

SPATIAL ANALYSIS ON SOCIAL ECONOMIC OF MONGOLIAN EASTERN ZONE AND DEVELOPMENT RESOURCE

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ABSTRACT

This study aims to analyze which developmental resources are better for each aimag in the eastern region of Mongolia that has actively participated in Northeast Asian economic integration. Spatial analyses was conducted on human settlements, labor force, agricultural resources, as well as the current planning transportation corridor and border port activity. Human population and livestock numbers have been increasing in some soums and in all cities along the current transportation network. Khentii and Sukhbaatar aimags have more potential to develop based on opportunities in the agriculture, tourism and service sector. Dornod aimag has the potential to become an industrial park, with opportunities to develop its industries, services, and intensive livestock breeding. Khalkhgol soum also has the potential to develop based on its tourism and farming. Lastly, Sukhbaatar aimag has the potential to develop based on pastoral animal husbandry and industries.

Key words: human settlement, labor force, geo spatial, agriculture, regional development concept

Introduction/ background

In the early 2000s, the State Great Khural of Mongolia approved regional development policy documents such as the Regional Development Concept of Mongolia [1], the Mid-term Regional Development Strategy for Mongolia [2] and State Great Khural's Resolutions on the Establishment of the Pillar Center city of the Regional [3], The government has also adopted programs related to regional development, including the East, West, Central and Khangai Regional Development Programs (2006-2015) [4]. The main purpose of the regional development concept is to reduce inequalities between rural and urban development; to accelerate economic and social development. To do that the advantages of the region, the material resources of the main commodities, and the resources of the workforce are managed in accordance with their environmental capacity. The implementation of these regional development documents expired in 2015.

In the Law on Development Policy and Planning approved by Parliament in 2016 [7], the "Regional Development Concept of Mongolia" is a document that defines the goals, objectives and approved

methods to support local economic and social development. This document promotes coherence between regional and urban development and ensures environmental sustainability.

In addition, the "Regional Development Concept of Mongolia" has to be closely linked to the national program, the "State Policy on Population Settlement and Residential system of Mongolia" and the "Mongolia-Russia-China Economic Program", as well as other programs in neighboring counties. For example, projects in transportation, energy and infrastructure of the Russian Government's "Eurasian Economic Association" and the Chinese initiative "One Belt and One Road".

Furthermore, the Mongolian Economic Foreign Exchange Program outlines regional economic integration. However, it is unclear exactly how to initiate the regional economic integration, based on local development available resources. At this time, the National Development Agency of Mongolia has begun to develop the "Mongolia Regional Development Policy".

This study aims to identify spatial analysis of the transportation network planning, population and human settlements, labor resources and the distribution of agricultural resources in the eastern region and to determine what development resources exist at aimag and soum levels.

Methodology

The study assessed population settlement, labor, livestock and crop data overlapped with the planned transportation network and identified the most valuable development resources in each soum and aimag. Data from 3 aimags and 45 soums between 2000-2017 were used, and the population number, aged 15 and over people, economically active population, employees, unemployed population, number of herders, structure of GDP by economic sector, number of inbound and outbound passenger and transport by crossing border, amount price of major export and import goods and harvesting grain and vegetable, potatoes data were analyzed.

Research result

Transportation network

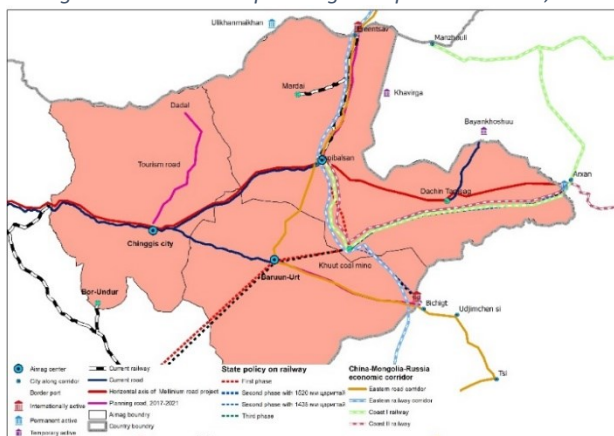
Under the "China-Mongolia-Russia Economic Corridor Program", joint projects and programs are designed to increase trade turnover, supply of goods

competitively, facilitate trans-border transportation, develop infrastructure of Mongolia, Russia and China. A total of 32 projects have been planned in the joint project. Consider these joint projects and programs by sectors, 13 projects in the transport infrastructure sector (of which 6 projects in railway 4 projects in road); 2 projects in the industrial sector; 1 project in upgrading the border port; 1 project in energy sector; 4 projects in the trade, customs, professional inspection and quarantine; 3 projects in the environmental sector; 3 projects in the science and technology sector; 3 projects in the humanitarian sector; 1 project in the agricultural sector 1 project on protection of medicine and health. [6].

Within the scope of the economic development, one goal of regional development is to establish a national movement to build cross-roads between the regions and between countries. As a result, the State Great Khural approved the Millennium Road and the vertical axis infrastructure, the State Railways Policy, and the "Development Path" National Programs and continues to construct transportation network. The newly proposed road and rail project in the Eastern region is in line with the Millennium Road, the vertical axis infrastructure and the expansion activity of transportation in the Eastern Regional Development Program.

As shown in Figure 1, the road and rail project (corridors) reflected in the China-Mongolia-Russia Economic Corridor Program will be an important development in the long-term to increase foreign trade and cooperation opportunities in Northeast Asian country.

Figure 1. Current and planning transportation route,



Currently, the eastern region's centers have been connected to Ulaanbaatar capital with paved roads. Aimag center-to-aimag center and border port-to-border port connections along the vertical and horizontal axis transport infrastructure routes is

planned to be established in the national and international program.

Border port activity

There are 4 ports on the border with China and two ports on the border of Russia. The ports of Ereentsav and Bichigt are internationally permanently active; the border ports of Havirga and Bayankhoshuu are permanently active; and Sumber and Ulikhanmaikhan border ports are temporarily active. As shown in Figure 1, there were 52-58 thousand passengers traveling through the Bichigt and Khavirga border ports, mostly at Bichigt port, with over 27 thousand trucks and 7.3 thousand passenger cars. Over one thousand trucks crossed at Khavirga port and 8.2 (thousand?) passenger cars. At Bayankhoshuu port, 39 thousand passengers, 21.5 thousand passenger trucks and 3.6 thousand passenger cars were transported.

According to major goods exported by Dornod aimag border ports in 2016, 220,871.5 thousand USD of crude oil was exported via Bayankhoshuu port, 19,767 USD of concentrated zinc and lead via Ereentsav port, and 1,084 USD of hay and livestock raw material was exported via Khavirga and Bayankhoshuu border ports. In terms of major import products, 18,892 USD of fuel was imported by Ereentsav border port, 579,000 USD of vegetables and 1,116.4 thousand USD of construction and auto equipment were imported by Khavirga and Bayankhoshuu border ports [7]. Total amount price of imported petrol from Russia via Ereentsav port is equal to 8% of the total amount price of exported crude oil to China via Bayankhoshuu port.

Population and Human settlement

In terms of population and human settlements Mongolia is unique. Settlements are reclassified as urban and rural by population estimates based on the national statistical census. The urban category includes aimag centers and some soum centers with relatively high population density and developed infrastructure. The rural category recognizes herders living in pasture area and soum centers that provide basic social services.

In the Eastern region, at the end of 2017, there were around 216 thousand people, or 6.9% of the total population of Mongolia. Compared to 2003, the number of people increased by 21,000, but the proportion of the total population decreased by 1 percent. For settlements, there are 3 aimag center cities and 45 soum centers. Large settlements in this region are classified as follows: 1 city according to state ranking and 2 cities according to aimag ranking; 7 soum centers with populations of over

The population, human settlement and annual growth of population in the Eastern region are estimated by the "Average Yearly Growth and Decrease of Population" estimation by 2010-2017.

Legend

- City above nation
- Border border
- Nationality passport
- Active
- Permanent border
- Temporary active
- County boundary
- Province boundary
- Level boundary

The state policy and national program on transportation

- The proposed and to be built in 2017-2021
- The proposed rail in the both in 2017-2021
- Current rail
- Current road
- National road
- Road for national use

Program of Mongolia-Russian-China economic corridor

- Asia-southern seaport
- Land-sea road outside
- Rail seaport
- Harbor seaport
- The coast I
- The coast II

Population and Human settlement by urban and rural population

Urban population, 2017

- < 15000 population
- 15001 - 30000 population
- 30001 - 50000 population
- 50001 - 100000 population

Rural population 2017

- < 5000 population
- 5001 - 8000 population
- 8001 - 10000 population
- 10001 - 15000 population

Population change: Annual rate of population

- Annual average growth rate of population
- < 0.5% population decrease
- 0.5% - 1.0% natural population increasing
- 1.0% - mechanical population increasing

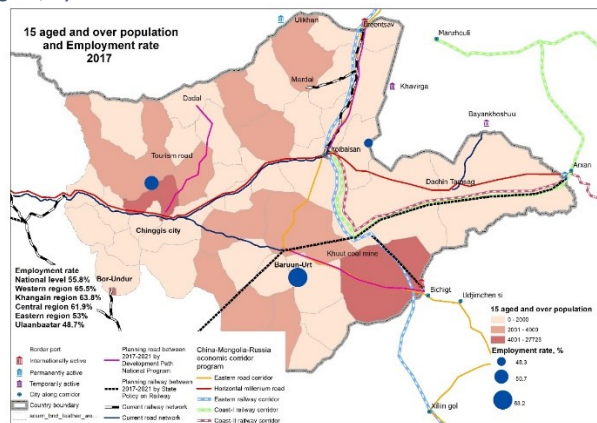
Bor-Undur soum has 8.9 thousand people and is a relatively urbanized soum in the eastern region. The main livelihood of the people of the Bor-Undur soum is different from other soums and relates to the mining and industry sector connected to the central rail network.

In Khentii aimag, Umnudelger, Binder, Dadal and Tsenhermandal soums are expected to have higher potential to increase population in the future. Because Binder, Dadal and Umnudelger soums have higher populations than other soums and there are located in the forest-steppe zones of the Khentii Mountain range which has a lot of State Special Protected Areas. This creates opportunities for development in agriculture and tourism. Additionally, Tsenhermandal soum has a large number of service stations along the horizontal road, and with higher population growth than eastern region of Mongolia.

In Dornod aimag, Bayan-Uul, Bayantumen, Khalkhgol and Chuluunkhoroot soums are expected to have higher potential to increase population. Bayan-Uul soum, one of the most populated soums of Dornod aimag, is located in the forest steppe zone. Bayantumen soum has a higher population growth than eastern region of Mongolia and is located near Choibalsan city. Chuluunkhoroot soum is located adjacent to Russia and China. The Bayantumen railway along the vertical axis of the eastern region passes by the Ereentsav border port. The railway runs 80 km from the Mongolian border and joins with the **Trans-Siberian Railway**, a route that connects East Asia to eastern Siberia and Europe. Khalkhgol soum is the closest to the ports of eastern China and is one of the higher populated soums; however in recent years this soum's population has been declining. Also, Bayankhoshuu and Sumber border ports locate in Khalkhgol soum. As part of the China-Mongolia-Russia economic corridor program, a railway route is planned to pass through Sumber border port in Khalkhgol soum.

In the eastern region there are over 150,000 people aged 15 and over, of which 83,000 are employed, 9,700 are unemployed and others are economically inactive. Of the total 83,000 workers the majority are employed in the agricultural sector, including 36.4 thousand people or 20.5 thousand herding households engaged in livestock breeding, and 2.8 thousand engaged in agriculture, forestry, fish and hunting. The rest of the employed population are in services, mining and manufacturing. Within the large agricultural sector, the livestock sector alone employs 43.8% of the working population.

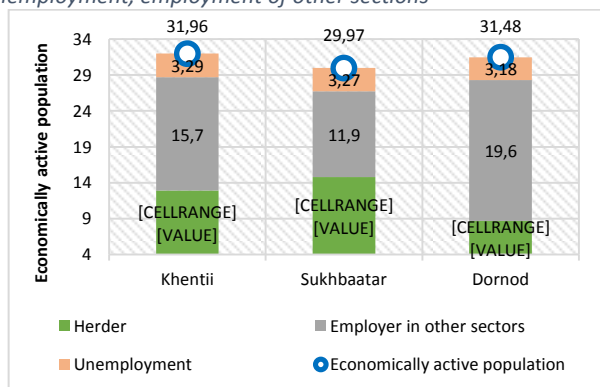
Figure 3. 15 aged people and employment rate in eastern region, by 2017



In Sukhbaatar aimag, 42.27 thousand people are aged 15 and over, of which 14.77 thousand are herders who are 55% of total economically active population. In Khentii aimag, 56.67 thousand people are aged 15 and over, of which 12.9 thousand are herders who are 45.1% of total economically active population. In Dornod aimag, 58.8 thousand people are aged 15 years and over, of which 8.7 thousand are herders who are 30.8% of total economically active population.

While Dornod aimag has a relatively small number of herders and other sectors of employment, Sukhbaatar and Khentii aimag have larger herder population and the main livelihood sector is livestock husbandry. In the Eastern region, 36.4 thousand herders, the livestock sector is an important economic sector as three out of every five workers are involved in this sector. However only 52 thousand people work in the mining sector at the national level. It means miner number is not too higher number compared to herder population of eastern region of Mongolia.

Figure 4. Economically active population number, herders, unemployment, employment of other sections



By 2017, there were 9.6 thousand unemployed people in these three aimags. Figure 4 shows the population pyramid of the eastern region in relation to the proportion of young people in total population were be high. After 10 years, the current group of 15-22 year olds, approximately 17-34 thousand people, will choose their profession and move into the group of economically active people [9]. Therefore, there is a need to manage the new labor force into required occupations in order to coordinate for local development and promote an efficient labor market. If the these strategic actions are not taken, there may be an increase in unemployment and a decrease in population growth.

Agriculture

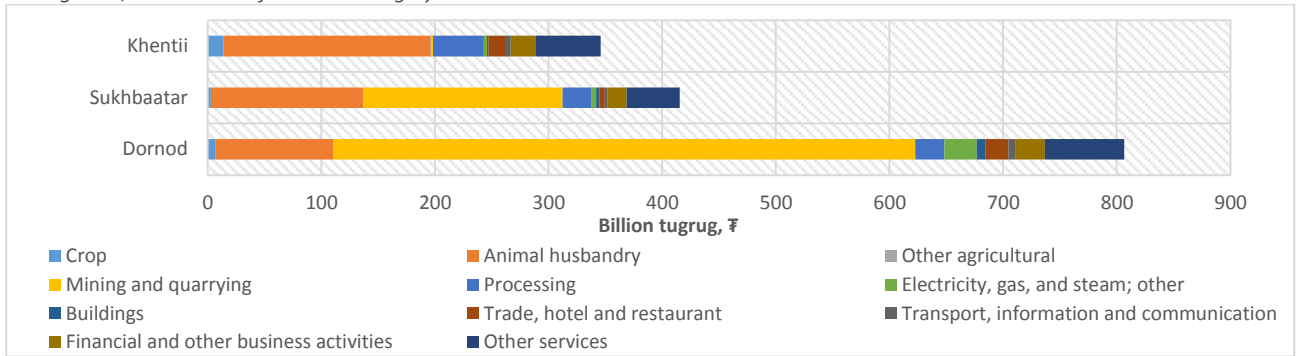
The Eastern region's GDP has grown rapidly since 2000, reaching 1.5 trillion MNT in 2017 and accounting for 5.6% of national's GDP. In recent years the eastern region's economic growth has been increasing faster than in other economic regions, with the exception of the capital city. This region's economy is comprised of 4 major sectors that contribute to GDP: mining, which contributes 43.9% of GDP; livestock husbandry, which contributes 26.8%; processing industry, which contributes 6.1%; and crops, which contribute 1.5%. The mining sector's share of GDP has grown faster than other economic activities, but the processing industry activity has not changed..

In 2017, Dornod aimag's GDP reached 806.57 billion MNT and represents 51.4% of the eastern region's GDP. According to the economic structure, 63.5% is drawn from the mining sector, 12.8% from livestock husbandry, 8.7% from other service sectors, 3.1% from processing industries and 0.9% from farming sectors.

Sukhbaatar aimag reached 415.49 billion MNT and contributed 26.5% of the region's GDP. Mining contributed 42.2% of Sukhbaatar's GDP, livestock husbandry contributed 32.2%, other service sectors contributed 11.3% and the processing industry contributed 6.2%.

Khentii aimag contributed 22.1% of the eastern GDP with a local product of 345.99 billion MNT. Of this local product, 52.7% came from the livestock sector, 13% from the processing industry, 16.6 from other sectors services and 4% from the farming sector (Figure 5).

Figure 5, GDP division for each aimag by 2017



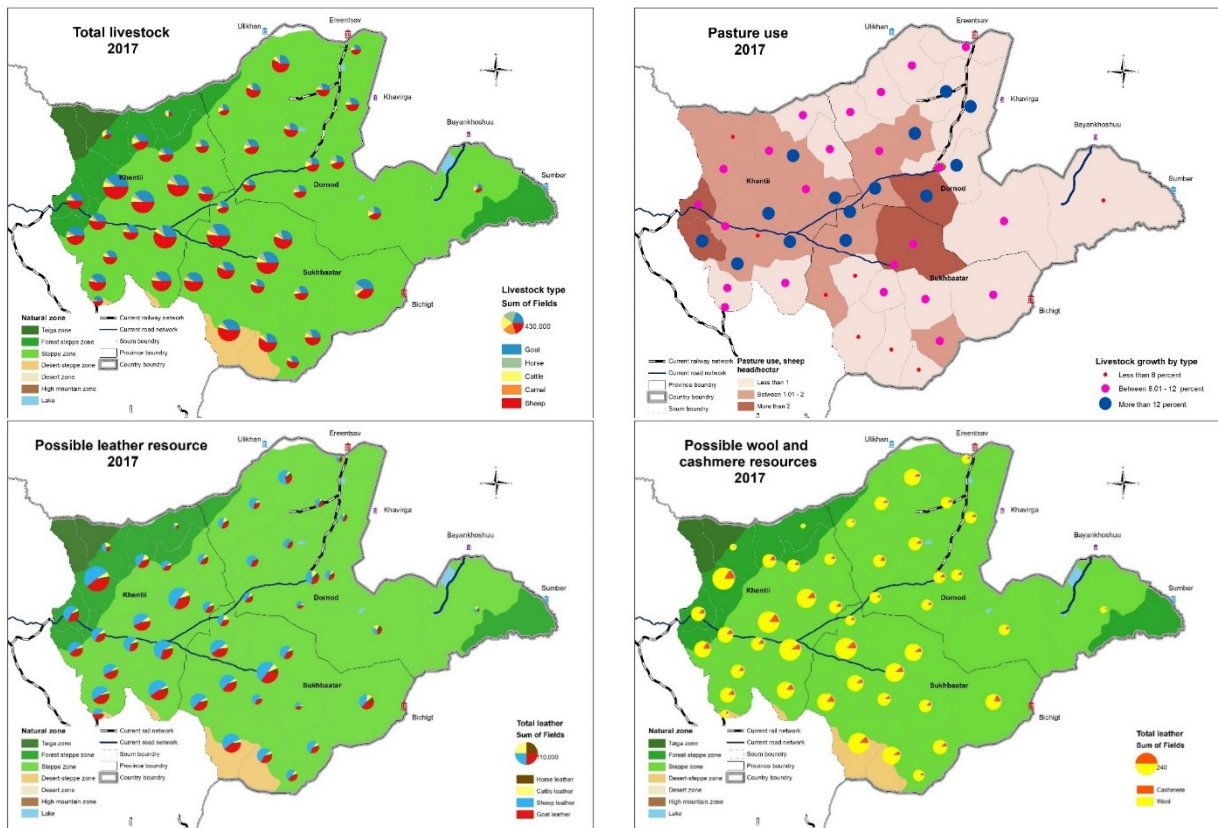
Animal husbandry

The total number of livestock in the eastern region has increased by 2.6 times since 2001 reaching 9.9 million in 2017. Of this total livestock population, 0.87 million horses, 0.78 million cattle (cows?), 18.1 thousand camels, 5.02 million sheep and 3.28 million goats were counted by census data. This region has 22.3% of the total horse population, 17.8% of cattle, 16.7% of sheep, 12% of goat and 4.3% of camel population. The Eastern Region is considered to be very suitable for the development of livestock husbandry. Rawhide, leather, wool, cashmere, meat and milk are the main raw materials

In Figure 6, the total number of livestock; average growth rate for the last 5 years; potential resources of wool and cashmere and rawhide and leather; overlap of natural zones; and livestock density are shown.

In Khentii aimag, there are 4.4 million heads of livestock and Umnudelger, Batnorov, Galshar, Bayankhutag, Darkhan, Kherlen and Tsenhermandal soums supply 62% of the aimag's total resource of rawhide, leather and meat. In Sukhbaatar aimag, there are 3.52 million heads of livestock including Baruun-Urt, Bayandelger, Munkhkhaan, Uulbayan and Tuvshinshiree soums, which account for 62.9% of the aimag's total meat, rawhide and leather

Figure 6 Total livestock, pasture use, possible resource leather type and possible resources of wool and cashmere by 2017.



for light and forage industries.

resources. In Dornod, there are 2.05 million heads of

livestock in Dornod and Bayandun, Bayan-Uul, Tsagaan-Ovoo, Kherlen and Khulunbuir soums provide up to 61.8% of total meat and leather products in Dornod aimag.

Since camel numbers are lower in the Eastern region, the main source of wool comes from sheep. Khentii aimag has the potential to produce 1,701.9 tons of wool annually. Batnorov, Bayankhutag, Galshar, Darkhan, Delgerkhaan, Jargalanhaan, Umnudelger, Kherlen and Tsenhermandal soums produce 73% of the total wool resources of the aimag. Sukhbaatar aimag has the potential to produce 1,437.8 tons of wool and 84% of the aimag's wool resources are produced by Baruun-Urt, Bayandelger, Dariganga, Munkhkhaan, Ongon, Sukhbaatar, Tuvshinshiree, Uvaan and Erdenetsagaan soums. Dornod aimag has the potential to produce 806.3 tons of wool annually and Bayandun, Dashbalbar, Tsagaan-Ovoo and Sergelen soums produce 42% of the total wool resources of the aimag.

The total number of goats in the eastern region is 3.8 times higher now than in 2000. The goat population annual growth rate is higher than other livestock. Due to the high demand and high value of raw cashmere, herders are very interested in raising goats. In Khentii aimag, 275 tons of cashmere is supplied annually, and Umnudelger, Kherlen, Bayankhutag, Batnorov, Delgerkhaan and Galshar soums produce 56% of the aimag's total raw cashmere resources. Sukhbaatar aimag produces 200 tons of cashmere annually, 57% of this total is produced in Baruun-Urt, Bayandelger, Munkhkhaan, Tuvshinshiree and Erdenetsagaan soums. Dornod aimag produces 106.9 tons of cashmere annually, producing 55% of the total reserve of the province in Dashbalbar, Tsagaan-Ovoo, Bayandun, Sergelen, Kherlen and Choibalsan soums.

Since the number of livestock has been increasing rapidly since the 2009-2010 dzud, the number of

livestock per hectare has now exceeded 100 sheep in 5 soums of Sukhbaatar aimag, in 13 soums of Khentii aimag and 2 soums of Dornod aimag. The 2nd, 3rd and 7th bag in Umnudelger soum, 5th, 7th and 8th bag of Kherlen soum, 4th bag of Batnorov soum, 2nd and 4th bag in Binder soum of Khentii aimag include and rely on farming land [10]. However, due to the increase in livestock numbers, these soums' pasture areas will be reduced and livestock grazing will become more difficult.

Farming

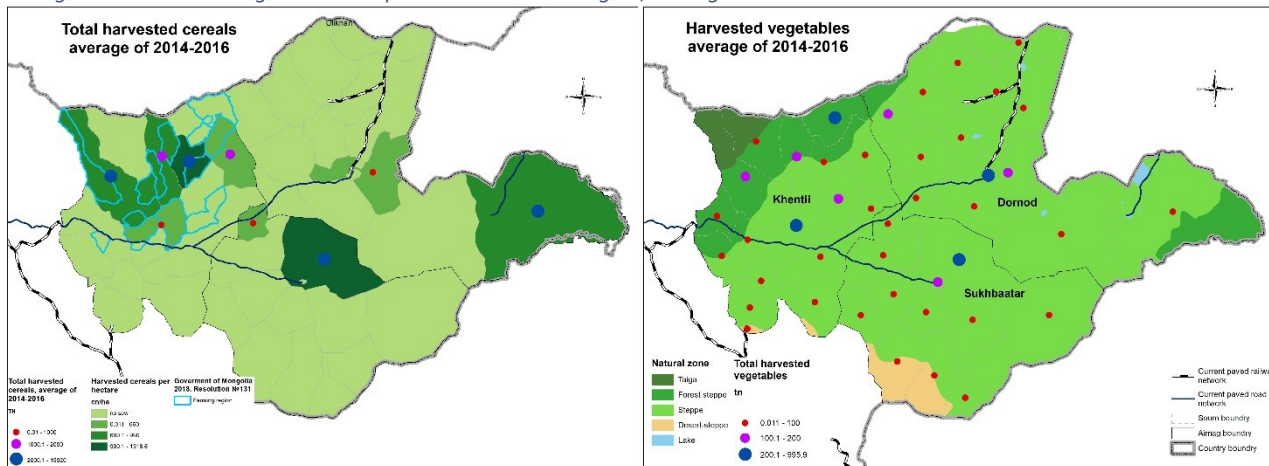
The eastern region harvests 8.9% of the national total harvested grain, of which 4.4% is from Khalkhgol soum of Dornod aimag, 3.9% is from Umnudelger, Binder, Bayan-Adraga and Norovlin soums of Khentii aimag and the remaining 0.6% is from Sukhbaatar, Tumentsogt soums of Sukhbaatar aimag.

As shown in Figure 7, many soums sowed potatoes and vegetables between 2014 and 2016, but these harvests were small when compared to total grain harvests. 4.4% of national total potato harvests come from the eastern region, of which 2.7% is from the Khentii aimag, 1.3% is from the Dornod aimag and 0.4% is from the Sukhbaatar aimag. Kherlen, Murun, and Umnudelger soums of Khentii aimag and Tsagaan-Ovoo, Bulgan of Dornod aimag harvested more than 300 tons collectively.

4.8% of national total harvested vegetables is contributed by the Eastern Region. Of which 3.2% is from Khentii aimag, 1.3% is from Dornod aimag and 0.3% is from Sukhbaatar. Murun, Kherlen and Dadal soums of Khentii aimag harvested in excess of 200 tonnes.

16 bags of 9 soums of Khentii aimag have been designated a crop area by Government Resolution №183 of 2018. This resolution sets pastoral areas and farming land boundaries. The farming land is more concentrated in the forest-steppe zone due to soil fertility, surface and groundwater resources.

Figure 7. Harvested vegetables and potatoes in eastern region, average between 2014-2016



Conclusion and Discussion

There are economic benefits to transport freights and passengers via eastern road and railway corridors, Ereentsav-Bichigt and Ereentsav-Sumber corridor in the transportation projects in the China-Mongolia-Russia Economic Corridor Program. If these transportation infrastructure project is implemented, it will increase foreign trade turnover. In order to join the East Asia Economic Integration (6 countries) and develop the eastern region, Eastern rail and road corridors have essential role for geographic location.

The livestock sector is the most important sector in the eastern region. It constitutes 26.8% of the Eastern Region's GDP, 43.8% of the total employees work in livestock sector, and it has 15% of the country's total livestock. It is important that revenue from the mining sector, which constitutes the most part of GDP, will be spent to development the manufacturing sector and prepare labor force, new generation after 5-10 years, to work this sector. Example, the eastern region has potential to develop crude oil refinery and processing industrial of livestock raw material.

Pasture use is too high in some soums, however, livestock sector is main livelihood sector. Therefore, it is suitable for these soums to combine pastoral livestock breeding with intensive livestock. It is also important to pay attention to the quality of productivity of per livestock.

The Choibalsan city of Dornod aimag has the potential to set up a state-rated city and then develop industrial parks, since the population of Ulaanbaatar, Darkhan and Erdenet will be higher. Since 2001, migration movement to urban has drastically increased, and declining population of 254 soums [11]. Between 1995 and 2014, over 480,000 people moved to Ulaanbaatar from rural

areas [12]. As of 2016, 46% of the population is settled in Ulaanbaatar. If the migration trend which toward to urban from rural area, continues to 2040, 62% of total population will be settled in the capital, it means that the population and the socio-economy will be concentrated in one city and the population, lived in rural area, will be more sparse. It possible to affect national security. Government need to focus to development other settlement with higher development potential at the regional level.

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