



Key messages

- Establishment of integrated vegetable storage and distribution centres operating at regional scales is essential for the sustainable development of the horticulture sector.
- An integrated vegetable storage and distribution centre in Ulaanbaatar would need to have an annual turnover of 75 thousand tons and a cold storage capacity of 20 thousand tons. Also, it should include a food safety lab, a vegetable processing plant and a packaging manufacturing plant.
- The proposed vegetable storage and distribution centre in Ulaanbaatar will require 3.5 ha of land and an initial investment of about MNT 100 billion.
- The social entrepreneurship character of the proposed centres justifies co-funding of the initial investment by the government.
- Regarding ownership structure, the following options are recommended: a) stock company jointly owned by the government, the lead company and farmer cooperatives or b) stock company jointly owned by the lead company and farmer cooperatives, to which the government may provide funds for the initial investment in the form of a repayable loan.

Justification and solutions for establishment of integrated vegetable storage and distribution centres

Following the global trend of securing sustainable food production in response to the increasing growth of world population and climate change, Mongolia has formulated its food policies within the framework of the "Food Revolution". A priority of the policies aiming at sustainable food supply is to increase and diversify vegetable production to reduce the dependency on vegetable imports. However, expansion requires profitability whereas in the vegetable sector of Mongolia, the profitability of production as well as the consumption is severely affected by the lack of an integrated storage and distribution structure, which causes numerous intermediate steps between producers and consumers, an enormous difference between producer and consumer prices and a much higher profit margin of intermediaries compared to that of the growers. Hence, the establishment of an integrated system of vegetable storage and distribution is of vital importance, and this need is already recognised in the crop and horticulture sector's policies. The main components of the system in question will be integrated storage and distribution centres operating at regional scales. Given the lack of domestic experience, Mongolia needs to learn from other countries to develop solutions that fit to the specific conditions and constraints in Mongolia. As an example, this policy brief presents a preliminary model of an integrated vegetable storage and distribution centre near Ulaanbaatar, along with policy recommendations for implementing this proposal.

Vegetable production, imports and the domestic market

Mongolia is self-sufficient in potato, with 182.7 thousand tons of domestic production against an import of 100.9 tons in 2021. In contrast, the total vegetable supply amounted to 197.2 thousand tons, with domestic production accounting for 61.7 percent while 76.0 thousand tons of unprocessed vegetables with a monetary value of USD 19.3 million were imported. On average over the past ten years, the total vegetable supply was 174 thousand tons and domestic production accounted for 57 percent (Figure 1).

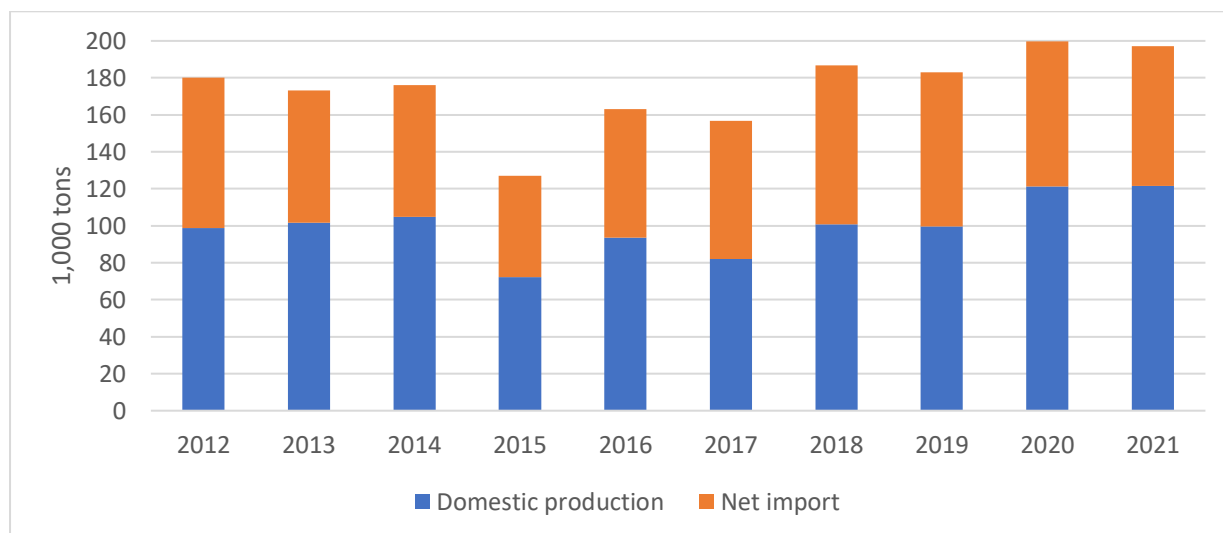


Figure 1: Total vegetable supply and its structure, 2012 to 2021

Sources: NSO 2016, NSO 2022a

Based on the value of 182.6 thousand tons of domestic supply and 200.7 tons of imports, the total potato market in 2021 was MNT 110.2 billion. Including the MNT 292.7 billion value of domestic vegetable supply, the total market for unprocessed potato and vegetables was MNT 292.7 billion and domestic production accounted for 86 percent (Table 1).

Table 1: Monetary value of the total supply of unprocessed potato and vegetables, 2021

Category	Quantity, 1,000 tons	Value, MNT billion
Domestic supply		
Potato	182.6	109.6
Vegetables	121.5	232.0
Total value of domestic supply	304.1	341.5
Imports		
Potato	0.2	0.6
Vegetables (unprocessed)	76.0	55.1
Total value of imports	76.2	55.7
Total value of the market for potato and vegetables		397.3

Sources: NSO 2016, NSO 2022a

Demand and supply of the standard population

By the end of 2021, the population of Mongolia was 3,312.3 thousand people, which can be converted into a standard population of 2,682.6 thousand people. Based on the recommended consumption per standard person, the potential demands for potato and vegetables were 117.5 and 254.6 thousand tons,

respectively. The population of Ulaanbaatar alone possesses a consumption potential of 54.8 thousand tons of potato and 118.6 thousand tons of vegetables (Table 2).

Based on the norms for storage, transportation and consumption losses, which are provided in the 2016 “Study on Mongolian vegetable sector and value chain situation” of MFARD, the net consumption of potato and vegetables in 2021 was 155.2 and 161.5 thousand tons, respectively (Table 3).

Table 2: Potential demand of the standard population for potato and vegetables, 2021

Scope	Standard population, 1,000 persons	Requirement per standard person and year, kg		Total potential demand, 1,000 tons	
		Potato	Vegetables	Potato	Vegetables
Mongolia	2,682.6	43.8	94.9	117.5	254.6
Ulaanbaatar (est.)	1,250.0	43.8	94.9	54.8	118.6

Table 3: Estimated net consumption of potato and vegetables, 2021

Categories	Total supply, 1,000 tons	Storage, transportation, distribution and consumption losses		Net supply, 1,000 tons
		Percent	1,000 tons	
Potato, domestic	182.6	15	27.4	155.2
Vegetables, domestic	121.5	20	24.3	97.2
Vegetables, imported	75.7	15	11.4	64.3
Vegetables, total	197.2			161.5

Source: NSO 2022a, NSO 2022b

The above estimations indicate that the total vegetable supply only covers 63 percent of the potential demand, with domestic production and imports accounting for 38 and 25 percent, respectively. The 37 percent shortage equals to 93 thousand tons of vegetables that need to be additionally supplied to fully meet the potential demand of Mongolia.

Value chains

The 2020 ADB study “Vegetable production and value chains in Mongolia” identified five main value chains and estimated the market share of each value chain, as shown in Table 4.

Table 4: Estimated shares of main value chains in the total vegetable trade

Main value chains	Estimated share of total trade, percent
Value chain 1: small-scale vegetable growers – intermediaries or large suppliers – wholesalers – retailers – consumers	50
Value chain 2: large- or medium-scale vegetable growers – retailers – consumers	10
Value chain 3: importers – intermediaries or large suppliers – wholesalers – retailers – consumers	25
Value chain 4: small-scale vegetable growers or importers – processors – retailers – consumers	10
Value chain 5: large-, medium- and small-scale vegetable growers – large-scale traders – consumers (direct-buying model)	5

Source: Asian Development Bank, 2020



As indicated above, the dominating value chain stretches from farmers through intermediaries, wholesalers and retailers to the final consumers. Due to these steps, consumer prices are 61 to 162 percent higher than producer prices. The average profit margin of intermediaries is 61 percent for sales to companies that supply institutional buyers and 82 percent for sales to wholesalers. In the case of retail trade, the traders also add their profit. As a result, consumer prices at food markets and retail shops are by 147 and 161 percent higher than producer prices, respectively. In the value chains 2 to 4, the difference between producer and consumer prices range between 85 and 1,446 percent. Only in the case of direct supply by farmers to the retail, the profit margin added by the retail is 22 percent.

Policy framework for the establishment of integrated vegetable storage and distribution centres

The following policy objectives directly relate to the proposed establishment of integrated vegetable storage and distribution centres in Ulaanbaatar and regional centres:

- Objective 8.3, sub-objective 7 of the First phase (2021 to 2030) of the “Vision – 2050” long-term development policy of Mongolia – Develop target markets of raw materials and products of agricultural origin, and improve the economic capacity and profitability”
- Objective 4.2.9 of the First phase action plan for the implementation of the “New Recovery Policy” – Establish regional logistic centres based on the production of food, raw materials, crop and horticulture, and construction materials”
- Objective 4.4 of the Action plan for the implementation of “Атаp-4” Campaign for Sustainable Development of Agriculture and Horticulture” – “Support the establishment of a trade centre (in Ulaanbaatar) with an integrated storage and distribution network, and objective 4.5 – Establish mechanised warehouses of potato and vegetables, and facilities for storing seedlings of fruits, berries and ornamental plants
- Objective 2.14 of the Action plan for the implementation of the national movement “Food supply and security” – Increase, with a regional approach, the capacity of grain silos and mechanised warehouses for potato and vegetables that meet the related standards by 20 thousand and 50 thousand tons, respectively

Functions, process flow and structure of the proposed integrated storage and distribution centre

The main functions of the proposed integrated storage and distribution centre include temporary storage and processing of potato and vegetables supplied by farmers, and facilitation of delivery to buyers via contractual arrangements and wholesale trade. The centre’s overall process flow can be structured into the following stages: reception – storage – processing – receiving orders – delivery. (Figure 2).

The centre’s main facilities include a wholesale market, cold storage warehouses, a vegetable processing plant, a packaging manufacturing plant and a food safety lab. Administration and service facilities are required in addition (Figure 3). A brief description of the main facilities is provided below.

Wholesale market – An estimated 50 percent of the total potato and vegetable supply in 2021, which was 182.6 and 197.2 thousand tons, respectively, is distributed in Ulaanbaatar. The wholesale market should have a capacity supplying 40 percent of the capital’s demands for potato and vegetables, which equals an annual turnover of 75 thousand tons.

Cold storage warehouses – The total available cold storage capacity for potato and vegetables in Mongolia is 66.1 thousand tons and covers 18 percent of the required capacity. The centre’s assumed wholesale turnover of 75 thousand tons will require a cold storage capacity of 20 thousand tons. Due to

the differences in storage conditions, a warehouse with a 10-thousand-ton cold storage capacity for coarse vegetables such as potato, root vegetable and onion and another 10-thousand-ton warehouse for fine vegetables, fruits and berries are required. Both warehouses should be fully automatised and have a sorting line. The warehouse for coarse vegetables needs a packaging line for 25 kg and 50 kg sacks. These warehouses will increase the total cold storage capacity of Mongolia by 30 percent.

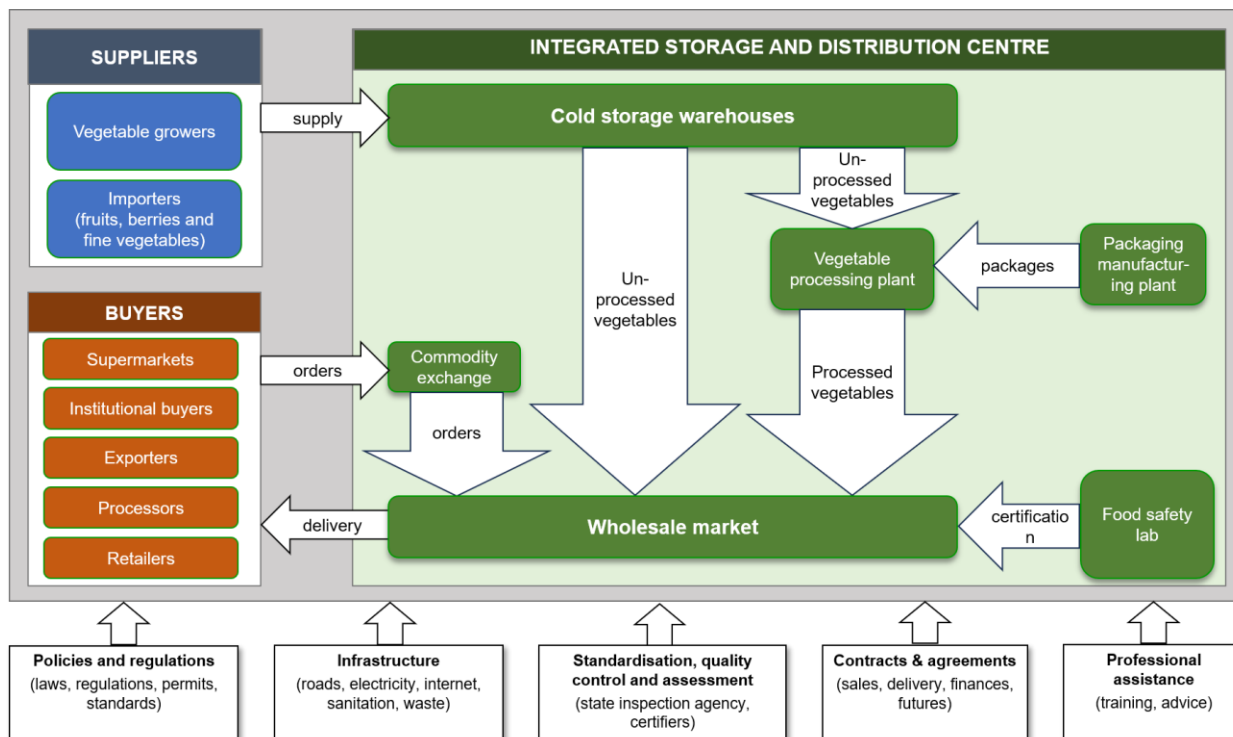


Figure 2: Process flow of an integrated vegetable storage and distribution centre



Figure 3: Facilities of the proposed integrated vegetable storage and distribution centre (1 wholesale market, 2 food safety lab, 3 warehouse for coarse vegetables, 4 warehouse for fine vegetables, 5 storeroom for goods and materials, 6 vegetable processing plant, 7 packaging manufacturing plant, 8 car repair shop, 9 petrol station, 10 car wash, 11 parking area, 12 hotel, 13 administration building, 14 service centre for customers, 15 residential building for employees, 16 service facility for employees, 17 waste sorting facility)



Food safety lab. In accordance with the relevant ISO and MNS standards, the centre's food safety lab will carry out analyses to detect residues of pesticides and other chemicals, examine fulfilment of plant health requirements and issue a food safety certificate, which should be mandatory for all potato and vegetables distributed from the centre. An office for the state inspectors for food safety and plant health will be in the lab building.

Vegetable processing plant. Mongolia spent USD 2 million on imports of 1,088 frozen vegetables and 153 of dried vegetables in 2021. To boost domestic value-added production and replace imports, the centre's facilities should include a vegetable processing plant with a washing, cutting and freezing line and a packaging line. Since imports are dominated by frozen vegetables, the processing plant should have an initial capacity of producing 1,000 tons of frozen vegetables per year and a future expansion plan, which should include the production of dried and other semi-processed vegetables. The vegetable packaging line will need a capacity of packaging 30 thousand tons p.a. of unprocessed and processed (washed, cut and frozen) vegetables in 0.5 to 5 kg plastic and mesh bags, depending on the requirements of supermarkets and other retailers.

Packaging manufacturing plant. Since packaging manufacturing is almost non-existent in Mongolia, it is crucial for the centre to have an own manufacturing plant. The plant should be able to produce mesh and woven sacks, plastic and mesh bags and carton boxes suitable for packaging of potato and vegetables. Based on the assumption that in addition to the 75 thousand tons of potato and vegetables distributed from the centre per year, the plant will receive orders from farmers, processors, wholesalers and retailers, it needs to have an annual production capacity of 1.2 million pieces of 50 kg sacks, 500 thousand pieces of 25 kg sacks, 3 million pieces of 10 kg carton boxes, 1.5 million pieces of 5 kg carton boxes, 5 million pieces of 0.5 to 1 kg plastic bags and 1 million pieces of 2 to 5 kg plastic bags.

Other facilities. The centre will also need to have an administration building, a waste sorting facility, a storeroom for goods and materials, a parking area as well as service facilities such as a car repair shop, a petrol station, a hotel and a service building for customers.

The proposed integrated vegetable storage and distribution centre will require 3.5 ha of land: 1 ha for the wholesale market, 1 ha for the parking area, roads, and loading and unloading areas, 1 ha for the two warehouses and the remaining 0.5 ha for other facilities.

Participation and responsibilities of the main stakeholders

Integrated storage and distribution facilities in different countries have different ownership structures. For Mongolia, the following options for the company status of the proposed centres are recommended: a) stock company jointly owned by the government, the lead company and farmer cooperatives or b) stock company jointly owned by the lead company and farmer cooperatives, to which the government may provide funds for the initial investment in the form of a repayable loan.

Participation and responsibilities of the government: Establishment of integrated vegetable storage and distribution centres in Ulaanbaatar and regional centres will require substantial investments. The centre in Ulaanbaatar alone, which is described in this policy brief, requires an initial investment of around MNT 100 billion. However, not many companies and cooperatives, if any at all, in the horticulture sector can raise investments at this scale. Another aspect that needs to be considered is that such centres should not only benefit a small number of companies, but also function as social enterprises that are committed to the benefit of all vegetable farmers in Mongolia.



These arguments underline the need for co-funding of the initial investment by the government. In the case of co-ownership by the government, equal partnership of the three parties (government, lead company and farmer cooperatives) will be secured if each party owns one third of the centre. However, since it can be expected that farmer cooperatives will not be able to co-fund the initial investment, the government will need to fund two thirds of 66.7 percent of the initial investment under the condition that half of this amount is repaid from the dividends attributable to the cooperatives. The lead company will be responsible for raising the remaining 33.3 percent. In the case that government co-ownership is not required, on the other hand, the government may fund up to 50 percent of the initial investment in the form of a loan that is to be repaid by the lead company.

Irrespective of whether a government co-ownership is required or not, the government's main responsibilities will include creating synergies between the sector's policies and the commercial activities of the centres, linking the centres to state procurement and controlling of the centres' operations.

Participation and responsibilities of farmers' cooperatives: At the operational level, farmers' cooperatives will be the main suppliers of the centres. They can also engage in the wholesale of their produce. Regarding co-ownership of the centres, the main benefit of farmer cooperatives having the status of a co-owner lies in the safeguarding of mutual benefits between the centres and farmers and creating an additional incentive for farmers to commit themselves to their responsibilities. The underlying assumption is that if farmers themselves become co-owners of integrated storage and distribution facilities via farmer cooperatives, they will be more responsible in performing their obligations with special regard to the quantity and quality of the vegetables they deliver, since the profitability of the centres will directly benefit the farmers. Furthermore, co-ownership of the centres will generate a substantial stream of revenues to farmer cooperatives, thus improving their financial capacities as well as enhancing the overall cooperative development in the horticulture sector.

Participation and responsibilities of the lead company: For each centre, the lead company is required to have sufficient management and financial capacities to cope with the overall administration of the centre and manage day-to-day operations, sales through various distribution channels and finances. Another prerequisite is responsibility and the ability to work together with thousands of vegetable growers, some of whom are organised in cooperatives. In fact, the management of an integrated storage and distribution centre may very well overstrain the capacities of a single entity. It would therefore be better to outsource certain functional areas such as the commodity exchange, transport or the food safety laboratory to specialised companies.

Other stakeholders and their responsibilities: Assistance of professional organisations such as MULS, RDC for Food, Agriculture and Light Industry, IPAS and the Mongolian University of Science and Technology will be primarily required for ensuring stability of the centres' operations, compliance with related ISO standards and introducing technological advancements into the commercial activities. Professional associations could act as an umbrella organisation for the farmer cooperatives involved and provide capacity building programmes to the cooperatives and their members. The engagement of various other stakeholders will be needed, depending on the scale of operation of each centre. Examples include standardisation bodies and certifiers, and international consultancies specialised in facilitating access to international markets and commodity exchanges.



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