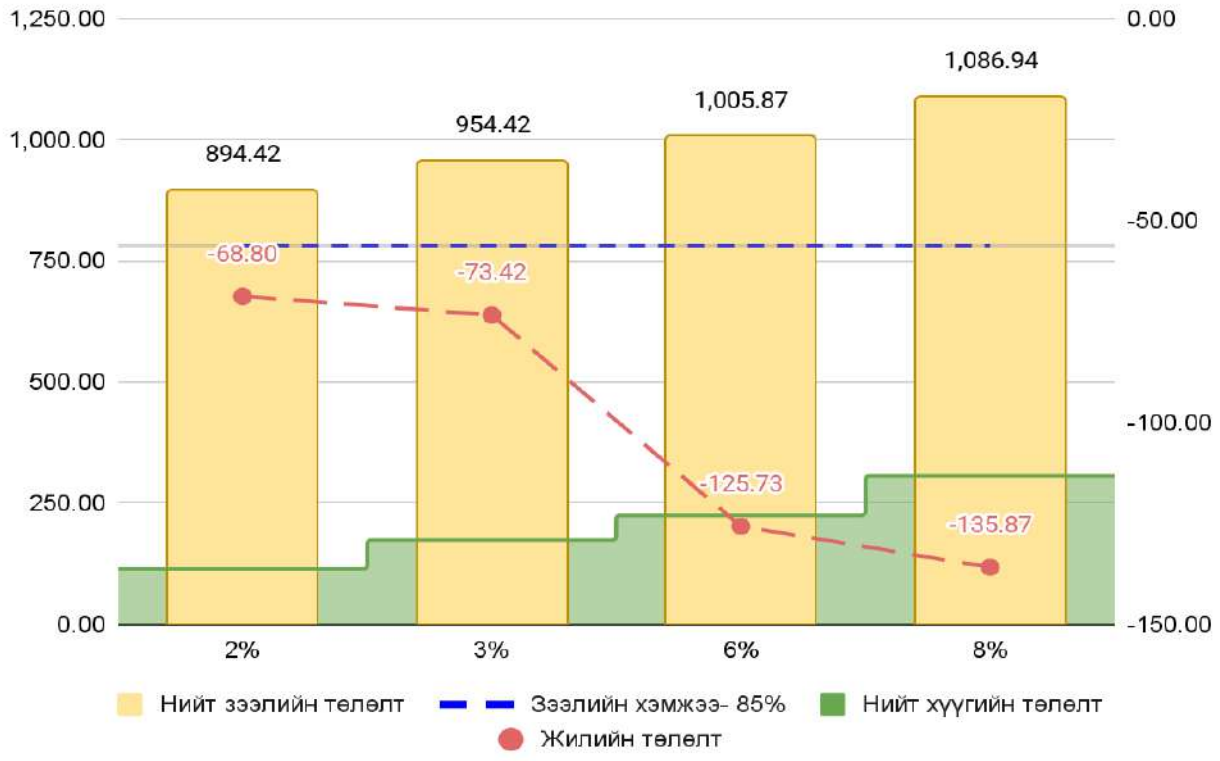
- Depending on the scenario, the annual loan payment is $68.80-135.87 million.
- Looking at the cash flow, in all scenarios except scenario 4, the loan repayment can be made from operating profit.
- Equity IRR is above 21 %in all scenarios, which shows efficiency.
- For DSCR, when it is above 1.5, the loan risk is considered low. In scenarios 1,2,3, if it is above 1.5, the loan conditions are considered optimal. However, for scenario 4, it is high risk.байна.

Investment scenario analysis

№	Option	Option 1	Option 2	Opion 3	Option 4
		International development organization	Exim Bank	International bonds	Domestic commercial bank
1	Total project cost	918.57	918.57	918.57	918.57
2	Loan amount - 85%	780.78	780.78	780.78	780.78
3	Loan interest	2%	3%	6%	8%

4	Loan premium	0.30%	0.50%	1.00%	1.00%
5	Total loan term	15	15	10	10
6	Grace period	2	2	2	2
7	Loan repayment period	13	13	8	8
8	Start a loan	2026	2026	2026	2026
9	Loan expiration	2040	2040	2035	2035
10	Annual payment	(68.80)	(73.42)	(125.73)	(135.87)
11	Total loan payment	894.42	954.42	1,005.87	1,086.94
12	Total principal payment	780.78	780.78	780.78	780.78
13	Total interest payment	113.63	173.63	225.09	306.16
14	Equity IRR	39.28%	37.03%	23.13%	21.04%
15	DSCR	3.18	2.98	1.87	0.98

In terms of interest payments, Option 4 is the highest, with $306.16 million in interest payments over the entire loan term.



Investment Scenario Analysis

9.3.3 Conclusion

- The financial analysis of the project was developed within the framework of 4 options depending on the route.
- The financial analysis of the project shows that all options are financially viable since the discount rate for PIRR is higher than 12 %and the PNPV is greater than 0.
- The payback period for the options is 9-10 years.
- In terms of the financial viability of the project, option 1a (24.8 km, 4% slope) is considered the optimal option because it has the highest financial viability.
- For options 1a, 1b, and 2, financial indicators are not viable if the cost exceeds 20 %or demand decreases by 20 percent.
- Considering option 1a as optimal, 4 financing options were analyzed in detail.
- For Equity IRR, all options are more than 21 %, indicating viability.

For DSCR, credit risk is considered low when it is above 1.5. In options 1,2,3, the loan terms are considered optimal if they are above 1.5. Therefore, it is optimal to finance the project with concessional loans from international development organizations, loans from Exim Bank, and international bonds.

Demand Matrix (2030)

Table 100. Investment scenario analysis

Exit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	0	7,886	2,789	0	8,144	5,827	3,243	989	2,022	89	1,648	3,626	196	0	0	0	0	36,459
2	5,114	0	1,862	0	3,938	2,415	463	124	267	0	187	418	35	0	0	0	0	14,823
3	1,666	1,060	0	0	2,895	1,862	1,123	570	1,025	80	1,034	1,452	133	0	0	0	0	12,900
4	0	0	0	0	160	27	0	0	0	0	9	27	0	0	0	0	0	223
5	7,610	3,635	1,345	1,140	0	0	0	0	0	0	0	0	0	0	0	0	0	13,730

	6	7	8	9	10	11	12	13	14	15	16	17	Total
	4,775	2,040	2,228	0	196	472	1,327	53	0	0	0	0	**25,481**
	1,720	490	490	0	35	107	311	9	0	0	0	0	**15,743**
	1,167	1,051	1,301	0	107	107	294	18	0	0	0	0	**10,041**
	454	89	196	0	18	71	142	0	18	0	0	0	**2,128**
	0	0	0	0	0	0	0	0	0	0	0	0	**15,137**
	0	4,304	6,825	0	1,354	2,317	6,095	374	855	0	0	0	**32,255**
	5,221	0	214	0	9	116	338	0	18	222	0	0	**10,967**
	3,475	35	0	1,514	240	2,415	5,854	62	222	2,022	0	258	**17,780**
	3,127	303	1,915	0	1,924	1,363	3,769	116	543	1,996	0	409	**18,779**
	240	9	18	454	0	0	0	0	0	0	0	0	**890**
	2,940	258	2,646	2,120	0	0	0	0	0	0	0	0	**10,842**
	5,743	490	5,372	4,998	0	0	0	285	1,283	4,892	0	1,310	**29,896**
	490	9	374	517	0	0	1,684	0	338	6,566	0	713	**11,055**
	917	18	249	730	0	0	864	294	0	2,423	0	730	**6,225**
	392	71	3,145	3,038	0	0	4,508	3,698	1,862	0	0	6,861	**23,575**
	0	0	0	0	0	0	0	0	0	0	0	588	**588**
	0	0	258	428	0	0	1,060	463	668	5,524	543	0	**8,944**
	30,661	9,167	25,231	13,799	3,883	6,968	26,246	5,372	5,807	23,645	543	10,869	**240,326**

- We propose a distance-based payment system.
- Optimal payment amount: Option 3-b, i.e. 4000 tugriks for a trip within 5 km, and 400 tugriks for each additional km.
- Internationally, the average fare per trip is 0.39 %of household income, while in our project it is 0.15 percent.