



# Diversification of the Economy and Leveraging Trade Potential of Mongolia for Green, Inclusive and Sustainable Growth

**Draft Report**

WORKSHOP IN SUSTAINABLE  
DEVELOPMENT PRACTICE

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## EXECUTIVE SUMMARY

Mongolia is a middle-income country that has made demonstrable progress in economic, environmental, and social sustainable development.<sup>1</sup> In particular, Mongolia has experienced rapid economic growth primarily driven by a high dependency on mineral resources and the mining sector. However, single-sector economic dependency leaves the country vulnerable to instability stemming from commodity price shocks and demand volatility. Furthermore, the lack of economic diversity leads to high unemployment rates among young educated Mongolians and precipitates a lack of inclusion in the workforce, especially among women.

To address some of these challenges, The United Nations adapted the United Nations Sustainable Development Cooperation Framework 2023-2027 to build a shared development vision for Mongolia and drive a coordinated and integrated approach to achieve Mongolia's development targets. The team from the School of International and Public Affairs, Columbia University, is working with the United Nations Resident Coordinator Office to operationalize the Joint Work Plan for Outcome 2.<sup>2</sup>

Based on extensive qualitative and quantitative desk research, case study reviews, and stakeholder interviews, including the private sector, development agencies, and government officials, this report presents findings on potential sectors for economic diversification, the challenges and gaps within the selected dairy subsector and detailed recommendations on initiatives to address the identified challenges. In addition, this report includes detailed sections covering our research methodology, sector identification process, and sub-sector prioritization framework.

### Key Findings

- Mongolia's thriving livestock population, coupled with increasing import demands for dairy products and export demands for other animal products, offer significant potential for the dairy industry to contribute to economic diversification in the country. However, multifaceted and complex challenges, including insufficient government support, inadequate financing, and deeply ingrained social norms hinder productivity in the dairy sub-sector.

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<sup>1</sup> United Nations, *United Nations Sustainable Development Cooperation Framework (2023-2027) Mongolia* (Ulaanbaatar: United Nations Mongolia, 2022), <https://mongolia.un.org/en/190088-united-nations-sustainable-development-cooperation-framework-2023-2027-mongolia>.

<sup>2</sup> Outcome 2: By 2027, the Mongolian economy is more diversified, innovative, productive, inclusive, green and geographically balanced, enabling decent livelihoods, especially for women and youth, building 21st century skills, and promoting low-carbon development”.

- A multi-layered approach with a diverse group of principal actors is needed to address the challenges across different areas of the supply chain
- The three proposed recommendations below tackle barriers hindering productivity across the supply chain:
  - The Mongolian Integrated Dairy Industrial Park
  - Milk Collection Network
  - Digital Application to enhance livestock management capacity in the dairy sector

This report provides aspirational and practicable recommendations for developing the dairy sector in Mongolia. The recommendations leverage existing government initiatives and, most importantly, enable social inclusion for the herder community. It is our hope that this report will provide actionable insights to the United Nations Sustainable Development Cooperation Framework Joint Work Plan.

## ACKNOWLEDGEMENTS

The SIPA team extends its sincere appreciation to everyone whose invaluable support has made this project and report possible. We would like to thank the United Nations Resident Coordinator's Office in Mongolia for their gracious invitation to collaborate with them in contributing to the United Nations Sustainable Development Cooperation Framework Joint Work Plan. We are particularly grateful to Mr. Tapan Mishra, the United Nations Resident Coordinator in Mongolia for his valuable leadership and support throughout this project.

We are especially indebted to Dr. Sangwon Lim (Development Coordination Officer and Economist at the United Nations Resident Coordinator's Office in Mongolia), for facilitating the field trip and connecting us with key development partners and non-governmental organizations, the Ministry of Economic Development (MED) and private sector organizations in Mongolia. Our field trip would not have been successful without him and we deeply thank him for his guidance at every stage of the project.

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The team would also like to thank Professor Eugenia McGill and Ilona Vinklerova in the Economic and Political Development department at the School of International and Public Affairs for their patience, support, and guidance throughout the project.

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## **ABBREVIATIONS**

ADB	Asian Development Bank
API	Application Programming Interface
FAO	Food and Agriculture Organization
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
HDI	Human Development Index
HS	Harmonized System
IDS	Integrated Dairy Scheme
ILO	International Labor Organization
IOM	International Organization for Migration
ITC	International Trade Centre
JICA	Japan International Cooperation Agency
JSC	Joint Stock Company
JWP	Joint Work Plan
KOICA	Korea International Cooperation Agency

KPI	Key Performance Indicators
MED	Ministry of Economy and Development
MIDIP	Mongolian Integrated Dairy Industrial Park
MNCCI	Mongolian National Chamber of Commerce and Industry
MOFALI	Ministry of Food, Agriculture and Light Industry
MNT	Mongolian Tugrik
NSO	National Statistics Office
PCI	Product Complexity Index
SDG	Sustainable Development Goals
SIPA	School of International and Public Affairs
SMEs	Small and Medium-Sized Enterprises
SOE	State Owned Enterprise
UN	United Nations
UNCT	United Nations Country Team
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Program

UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	United Nations High Commissioner for Refugees
UNIDO	United Nations Industrial Development Organization
UNRCO	United Nations Resident Coordinator's Office
UNSDCF	United Nations Sustainable Development Cooperation Framework
USAID	United States Agency for International Development
UNRC	United Nations Resident Coordinator
WB	World Bank

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## 1. Client Organization

The United Nations (UN) is a global organization established in 1945, comprising 193 Member States, collaborating to address worldwide challenges and achieve collective solutions for the common good through the Sustainable Development Goals (SDGs). Mongolia became a member of the UN in 1961, and since then, the relationship has evolved into a mutually advantageous, robust partnership that has only strengthened over the past 60 years.<sup>3</sup>

The United Nations Resident Coordinator's Office (UNRCO) in Mongolia is an umbrella organization that consolidates the workings of all the UN agencies in Mongolia and reports to the UN Headquarters. The UNRCO Mongolia comprises 23 agencies including resident members such as Food and Agriculture Organization (FAO), United Nations Development Program (UNDP), World Health Organization (WHO), and non-resident members such as International Labor Organization (ILO), International Organization for Migration (IOM), United Nations Environment Program (UNEP), United Nations Educational, Scientific and Cultural Organization (UNESCO), UN-Habitat, United Nations High Commissioner for Refugees (UNHCR), United Nations Industrial Development Organization (UNIDO)<sup>4</sup> and more.

In 2016, the Mongolian Government signed the UN Development Assistance Framework (UNDAF) 2017-2022. The UNDAF aimed to foster cooperation, enhance coordination, and strengthen partnerships among UN agencies and other development partners to support attainment of Mongolia's Sustainable Development Vision 2030. Following the successful conclusion of the UNDAF, the UN Office introduced the United Nations Sustainable Development Cooperation Framework (UNSDCF) for 2023-2027, which serves as a new roadmap for the UN's assistance to Mongolia. The UNSDCF is vital to the coordination of development related activities critical to Mongolia's achievement of the 2030 Agenda for Sustainable Development, and the national development agenda – Vision 2050.<sup>5</sup>

Since 2019, Mr. Tapan Mishra has led the UN country team (UNCT) in his capacity as the United Nations Resident Coordinator (UNRC) for Mongolia, the highest-ranking official of the UN system in Mongolia. For this project, the primary contacts within the UN team are Dr. Sangwon Lim (Development Coordination Office, Economist) and Ms. Tsend-Ayush Ganbaatar (Data Management, Result-Monitoring, and Reporting Officer).

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<sup>3</sup> “The United Nations in Mongolia,” United Nations, accessed April 13, 2023, <https://mongolia.un.org/en/about/about-the-un>.

<sup>4</sup> United Nations, *UN Mongolia Annual Results Report 2021* (2022), <https://mongolia.un.org/en/180343-un-mongolia-annual-results-report-2021>.

<sup>5</sup> “The United Nations in Mongolia.”

## 2. Project Rationale and Objectives

Mongolia is a middle-income country with a Human Development Index (HDI) value of 0.737 (2019), placing it high in the human development category.<sup>6</sup> With a burgeoning and thriving democracy, the country has made significant strides in social, economic, environmental, and sustainable development. Notably, Mongolia has experienced rapid economic growth driven by its heavy reliance on mineral resources and the mining sector.

Yet challenges remain; Mongolia's dependence on mineral resources and the mining sector drives rapid but fluctuating economic growth. The lack of diversification in the economy leaves the country vulnerable to commodity price shocks and demand volatility. Furthermore, high government turnover and lack of transparency pose challenges to effective policy making, hindering sustained economic and social development. High unemployment rates among educated young Mongolians and exclusion of marginalized groups further exacerbate the challenges.

To address these challenges, the UN and the Government of Mongolia, in line with Vision 2050 and the SDGs, agreed on the overarching objectives of the UNSDCF, which has three strategic priorities and four outcomes (Table 1).

The UNSDCF in Mongolia will be operationalized through the Joint Work Plans (JWPs) which will be prepared by the UN and endorsed by the Mongolian Government, on an annual basis. The JWP will comprehensively capture the Cooperation Framework outcomes, outputs, activities, and resources, SDG targets and indicators, and gender and human rights markers. The JWP will be prepared jointly by all resident and non-resident UNCT entities in each Results Group.

The team from School of International and Public Affairs, Columbia University (henceforth referred to as the 'SIPA team') will contribute to the development of outcomes and activities for the JWP focusing on Outcome 2: "By 2027, the Mongolian economy is more diversified, innovative, productive, inclusive, green and geographically balanced enabling decent livelihoods, especially for women and youth, building 21st century skills, and promoting low-carbon development."<sup>7</sup>

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<sup>6</sup> United Nations, *United Nations Sustainable Development Cooperation Framework (2023-2027) Mongolia*.

<sup>7</sup> United Nations, *United Nations Sustainable Development Cooperation Framework (2023-2027) Mongolia*.

# Section 1: Project Overview

Table 1: United Nations Sustainable Development Cooperation Framework Objectives

<b>Strategic Priority 1</b> Human Development and Well-Being	<b>Outcome 1:</b> By 2027, people in urban and rural areas, especially the most vulnerable and marginalized, equally realize their full human potential and benefit from inclusive, rights-based, gender- and shock-responsive health and nutrition, education, social protection, WASH and other services.
<b>Strategic Priority 2</b>	<b>Outcome 2:</b> By 2027, the Mongolian economy is more diversified, innovative, productive, inclusive, green and geographically balanced enabling decent livelihoods, especially for women and youth, building 21st century skills, and promoting low-carbon development.
Green, Inclusive and Sustainable Growth	<b>Outcome 3:</b> By 2027, communities and ecosystems in Mongolia are more resilient to climate change with improved capacity for evidence-informed and gender-responsive sustainable natural resource and environmental management and disaster risk reduction.
<b>Strategic Priority 3</b> People-Centered Governance, Rule of Law and Human Rights	<b>Outcome 4:</b> By 2027, policy-making and implementation in Mongolia is more gender-responsive, participatory, coherent, evidence-informed and SDG-aligned; governance institutions at all levels are transparent and accountable; and people, especially the marginalized groups, have access to justice and rule of law for full realization of human rights.

## 3. Research Methodology

The Sustainable Development Cooperation Framework's 'Outcome 2' mandates the diversification of the Mongolian economy, with the objective of reducing the country's reliance on the mining sector. To realize the project objective of contributing to the Joint Work Plan for 'Outcome 2', the team outlined two distinct deliverables - namely, the identification of sectors and sub-sectors that provide high potential for diversification activity, and recommendations for select high potential sub-sectors.

Each deliverable is supported by appropriate analyses (Figure 1) that employs a combination of research methods (Table 2) - literature review, secondary data analysis, stakeholder analysis, semi-structured interviews, and case studies. Furthermore, client input informs the results from each stage to ensure relevance to the Mongolian context. The first deliverable utilizes a combination of literature review, secondary data analysis, and case studies. While 'Deliverable 1' makes use of secondary research methods, 'Deliverable 2' employs primary research methods, namely, stakeholder analysis and semi-structured interviews.

'Deliverable 1' takes the form of a list of seven sectors that present opportunities for diversification activity. However, to achieve greater depth in 'Deliverable 2', the team defines the scope of this deliverable to focus on a single sector and sub-sector. 'Deliverable 2' takes the form of recommendations and initiatives for the selected sub-sector. In addition to presenting findings and recommendations, this report serves the dual purpose of documenting the team's approach and methodology, for future reference.

Figure 1: Summary of Deliverables and Analyses

## Deliverable 1: High Potential Sectors and Sub-Sectors

### 1.1. Mongolia Situation Analysis

Define economic, political, and social landscape, and COVID-19 impact.

### 1.2. Economic Diversification Definition

Develop conceptual foundation of economic diversification; define Mongolian context.

### 1.3. Sector and Sub-Sector Assessment

Determine high potential sectors and sub-sectors for economic diversification.

## Deliverable 2: Sub-Sector Initiatives

### 2.1 Primary Research

Conduct interviews with key stakeholders to inform sub-sector value chain analysis.

### 2.2. Sub-Sector Value Chain Analysis

Analyse sub-sector value chain, focusing on challenges, opportunities, and gaps.

### 2.3. Sub-Sector Recommendations

Propose and analyse recommendations for sub-sector development.

Table 2: Summary of Research Methods

Deliverable	Analysis	Literature Review	Data Analysis	Stakeholder Analysis	Interviews	Case Study
High Potential Sectors and Sub-Sectors	1.1.	✓	✓			
	1.2.	✓				
	1.3.	✓	✓			✓
Sub-Sector Initiatives	2.1.			✓	✓	
	2.2.	✓		✓	✓	✓

## 4. Mongolia Situation Analysis

### 4.1. Economic History: Transition Economy

Mongolia's political and economic history is closely linked to that of China and the erstwhile Soviet Union. For the most part of the 20th century, the Mongolian economy was characterized by 1) domestic agrarian economic activity with services, trade, and banking concentrated with Chinese nationals; 2) high dependence on the Soviet Union's financing; and 3) central planning with economic and political systems modeled on the Soviet Union and Chinese ideology.

In the 1990s, following the Democratic Revolution, Mongolia began its transformation from a centrally planned economy to an independent market-based economy. To facilitate this, Mongolia implemented 'big bang' liberalization and 'shock therapy' reforms, which involved large scale privatization and shutdown of small and medium state-owned enterprises (SOEs), mass liberalization, significant reduction in social spending, and stringent monetary policy. Simultaneously, Mongolia suffered a significant exogenous shock in the form of the collapse of the Soviet Union: at that point, the Mongolian economy had been sustained by very large aid from the Soviet Union and a trade deficit with the Soviet Union was equivalent to 30% of GDP.<sup>8</sup>

*"Today, Mongolia retains many features of a 'transition' economy, in that growth processes are dominated by the exploitation of natural capital."*

*- Asian Development Bank, Mongolia Economic Prospects*

The discovery of mineral resource deposits attracted an influx of foreign direct investments (FDIs) in the early 2000s and shifted the country's economic focus to the mining sector.<sup>9</sup> As a result, the Mongolian economy has become increasingly reliant on its mining sector over the past decade (Figure 2).

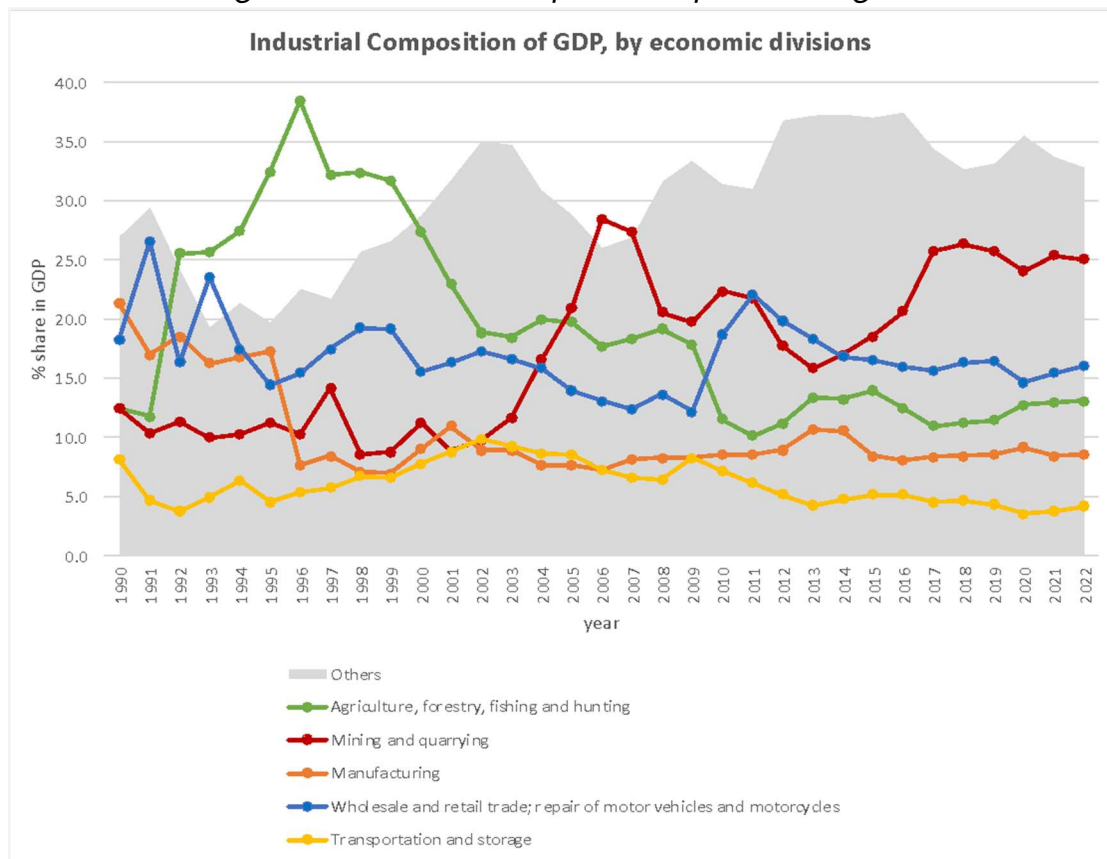
<sup>8</sup> Richard Marshall and Tselvelmaa Hyargas, *Lessons from Mongolia's Transition to the Market* (Irvine, CA: Economic Research Institute, 2004), <http://www.eri.mn/library/publication/155-u2wiczn5>.

<sup>9</sup> Asian Development Bank, *Mongolia: Improving Extractive Sector Governance* (Manila: Asian Development Bank, 2019), <https://www.adb.org/sites/default/files/project-documents/52330/52330-001-tar-en.pdf>.

## 4.2. Economic Landscape: Single-Sector Dependency

In 2020, the mining sector accounted for approximately 22% of the country's gross domestic product (GDP), 57% of total industrial production, 42% of total investments, and 30% of the government revenues.<sup>10</sup> Coal, copper, and gold comprise 70% of Mongolia's total exports, with China as the primary export destination receiving around 90% of the total exports.<sup>11</sup> In addition, over 75% of the country's FDIs flowed into Oyu Tolgoi, the world's largest copper and gold deposits whose mining production is projected to contribute as much as 34% of the country's GDP in the future.<sup>12,13</sup>

Figure 2: Industrial Composition of GDP, Mongolia



Source: National Statistics Office of Mongolia

<sup>10</sup> "Mongolia," Extractive Industries Transparency Initiative (EITI), accessed April 13, 2023, <https://eiti.org/countries/mongolia>.

<sup>11</sup> Gordon Feller, "How Mongolia Is Handling Its Mining Bonanza," *Global Asia*, December 2021, [https://www.globalasia.org/v16no4/feature/how-mongolia-is-handling-its-mining-bonanza\\_gordon-feller](https://www.globalasia.org/v16no4/feature/how-mongolia-is-handling-its-mining-bonanza_gordon-feller).

<sup>12</sup> "Mining Market in Mongolia," Trade Commissioner Service, Government of Canada, last modified June 16, 2022, <https://www.tradecommissioner.gc.ca/mongolia-mongolie/market-reports-etudes-de-marches/0006654.aspx?lang=eng>.

<sup>13</sup> Theodore H. Moran, *Avoiding the 'Resource Curse' in Mongolia* (Washington, D.C.: Peterson Institute for International Economics, September 2018), <https://www.piie.com/publications/policy-briefs/avoiding-resource-curse-mongolia>.



## Section 2: Economic Diversification and Sub-Sector Assessment

While the mining boom has driven rapid economic growth, reduced poverty, improved quality of life, and enhanced human and physical capital, the sector presents unique challenges, such as commodity price shocks, demand volatility, and limited export potential.<sup>14</sup> For instance, Mongolia had to approach the International Monetary Fund (IMF) for a \$5.5 billion bailout package in 2017 when national debt ballooned due to the sharp decline in commodity prices and weak Chinese demand in 2016.<sup>15</sup> This was also evident during the coronavirus pandemic, when China's border closures led to a 16.9% decline in Mongolia's exports and 9.7 % reduction in the country's economic growth in the first half of 2020.<sup>16</sup>

Furthermore, development of the mining sector has come at the cost of economic growth in the rest of the sectors. While the mining sector is the largest contributor to the country's revenue, it employs only 2% of the workforce.<sup>17</sup> In contrast, though the agriculture sector employs 30% of the workforce, it accounts for 13% of GDP and remains underdeveloped in terms of production capacity and transport infrastructure in spite of resource abundance. This is partly explained by the fact that investment in the agriculture sector has been crowded out by investment in the mining sector.<sup>18</sup> Similarly, in other sectors, the mining boom has not translated to increased levels of labor productivity as production is focused on the extraction and trade of raw materials.<sup>19</sup> One study shows that FDIs in Oyu Tolgoi, the country's largest investment project, has resulted in a negative job-multiplier effect in the country due to limited absorptive capacity to develop forward and backward supply chain linkages to the project.<sup>20</sup> Subsequently, the level of product complexity in Mongolian exports and the associated income generation capacity remains largely in the 'very low' and 'low' income classification.<sup>21</sup>

The social and environmental implications, too, are numerous, especially for rural pastoral communities that account for 30% of the population. Much of the infrastructure development supports the mining sector. Although land is state-owned, mining licenses prevail over customary tenure resulting in extensive

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<sup>14</sup> Feller, "How Mongolia Is Handling Its Mining Bonanza."

<sup>15</sup> Pranay Varada, "Mongolia: On the Verge of a Mineral Miracle," *Harvard International Review*, February 12, 2022, <https://hir.harvard.edu/mongolia-on-the-verge-of-a-mineral-miracle/>.

<sup>16</sup> Dorjidari Namkhajantsan, *Mongolia: Updated Assessment of the Impact of the Coronavirus* (New York: Natural Resource Governance Institute, October 28, 2020), <https://resourcegovernance.org/analysis-tools/publications/mongolia-updated-assessment-coronavirus-extractive>.

<sup>17</sup> OECD, "Chapter 6. Mongolia's Sustainable Infrastructure Investments," in *Sustainable Infrastructure for Low-Carbon Development in Central Asia and the Caucasus* (Paris: OECD, 2019), <https://doi.org/10.1787/d1aa6ae9-en>.

<sup>18</sup> Asian Development Bank, *Mongolia Economic Prospects*, ed. Matthias Helble, Hal Hill, and Declan Magee (Manila: Asian Development Bank, 2020), <https://www.adb.org/sites/default/files/publication/611416/mongolia-economic-prospects.pdf>.

<sup>19</sup> Asian Development Bank, *Mongolia Economic Prospects*, 122.

<sup>20</sup> Asian Development Bank, *Mongolia Economic Prospects*, 106-107.

<sup>21</sup> Asian Development Bank, *Mongolia Economic Prospects*, 127.

grassland fragmentation.<sup>22</sup> Water resources are excessively monopolized by the mining industry. The engineering of mines that involve gigantic open pits and overburden heaps in combination with heavy traffic in the areas have contributed to dust pollution in the country. The urgency of these environmental impacts is intensified by climate change, as the temperature rise and decreased precipitation significantly affects agriculture and livestock herding. In fact, Mongolia was forced to stop exporting grains after severe drought had resulted in widespread crop failures in 2017.<sup>23</sup> In addition, the global phaseout of fossil fuels by 2050 will further impose pressures on the Mongolian economy which holds an estimated 10 % of the global coal reserve.<sup>24</sup>

### 4.3. Political Landscape

Since its peaceful revolution in the 1990, Mongolia has become a democratic country with a consistent record of free elections and peaceful transfers of power.<sup>25</sup> However, the country's majoritarian voting system that favors its two major political parties – the Mongolian People's Party (MPP) and the Democratic Party (DP) – has increasingly led to frictions and political bargaining between clientelist networks, as opposed to a competition of policy visions. This situation often develops into political instability and unpredictability.<sup>26,27</sup>

Although there has been progress in the development of legal and institutional frameworks to fight corruption over the past decade, such as the Anti-Corruption Law and the Independent Agency against Corruption, the implementation of such policies remains elusive, especially at the national level, due to deep-seated conflicts of interests.<sup>28</sup> Nevertheless, recent amendments to the constitutions in 2019 and 2021 have signaled potentially significant steps toward rebuilding an independent and fair judiciary system, which had been undermined by increasing interference from major political actors over the past decade.<sup>29</sup>

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<sup>22</sup> Ariell Ahearn and Troy Sternberg, "Ruins in the Making: Socio-Spatial Struggles over Extraction and Export in the Sino-Mongolian Borderlands," *Eurasian Geography and Economics*, (October 11, 2022): 1–24, <https://doi.org/10.1080/15387216.2022.2132971>.

<sup>23</sup> Varada, "Mongolia."

<sup>24</sup> Asian Development Bank, *Mongolia: Improving Extractive Sector Governance*.

<sup>25</sup> "Mongolia Country Report 2022," BTI Transformation Index, accessed April 13, 2023, <https://bti-project.org/en/reports/country-report/MNG>.

<sup>26</sup> BTI Transformation Index, "Mongolia Country Report 2022."

<sup>27</sup> "Freedom in the world 2022: Mongolia," Freedom House, accessed April 13, 2023, <https://freedomhouse.org/country/mongolia/freedom-world/2022>.

<sup>28</sup> BTI Transformation Index, "Mongolia Country Report 2022."

<sup>29</sup> BTI Transformation Index, "Mongolia Country Report 2022."

In addition, Mongolia's diplomatic and international relations with other countries are shaped by its geographical location. "Sandwiched between China and Russia with no access to sea", Mongolia has sought a 'trilateralism' strategy to prevent being bypassed by a new version of the Eurasian Silk Road under the Belt and Road Initiative (BRI) by promoting itself as 'a reliable and cheaper 'Economic Corridor' for Sino-Russian transit traffic across Eurasia.<sup>30</sup> However, there is a substantial gap of bargaining power between Mongolia and its two neighbors. Consequently, the funding and partnership opportunities for the development of Mongolia's economic and infrastructure system will be dependent on the economic and political priorities of the Russian and Chinese economies because Mongolia lacks the financial and technical capacity to finance these large-scale projects on its own. Although Mongolia has also pursued a 'third neighbor' policy with other developed countries such as the United States, Germany, Japan, and South Korea, the economic linkages between them are still limited. Moreover, Mongolia's current debt position does not allow the country to take on larger loans because it is already considered to be at high risk of sovereign default.<sup>31</sup>

#### 4.4. Social Landscape

In 2020, 27.8% of Mongolia's 3.4 million population were living in poverty, a slight improvement from 28.4% in 2018.<sup>32</sup> The country has a large nomadic population, whose livelihood relies on herding, comprising around 25% of the total population.<sup>33</sup> However, about 68,000 herders a year have moved to the city since 2001 for better education, health and job opportunities. The more frequent and severe natural disasters such as drought and harsh winter "dzud" also contribute to the increasing trend of rural-urban migration.<sup>34</sup> This migration trend has almost doubled the population of Ulaanbaatar in the past decade, where 55% of the city's population are living in informal ger districts which lack facilities like water and power.<sup>35</sup>

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<sup>30</sup> Yelif Ulagpan, "Belt and Road Initiative: Opportunities and Challenges for Mongolia," *The Asia-Pacific Journal* 19, no. 3 (February 1, 2021), <https://apjif.org/2021/3/Ulagpan.html>.

<sup>31</sup> OECD, "Chapter 6."

<sup>32</sup> "The World Bank in Mongolia: Overview," World Bank, accessed April 13, 2023, <https://www.worldbank.org/en/country/mongolia/overview>.

<sup>33</sup> Masako Hiraga, Ikuko Uochi, and Gabriela R. A. Doyle, "Counting the Uncounted – How the Mongolian Nomadic Survey Is Leaving No One Behind," *World Bank Blogs* (blog), *World Bank*, April 17, 2020, <https://blogs.worldbank.org/opendata/counting-uncounted-how-mongolian-nomadic-survey-leaving-no-one-behind>.

<sup>34</sup> Max Baring, "Urban Nomads: Mongolian Herders Battle New Future as Leave the Land for the City," *Reuters*, May 3, 2018, <https://www.reuters.com/article/us-mongolia-climatechange-herders/urban-nomads-mongolian-herders-battle-new-future-as-leave-the-land-for-the-city-idUSKBN1400N>.

<sup>35</sup> Baring, "Urban Nomads."

Mongolia belongs to the high human development country category, ranking 96th out of 191 countries, with medium to high equality in the HDI achievement between women and men (Group 2 in Gender Development Index). Despite improvements in the indicators for the quality of life in the country over the past decade, there is a perception that economic growth has translated into greater income equality. In fact, the Asian Development Bank (ADB) estimated that the growth rate of income per capita of the bottom 40% of the population was only 1% between 2011 and 2018.<sup>36</sup> The regional and social disparities in the country have implications regarding equal access to quality education, health services and adequate housing sanitization.

Mongolia has the youngest population in Northeast Asia with the average age of 27.5 years, and about 59% of the population are under the age of 30.<sup>37</sup> However, high and rising youth unemployment has become a significant challenge to the economy even before the pandemic in 2020 because the most productive sectors such as mining, manufacturing and services have not been able to sufficiently absorb the workers that are steadily moving out from agriculture.<sup>38</sup>

### 4.5. COVID-19: Implications for Mongolia

Mongolia closed borders with China and Russia, and the international airport in the early stages of the coronavirus pandemic in 2020. Consequently, its exports and imports declined by 16.9% and 15.6% respectively in the first eight months of 2020, resulting in the contraction of its GDP by 9.7% in the first half of the year.<sup>39</sup> Inflation also skyrocketed to 9.6% with meat prices in Ulaanbaatar having risen as high as 16% and fuel prices 38.8%.<sup>40</sup> The lockdown and quarantine measures revealed the vulnerability of the food supply chains that were dependent on imports. Between 2020 - 2022, **Mongolia encountered high food prices and food shortages from high international market prices for imported food, aggravated by the inadequate storage facilities and logistic capabilities, which impacted the food security in the country.**<sup>41</sup>

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<sup>36</sup> BTI Transformation Index, “Mongolia Country Report 2022.”

<sup>37</sup> “Mongolia Population 2023 (Live),” World Population Review, accessed April 13, 2023, <https://worldpopulationreview.com/countries/mongolia-population>.

<sup>38</sup> Thilasoni Benjamin Musuku, Javkhlan Bold Erdene, Erdenebulgan Ganbat, and Sukhchimeg Tumur, *Mongolia Business Environment and Competitiveness Assessment Report : Implementing Business Environment Reforms for Economic Recovery* (Washington, D.C. : World Bank Group, December 1, 2022), <http://documents.worldbank.org/curated/en/099540012122228801/P1774630d45d190e80b39e05e68d6e5c93e>.

<sup>39</sup> Namkhajantsan, “Mongolia.”

<sup>40</sup> Antonio Graceffo, “Mongolia Suffers under China’s Zero Covid Policy,” *Lowy Institute*, January 19, 2022, <https://www.lowyinstitute.org/the-interpretor/mongolia-suffers-under-china-s-zero-covid-policy>.

<sup>41</sup> Shingo Kimura, Enkhjargal Tumur-Ochir, and Tserendavaa Tseren, “Strengthening Mongolia’s Food Security Post-COVID-19,” *Development Asia*, March 30, 2022, <https://development.asia/insight/strengthening-mongolias-food-security-post-covid-19>.

## Section 2: Economic Diversification and Sub-Sector Assessment

According to the ADB's household survey, 35% of 362 households reported food supply disruptions during the pandemic where they experienced unavailability of food or economic difficulty in accessing the food due to high prices or low purchasing power.<sup>42</sup> Although the supply of locally grown products was the least disrupted, their prices also increased partially due to higher demand resulting from shortage of imported products.

The cost of COVID-19 relief measures also deteriorated the fiscal balance from 1.4 % in 2019 to -11.4% in 2020 and increased the government debt from 69.5% in 2019 to 83% in 2020.<sup>43</sup> Although the health emergency and business environment in the country improved in 2021, exports remained low, while domestic consumer prices remained high, largely due to China's tight border control policies.

The Mongolian economy has fully recovered from the pandemic in 2022 driven by the growth in pent-up domestic demand and the recovery of the non-mining sector. The economy is projected to grow at 5.4% in 2023 and 6.1% in 2024 from the easing of border trades and resumption of coal production.<sup>44</sup> Despite reduced inflationary pressures from a rising meat production, falling international food and energy prices and the agreement to purchase Russian oil at a discount, the inflation rate is projected to remain high at 10.9% in 2023 and 8.7% in 2024 as a result of the fiscal and quasi-fiscal support in past years, coupled with recent approval of the large minimum wage increase and the lagged impact of exchange rate depreciation.<sup>45,46</sup>

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<sup>42</sup> Kimura, Tumur-Ochir and Tseren, "Strengthening Mongolia's Food Security."

<sup>43</sup> BTI Transformation Index, "Mongolia Country Report 2022."

<sup>44</sup> "Economic Forecasts for Mongolia," Asian Development Bank, accessed April 13, 2023, <https://www.adb.org/countries/mongolia/economy>.

<sup>45</sup> "Economic Forecasts for Mongolia."

<sup>46</sup> "Mongolia: Staff Concluding Statement of the 2022 Article IV Mission," Mission Concluding Statement, International Monetary Fund, October 25, 2022, <https://www.imf.org/en/News/Articles/2022/10/25/mcs102522-mongolia-staff-concluding-statement-of-the-2022-article-iv-mission>.

## 5. Economic Diversification Definition

### 5.1. Economic Diversification Policy Overview

In response to the economic setbacks from the pandemic, the Mongolian government introduced the long-term development policy 'Vision 2050'. The policy's primary objective is to position Mongolia as a prominent regional power by 2050. To achieve this, it emphasizes poverty reduction, green transformation, enhanced job accessibility facilitated by improvements in education systems and gender equality, and citizen-centric social strategy. As it pertains to the economy, Vision 2050's objectives<sup>47</sup> are:

**Objective 4.1.** Promote macroeconomic stability and transform the middle class into a predominant group. To enhance risk resilience, ensure macro-economic stability, increase efficiency and resolve overdue government external debts without compromising macro-economic stability.

**Objective 4.2.** Create an export-oriented economy by promoting the development of priority sectors, namely mining, agriculture, food, light industry, energy, creative industry, communication technology.

**Objective 4.5.** Develop internationally competitive micro, small and medium enterprises and increase employment. To develop micro, small and medium enterprises through innovation and increase their productivity.

### 5.2. Defining Economic Diversification: Literature Review

To ensure macroeconomic stability and expand the economic base for sustainable economic development, Mongolia must implement policies that aim to diversify the country's economic structure. However, economic diversification is a complex endeavor, and the primary challenge is to effectively identify and target appropriate sectors of the economy. Extensive research conducted by academics and development organizations has yielded significant insights on this topic.

"Findings can be distilled into a few central themes: the central role of manufacturing and processing industries, the importance of export-led growth, and the significance of economic complexity."

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<sup>47</sup> "Economy," Vision 2050, Government of Mongolia, accessed April 14, 2023, <https://vision2050.gov.mn/eng/vis4.html>.

For instance, Enkhbayar, Monkzaya, Tsolmon and others 2021 research on Mongolia's economic sectors carried out on the basis of an inter-sectoral balance model estimated that the allocation of ten trillion Mongolian Tugrik (MNT) funds to six sectors such as agriculture, processing industry, and construction would be the most efficient.<sup>48</sup> Similarly, Gabriel & Ribeiro's 2019 research demonstrates how the industrial sector has supported the development of developed nations since the 1950s as well as the expansion of export-driven manufacturing in Asia. The industrial sector plays such a crucial role in the economy that the flexibility and technological advancement of this sector is imperative to economic growth and sophistication.<sup>49</sup> The United Nations Conference on Trade and Development 2022 states that a country needs to be able to produce not only new products but also those that are more sophisticated, using higher skilled labor and more advanced technological applications. This requires the diversification of economic activity towards more complex products. To do this, policymakers should identify and target appropriate sectors and products, based on the productive structure of each country and changes in global demand."<sup>50</sup>

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<sup>48</sup> Professor Ch. Enkhbayar, teacher T. Monkzaya, Associate Professor S. Tsolmon and others (2021)

<sup>49</sup> Luciano Ferreira Gabriel and Luiz Carlos De Santana Ribeiro, "Economic Growth and Manufacturing: An Analysis Using Panel VAR and Intersectoral Linkages," *Structural Change and Economic Dynamics* 49 (June 1, 2019): 43–61, <https://doi.org/10.1016/j.strueco.2019.03.008>.

<sup>50</sup> "UNCTAD Outlines New Productive Sectors for Economic Diversification," United Nations Conference on Trade and Development, last modified October 25, 2022, <https://unctad.org/news/unctad-outlines-new-productive-sectors-economic-diversification>.

## 6. Sector and Sub-Sector Assessment

The SIPA team developed a framework (Figure 3) consisting of quantitative measures and qualitative research to evaluate diversification potential for sectors. The quantitative indicators are informed by the findings from the review of existing academic literature (section 5.2).

These measures were then categorized into broader attributes (Table 3) of diversification and sectors were scored on the basis of each measure to indicate diversification 'potential'. As the final step, the SIPA team identified strategic sub sectors aligned with Mongolia's national objectives. For consistency across measures, the team utilized the Harmonized System<sup>51</sup> (HS) 2-digit sector classification to the extent possible.

Figure 3: Sectoral Identification Framework



### 6.1. Quantitative and Qualitative Measures: Conceptual Foundation

Table 3: Summary of Grouped Measures

Criteria A Domestic Production Potential	Criteria B Export Diversification Potential	Criteria C Competitive Advantage	Criteria D Resource Availability
*Average product complexity index 2019	*Annual growth in world import value, 2017-2021 (% p.a.)	Instances of recommendations in external research	Instances of Government Initiatives
*Annual growth in domestic demand <sup>52</sup> 2015-2019 (% p.a.)	*Annual increase of Mongolia's share in world exports 2017-2021 (% p.a.)	Instances of comparable country initiatives	Instances of financing initiatives
*Sectoral share of total employment 2018-2019 (%)			<i>*Indicates quantitative metrics</i>

<sup>51</sup> The Harmonized System is an international industry classification system standardized between countries, typically used to classify physical traded goods. Classifications typically range between 2-digits to 6-digits with increasing levels of granularity

<sup>52</sup> Domestic demand is intermediate domestic consumption, final domestic consumption, and gross capital formation



### Criteria A: Domestic Production Potential

**Production Complexity Index** - As per Hidalgo and Hausmann 2009, the productivity of a country resides in the diversity of its available capabilities. Therefore, cross-country differences in income can be explained by the diversity of capabilities present in a country and their interactions or, in other words, differences in economic complexity. Harvard Growth Lab's [Production Complexity Index](#) (PCI) ranks the diversity and sophistication of the productive know-how required to produce a product, irrespective of country context. Therefore, sectors with higher production complexity or, in other words, sectors with more diverse capability, will lead to enhanced economic productivity. PCI is calculated based on how many other countries can produce the product and the economic complexity of those countries.<sup>53</sup>

The team used Harvard Growth Lab's PCI from 2019, which is provided for each 4-digit HS sector at the global level.<sup>54</sup> From all the products (sectors) that Mongolia exported, the top ten products (sectors) were considered as having high 'product complexity' and therefore, potential to increase productivity.

**Domestic Demand Growth** - In conjunction with export-led growth, nations must make the gradual shift towards domestic demand-oriented growth. When the final demand is satisfied domestically, it gives impetus to income growth since the value-added from the consumption of manufacturing goods exceeds that which is directly generated in production.<sup>55</sup>

The SIPA team estimated annual growth in domestic demand ('15 - '19, %) using the Input-Output Tables developed by Mongolia's National Statistics Office (NSO). Domestic demand is calculated as the total intermediate domestic consumption, final domestic consumption, and gross capital formation. 'High potential' sectors are considered as those with domestic demand growth as higher than the median domestic demand growth.

**Inclusive Employment Potential** - In addition to improving productivity, this measure is intended to address the project objective of achieving inclusive growth. The underlying assumption is that sectors with larger employment shares are

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<sup>53</sup> César A. Hidalgo and Ricardo Hausmann, "The Building Blocks of Economic Complexity," *Proceedings of the National Academy of Sciences of the United States of America* 106, no. 26 (June 30, 2009): 10570–10575, <https://doi.org/10.1073/pnas.0900943106>.

<sup>54</sup> For consistency across quantitative indicators, the team estimated the 2-digit HS sector PCI, calculated as the simple average of the PCI of all the 4-digit sectors within each 2-digit sector.

<sup>55</sup> United Nations Industrial Development Organization, *Industrial Development Report 2018* (Vienna: United Nations Industrial Development Organization, May 2019), [https://www.unido.org/sites/default/files/files/2019-07/IDR\\_Brief\\_3.pdf](https://www.unido.org/sites/default/files/files/2019-07/IDR_Brief_3.pdf).

expected to have higher potential for inclusive growth, resulting from investments in productivity gains.

The SIPA team estimated sectoral share of total employment in 2018-2019 (%) using the ILO's 2020 Labor Force Survey, developed by Mongolia's NSO. 'High potential' sectors are considered as those with the top three largest share of employment.

### **Criteria B: Export Diversification Potential**

Based on the International Trade Centre's (ITC) research on the prospect for market diversification, sectors with export diversification potential are those in which Mongolia has already proven to be internationally competitive and in which they have good prospects of export success. This is based on the assumption that in a world without friction, trade flows can be described as a combination of supply performance, ease of export and total demand.

To measure the two concepts, the SIPA team used the ITC [Trade Map](#) indicators: (1) Increase of Mongolia's share in world exports between 2017-2021, and (2) Annual growth in world import value between 2017-2021 (% per annum). Sectors with the greatest potential for export diversification were those that had positive change in export market share and ranked in the top ten sectors in terms of import demand.

### **Criteria C: Competitive Advantage**

The underlying assumption is that expert recommendations and comparable country case studies identify untapped potential in that they reflect Mongolia's (or nations with comparable economic structures') strengths and competitive advantages.

The SIPA team conducted literature reviews and country case studies to identify 'high potential' sectors. Expert recommendations were based on reports by development organizations, such as ADB and World Bank. Comparable country case studies included countries with similar levels of economic development, geography, and economic structures such as Inner Mongolia, Kazakhstan, India.

### **Criteria D: Resource Availability**

The objective of this measure is to embed the identification framework in the Mongolian context. Here, resource availability means the availability of political, financial, and logistic infrastructure.

The SIPA team conducted literature review to identify sectors with one or more of

the following: government initiatives in financing and infrastructure, or financial and strategic support from development organizations.

### 6.2. Assessment Methodology: Adjustments, Weights, and Scores

To analyze the sectors against each measure, the SIPA team adopted different approaches for quantitative measures and qualitative research. For the former, the metric was calculated for each sector in the economy and shortlisted based on cutoff criteria. For qualitative measures, the SIPA team identified and listed relevant sectors through a comprehensive literature review.

To ensure relevance, minor adjustments were made to the methodology: namely, raw materials-oriented sectors were excluded from the identified 'high potential' sectors list to focus on value-added production, and 2-digit sectors were grouped together (by output). These sector groups are not derived from the HS classification system and have been verified across various sector classification systems.

Weights were then assigned to each 'criteria' - with client inputs - to reflect the relative importance of project objectives. Each measure within a single 'criterion' held the same rank. However, 'criteria' were ranked from 1 through 4 in ascending order of priority (Figure 4).

*Figure 4: Criteria Ranking*



For a weighted score, the count of each sector identified within a 'criterion' was multiplied by the respective rank. Therefore, for sectors that scored well across multiple measures, the summation of the weighted count was considered as total count, i.e., the total number of times a sector was identified as 'high potential'. For instance, if 'Sector A' was identified once each in 'Domestic Production Potential' and 'Export Diversification Potential', then the total Sector A count would be:

*Equation 1: Sample Weighting*

$$\text{Sector A} = (1 \cdot 4) + (1 \cdot 3) = 7$$

Please note that the team primarily used the HS 2-digit sector classification. In cases where this was not available, the higher-level classification was retained

(agriculture, forestry, and fishing) and added to the count for each 2-digit sector, assuming that a grouped focus would still increase 'potential' of the 2-digit sector.

### 6.3. Sector Shortlist: Results Validation

Considering project objectives, the highest weights were given to the quantitative 'criteria'. As a result, the six 'high potential' sectors identified were largely production focused<sup>56</sup>. Therefore, to further strengthen the selection process, the SIPA team modified this list based on additional qualitative research. Specifically, the 'transportation and storage' sector was removed from consideration as research indicates that the transportation figures also include overflight fees for air travel, reducing the attractiveness of this sector as an option for economic diversification. In addition, 'Renewables' and 'Tourism' were included, as they were often highlighted in qualitative research but did not appear as highly weighted, due to the quantitative nature of the analysis.

Based on this approach, the team's primary recommendations were as follows (Table 4), with suggested focus on food and beverage production due to higher potential.

*Table 4: Sector Results*

<b>1. Food and Beverage Products</b>
<b>2. Mineral Products</b>
<b>3. Stone and Glass Products</b>
<b>4. Chemical and Allied Products</b>
<b>5. Machinery and Equipment</b>
<b>6. Renewable Energy</b>
<b>7. Tourism</b>

<sup>56</sup> The complete sector results are as follows: Food And Beverage Production, Mineral Products, Transportation And Storage, Stone And Glass Products, Textiles And Clothing, Music And Entertainment Products, Machinery, Chemical And Allied Products, Pharmaceutical Products, Misc. Products, Arms Industry, Renewable Energy, Wool, Fine Or Coarse Animal Hair, Wood Products, Plastic And Rubber Products, Metal Products, Manufacturing, Misc. Services, Animals; Live, Accommodation And Food Service Activities, Education, Financial And Insurance Activities, Tourism, Digital

## 6.4. Sub-Sector Shortlist

The SIPA team further recommends narrowing focus to 'Dairy Production' within 'Food and Beverage Products', so as to align with Mongolia's national objectives and strategic priorities. The considerations to conclude as such were the following:

### 1. Food Security and Nutrition

Following a period of intense food insecurity stemming from the pandemic, Mongolia's Vision 2050 seeks to address the issue of food systems transformation. One of the main goals is to explore what actions should be taken in Mongolia to be able to access sustainably produced food in ways that contribute to equitable, resilient livelihoods and provide healthy, nutritious diets for the whole population while adapting to and mitigating climate change.<sup>57</sup> Additionally, over 2017 - 2021, dairy products grew by approximately 16%, indicating strong domestic demand.

### 2. Export Potential

Vision 2050 aims to ensure export diversification to promote the regional economy as well as improve conditions to export Mongolian eco-food brands and become a leader in the food processing industry development. The objective is to increase the level of processing of agricultural products and boost the export of livestock products.<sup>58</sup> Furthermore, some of Mongolia's principal trade partners, namely the United States and South Korea, have shown a greater than average increase in their import of dairy products from the global market between 2017 and 2021.<sup>59</sup>

### 3. Regional Rural Development:

Vision 2050 aims to promote decent employment, increase economic activity of the working-age population, reduce unemployment and increase resources of the fund to support small and medium enterprises.<sup>60</sup> In addition, the animal husbandry sector offers significant employment opportunities, with approximately 27% of total employment as of 2018 being in this sector.<sup>61</sup>

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<sup>57</sup> United Nations, *Towards Sustainable Food Systems in Mongolia*, (United Nations, June 2018), [https://summitdialogues.org/wp-content/uploads/2021/09/ENG\\_sustainablefoodsystems\\_Mongolia\\_FSD\\_Pathway-document.pdf](https://summitdialogues.org/wp-content/uploads/2021/09/ENG_sustainablefoodsystems_Mongolia_FSD_Pathway-document.pdf).

<sup>58</sup> Government of Mongolia, *'Vision-2050' Long-Term Development Policy of Mongolia*, 2020, [https://cabinet.gov.mn/wp-content/uploads/2050\\_VISION\\_LONG-TERM-DEVELOPMENT-POLICY.pdf](https://cabinet.gov.mn/wp-content/uploads/2050_VISION_LONG-TERM-DEVELOPMENT-POLICY.pdf).

<sup>59</sup> SIPA analysis using ITC data

<sup>60</sup> Government of Mongolia, *'Vision-2050.'*

<sup>61</sup> SIPA analysis using ITC data

### 4. Untapped Potential:

Mongolian livestock has significant untapped potential; research suggests that only 10% of the 892 million liters of raw cow and sheep milk produced in 2018 were processed through dairy factories.<sup>62</sup> Furthermore, as per Vision 2050, the government aims to sustainably use and protect livestock resources, and improve and transform livestock production from quantity to quality and productivity.<sup>63</sup>

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<sup>62</sup> “Keeping the Milk and Cash Flowing in Mongolia,” Asian Development Bank, last modified May 28, 2021, <https://www.adb.org/results/keeping-milk-and-cash-flowing-mongolia>.

<sup>63</sup> Government of Mongolia, ‘*Vision-2050*.’

### 7. Primary Research

After identifying the dairy products sub-sector (henceforth referred to as sector) for diversification activity, the SIPA team focused on developing recommendations and initiatives through primary research methods. The team spent a week conducting semi-structured interviews in Mongolia to acquire deeper insights into the workings of the dairy products sector. In preparation, prior to travel, the team developed a stakeholder analysis to identify relevant interview participants with UNRCO inputs and support.

#### 7.1. Stakeholder Analysis

The primary objective of the stakeholder analysis is to identify a comprehensive set of interview participants who can provide valuable insights to the team's understanding of the dairy products sector. To facilitate this, the SIPA team defined the desired objectives from the interview process, and with UNRCO input and support identified relevant interview participants.

On the whole, the team interviewed approximately 20 stakeholders and experts across four types of organizations (Figure 5) - namely, government entities, development agencies, private companies, and local communities. Within these organizations, the team interviewed either Agribusiness or Dairy specialists, whenever available.

The SIPA team defined three objectives from the interview process:

- 1. Validate the selection of the dairy products sector for diversification activity**  
The SIPA team received conflicting feedback on the selection of the dairy sector for diversification in our discussions with the development agencies. While one key development partner highlighted the complexity and significant challenges faced in this sector, questioning the feasibility of making an impactful change, other development agencies had selected the dairy sector as a key sector for driving economic growth and development in Mongolia. On the other hand, the private sector responded positively to the selection of the dairy sector, as was evident throughout the discussions and interviews. In sum, having presented the framework, data and criteria, the team was able to justify the selection of the dairy sector. That being said, the team recognized that the challenges in the sector were complex and multifaceted.
- 2. Develop a practical understanding of the dairy products sectoral landscape.**

## Section 3: Sub-Sector Recommendation

The SIPA team achieved this objective through interviews with multiple dairy organizations across the supply chain. The team interviewed milk production and processing organizations, milk distribution companies, as well producers of cheese and other premium dairy products. In addition, the team interviewed a couple of dairy NGOs who provided extensive insights into the dairy products landscape.

- 3. Identify opportunities, constraints, and gaps in the dairy products sector.**  
The SIPA team successfully identified gaps, constraints and opportunities in the dairy products sector which are detailed in section 8.1.

*Figure 5: Stakeholder Summary*

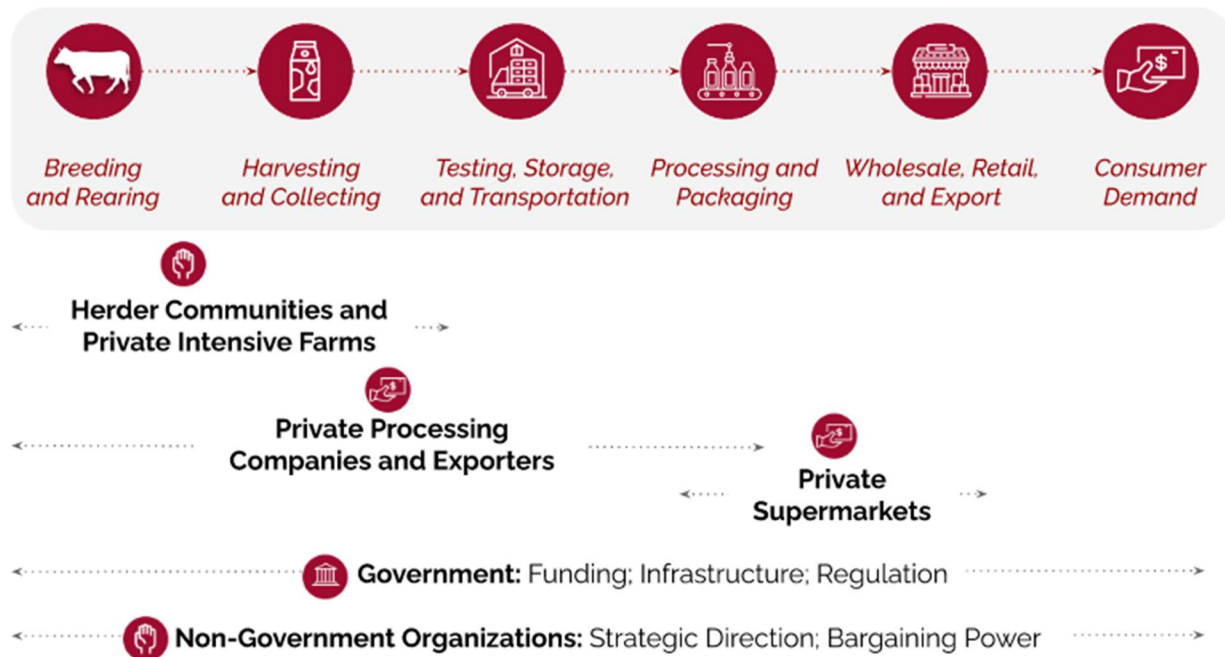




## 8. Sub-Sector Supply Chain Analysis

The SIPA team organized findings from the primary research in the form of challenges and gaps across the dairy products supply chain. Although the interviews indicated the presence of two types of supply chain in this sub-sector - 'Modern' and 'Traditional', the sequence of activities in this industry is standard. Therefore, Figure 6 is representative of and highlights challenges and gaps in both types of supply chains. In addition to technical and geographical constraints, the team identified fundamental structural, economic, political, and social limitations that exacerbated existing challenges.

Figure 6: Dairy Products Supply Chain and Key Players



### 8.1. Challenges by Supply Chain Component

The SIPA team's field interviews with government officials, private sector, non-governmental organizations and donor agencies realized the numerous challenges which posed barriers to foster the dairy industry in Mongolia. A few of challenges by supply chain component identified during the field research and interviews has been explained below:

### Breeding and Rearing

#### *Seasonal Challenge*

The quality of milk produced by cattle is determined by the way they are bred and reared, which can be influenced by various factors such as weather, food, and temperature. This signals that herders must carefully consider their comparative advantage in different sectors, such as cashmere, milk, or meat, based on the conditions of their habitat. As a result, many stakeholders, including private intensive farms, find breeding and rearing cows for milk production challenging during the winter season due to the higher comparative advantage of producing cashmere and meat during that time. Herders tend to prioritize wool and meat production over milk during the winter season. As a result, milking is not a preferred activity for herders during this time.

The SIPA team's field research shows that one of the major challenges faced by herding communities and intensive farmers is that they can milk animals only during warm seasons<sup>64</sup>. This is particularly problematic as there is a high demand for milk and dairy products during cold seasons, which Mongolia is unable to supply locally. In fact, it has been reported that while Mongolia has 66 million livestock, local production is unable to meet domestic demand - producing only enough milk to meet 20% of domestic demand. Milk production ceases in the winter and while large milk producers seek to acquire milk from remote settlements during this season, it is often too difficult for the remote settlements to meet the demand due to the infrastructural challenges.

#### *Scarcity of Quality Feed for Cattle*

Another problem faced by herders and dairy farmers is quality animal feed. In the traditional supply chain where herders prefer to rear cattle in their natural habitat, food scarcity is a major challenge for the dairy industry. Farmers can produce high-quality milk by providing nutritious feed to cows and other animals. Yet, farmers must frugally use the feed due to high taxes imposed on this type of product. Herders specify water availability, variable precipitation, insect invasion, adequate pasture, and extreme winters as the primary pastoral challenges<sup>65</sup>.

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<sup>64</sup> Dulguun Bayarsaikhan, "Milk Producers: 66 Million Livestock Are Not Enough to Meet Local Demand," *The UB Post*, February 9, 2018, <https://theubposts.com/milk-producers-66-million-livestock-are-not-enough-to-meet-local-demand/>.

<sup>65</sup> Troy Sternberg, "Environmental Challenges in Mongolia's Dryland Pastoral Landscape," *Journal of Arid Environments* 72, no. 7 (July 1, 2008): 1294–1304, <https://doi.org/10.1016/j.jaridenv.2007.12.016>.

## Section 3: Sub-Sector Recommendation

Similarly, the profit margins from dairy production are low when raw materials are sourced from local herders compared to the intensive farming industry. This poses a challenge in the societal aspect of Mongolia typically because Mongolia is a country with the culture of herder family for a long time. It would be a huge challenge to shift cattle rearing to industrial farming by replacing herders.

### *Limited Training Opportunities for Women and Youth Involvement*

In Mongolia, women are responsible for the preservation of traditional dairy products like yogurt, dried curds, fresh cheese and whey, sour cream, butter, and fermented milk<sup>66</sup>. However, the limitation of training opportunities available to women in Mongolia hinders the development of high-quality dairy products. It is because (herder) men migrate to various places leaving lesser opportunities for women to prepare for formal engagements contributing to the economy.

Mongolia is facing challenges in attracting young people to the agriculture sector, including dairy production. The Mongolian National Chamber of Commerce and Industry (MNCCI) reports that many dairy companies are struggling to find employees, as most youths are more interested in pursuing careers in technology and science than in agriculture. One of the reasons for this trend is that the agriculture sector, including dairy production, often requires working in remote areas that offer less comfortable living conditions. Furthermore, Mongolia has a shortage of institutions that offer vocational training in these fields.

### Harvesting and Collecting

#### *Geographical and Infrastructural Barriers*

Mongolia's traditional and modern dairy production supply chains are significantly impacted by geographical and infrastructural barriers. The difficult terrain and limited connectivity pose challenges to milk collection, particularly in remote areas. This hampers the milk supply chain and has negative effects on dairy product quality as well as quantity. Collection centers are currently only located within a limited radius around the capital city, Ulaanbaatar.

Additionally, Mongolia's status as a landlocked country presents further challenges for the export of dairy products. While the government and private companies are optimistic about expanding Mongolian dairy product exports, the feasibility of transport through other countries with seaports must be carefully studied. Moreover,

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<sup>66</sup> Food and Agriculture Organization, *Support to Income Creation in Mongolia (Secim): Improving Local Dairy Processing Through Promoting Women* (Rome: Food and Agriculture Organization, 2020), <https://www.fao.org/documents/card/en/c/CA8770EN/>.

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presently, Mongolia's geopolitical situation is even more precarious by the ongoing Russia-Ukraine crisis, and the country's commitment to neutrality towards neighboring countries.

### Testing, Storage and Transportation

#### *Connectivity Issues*

Mongolia's vast geographical area poses a significant challenge to milk collection. The country's road infrastructure, especially in rural areas, is outdated and limited to urban areas, making it difficult to access remote areas where many nomadic families live. Moreover, since herders live far apart from each other in sparsely located ger houses, initiating a cooperative program among them presents a challenge. As a result, the cost of transporting raw milk required to produce dairy products is high. It is because separate arrangements have to be made for each ger house to assimilate it to the modern as well as traditional supply chain.

Despite these challenges, Milko Liability Limited Company (Milko) based in Ulaanbaatar, with the support of the ADB, has managed to double the number of its collection points. This has helped to reduce the time and distance required to collect milk from local herders and transport it to processors.

#### *Modern Storage System*

Raw materials for dairy products are perishable products whose supply is dependent on the timing of transportation. Well-equipped cold storage facilities are a must for perishable dairy products. The lack of integration of the modern cold storage facilities into the supply chain affects the value of dairy raw materials and is a huge barrier to developing the dairy industry.

### Processing and Packaging

#### *Limited Processing Capacity*

Most of the processing centers for dairy products are located either within Ulaanbaatar or within a limited radius from the city to minimize the transportation costs. Consequently, a lot of companies import raw materials (milk powder) from neighboring countries to meet the demand.

According to Asian Development Bank (ADB), livestock per capita in Mongolia is the highest in the world, and 61% (2020 data) of households depend on pastoral activities

## Section 3: Sub-Sector Recommendation

and animal husbandry for their livelihood<sup>67</sup>. However, domestic dairy production and processing capacity remain limited. Data from 2018 reveals that only 10% of 892 million liters of raw cow and sheep milk produced was processed through a dairy factory to produce other products or pasteurize. In discussions with the SIPA team, the FAO stated that “Mongolia has 71 million livestock that could produce up to 100 billion tons of milk but only 152.2 million tons of milk is processed currently.”

In 2020, the ADB provided support for Milko, one of Mongolia's leading privately-owned dairy processors based in Ulaanbaatar, to expand its dairy operations by improving its raw milk sourcing and processing capacity. The project enabled Milko to install more collection points in rural areas, procure modern equipment, and invest in more efficient management and raw milk processing systems.

However, the limited number of processing centers based in urban areas and the lack of coverage in remote areas is one of the major issues affecting the expansion of processing capacity in the dairy sector.

### Wholesale, Retail and Export

#### *Unpredictable Supply*

The dairy sector faces high unpredictability in the supply of both raw materials and finished products due to seasonal fluctuations, poor milk quality and lack of technology. The major reason for irregular supply is also because of lesser advantage from the dairy sector compared to other sectors with similar investment of time and money. The Asian Development Bank (ADB) notes that this irregular supply has a significant impact on the traditional supply chain of the dairy industry.

#### *Poor Safety Standards*

While national safety standards exist in Mongolia, herders struggle to meet these standards. This is due to a lack of knowledge of food production and food storage regulations, as well as a lack of modern equipment and animal husbandry techniques. Mongolian dairy producers also struggle to meet international safety standards such as the International Organization for Standardization (ISO) 22000. The dairy industry cannot export without meeting this standard<sup>68</sup>, limiting export opportunities. The inability to meet safety standards also prevents major dairy companies from exporting their dairy products to neighboring countries like China. For example: Suu Joint Stock Company (JSC), the first dairy company in Mongolia,

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<sup>67</sup> Asian Development Bank, “Keeping the milk and cash flowing in Mongolia.”

<sup>68</sup> Batsuuri Munguntuya, *The Safety of Mongolian Dairy Production* (Niigata: Niigata University Academic Repository, December 1, 2016), [https://niigata-u.repo.nii.ac.jp/record/7357/file\\_preview/63\\_257-285.pdf](https://niigata-u.repo.nii.ac.jp/record/7357/file_preview/63_257-285.pdf).

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has recently taken steps to export dairy products to Inner Mongolia (China) which is contingent upon meeting the Chinese standard for import.

### **Branding**

Due to limitations in training opportunities, poor safety standards, and technology, premium branding of Mongolian dairy products is difficult. It is also because the government has been prioritizing agriculture as a whole which overshadows the focus on dairy specific sectors. Consequently, as dairy products do not meet current international safety and packaging standards, branding dairy products for export to global markets is a challenge. Several workshops and training are necessary to commercialize the dairy sector for global recognition and market of Mongolian dairy products which will highly impact the modern supply chain of the dairy industry.

### **Lack of a Single Window System**

For export-based dairy production, the single window system that provides a single gateway for all the necessary documentation and certifications required for exchanging the trade regulatory data is a must which Mongolia has been working to progress for more than a decade. As a result, Small and Medium-sized Enterprises (SMEs) have been unable to fulfill the eligibility criteria to successfully export their products. According to MNCCI, the single window system initiative has been ongoing for the last 10 years with no predicted completion date.

### **Consumer Demand**

#### **Lack of Marketing**

Domestic consumers are necessary for the high scale production of dairy products. However, the Mongolian population highly consumes meat as their staple food. Marketing the positive impacts of dairy foods is required to increase consumption and upscale the processing and production in the country. Sufficient domestic demand is needed to support both the traditional and modern dairy supply chains. The FAO conducted a Milk Marketing Enhancement Programme in Mongolia to increase the supply of dairy products to urban centers in Mongolia by reducing post-harvest losses and restocking<sup>69</sup>. It was a 2-year project (2004-2006) with a total fund of \$ 1.96 million funded by the Governments of Mongolia and Japan. It was executed by the FAO under its global Special Programme for Food Security and implemented during 2005-2007 to rebuild the dairy industry in Mongolia.

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<sup>69</sup> “Mongolian Milk for Health and Wealth,” FAO in Mongolia, Food and Agriculture Organization, last modified June 2016, <https://www.fao.org/mongolia/programmes-and-projects/success-stories/milk-for-health/en/>.

### 8.2. Fundamental Structural Limitations

#### Inadequate economic mass

In essence, inadequate economic mass is directly linked to low productivity in the sector as it pertains to lack of market organization, structural barriers to achieving scale, and limited access to capital markets. This is largely due to the country's economic and historical context – specifically, the shutdown of small and medium SOEs i.e., dairy farms and cooperatives and reduced government spending in the 1990s, flow of capital to the mining sector in the 2000s – and geographical constraints. Therefore, processing capabilities are concentrated in the Ulaanbaatar region among a handful of large businesses that have the capacity to own the entire supply chain. Consequently, smaller enterprises focused on either niche products, or regions or certain parts of the supply chain struggle to achieve adequate scale.

#### Tenuous political support

Mongolia faces institutional and governance challenges that result from frequent political turnover and a lack of policy consistency. The frequent changes in government leadership make it difficult to establish and maintain long-term plans, policies, and programs for the country's agricultural industry, including the dairy sector. This lack of continuity and consistency can be a major obstacle to the growth and development of the agricultural sector, limiting the ability of businesses and investors to make long-term investments and plan for the future.

#### Behavioral constraints

Nomadic herders in Mongolia are spread out across the country's remote rural locations, making it difficult to establish centralized dairy production facilities or modern supply chains. Cultural norms of seasonal migration also pose a challenge to the dairy sector's growth and development as nomadic herders typically move their herds to different grazing areas throughout the year, which can result in fluctuations in milk production and supply. Furthermore, family-based production is a common practice among nomadic herders in Mongolia. This means that the dairy sector is primarily composed of small-scale producers who may lack the resources and capacity to invest in equipment or new technology that could increase productivity and efficiency.

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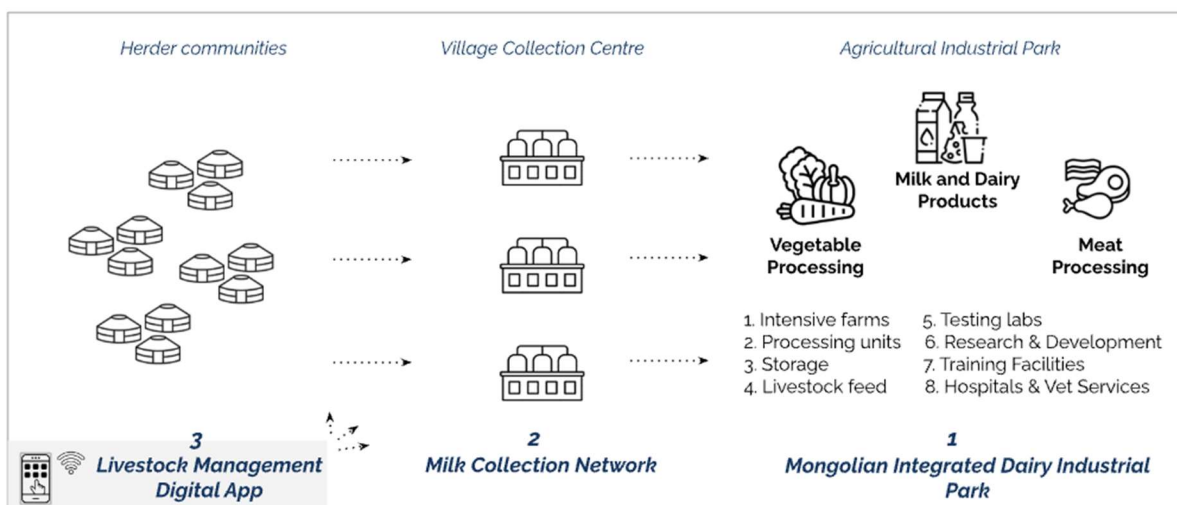
### 9.1. Overview

From the supply chain analysis, it is evident that the dairy products sector faces numerous structural challenges. The SIPA team's initiatives aimed to address critical structural constraints such as livestock productivity, output quality, geographic spread, and harsh climate, through regional production centers, adoption of new technology, and real time data analytics.

Furthermore, recognizing that discrete initiatives are insufficient in addressing fundamental structural limitations, the team adopted a 'systems' approach and developed a multi-initiative integrated recommendation (Figure 7). This approach organizes the private sector to generate adequate economic value, derives synergy with existing government initiatives in the absence of consistent political support, and incentivizes behavioral change.

*The multi-initiative integrated recommendation proposes the development of regional dairy production clusters that are integrated with rural communities through milk collection networks and a digital livestock management app.*

Figure 7: Multi-Initiative Integrated Model





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### Initiative 1: The Mongolian Integrated Dairy Industrial Park (MIDIP)

In essence, the Mongolian Integrated Dairy Industrial Park (MIDIP) model aims to develop dairy production clusters in strategic regions with proximity to rural communities and export routes. Potential locations may be further informed by environmental, social, and economic criteria as defined by the Ministry of Economy and Development. These dairy clusters may be further integrated with other agribusiness production clusters, such as meat processing and vegetable production, to share costs and enhance cluster productivity.

The MIDIP will house a combination of intensive farms and processing, testing, and storage units owned by the private sector. The intensive farms will feature technology-enabled systems to enhance productive capacity, track and monitor well-being, shield from inclement weather, and enable the practice of sustainable farming. Similarly, processing units, testing systems, and storage units will be enabled with smart systems for temperature monitoring, real-time updates and tracking, and quality monitoring. To further improve productivity, intensive farms may import higher-quality breeds of livestock.

1. Precision livestock farming technology: Combines sensor technology, robotic systems, imaging systems, GPS tracking, and data analytics for livestock weighing, feed and water intake recording, temperature recording, and emission tracking.
2. Automated milking systems: Employs robotic systems to milk livestock and analyze milk quality and quantity.
3. Climate control systems: Employs temperature controls and pressure systems to shield livestock against harsh winters and increase lactation periods.

To ensure benefits accrue to rural communities, there should be a stipulation or incentivization process to ensure that a specified proportion of milk supply is to be sourced from such communities. This may further create incentives for quality management and productivity management in traditional value chains. The dairy production hubs may further provide employment opportunities in non – agricultural fields such as technical support, operations management, and maintenance.

### Initiative 2: Milk Collection Network

The Milk Collection Network is intended to be a network of satellite collection systems and cold storage units for both the Industrial Park and existing processing businesses. Under this initiative, physical storage and transportation infrastructure

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will be established in designated villages and towns, along with supply chain software systems.

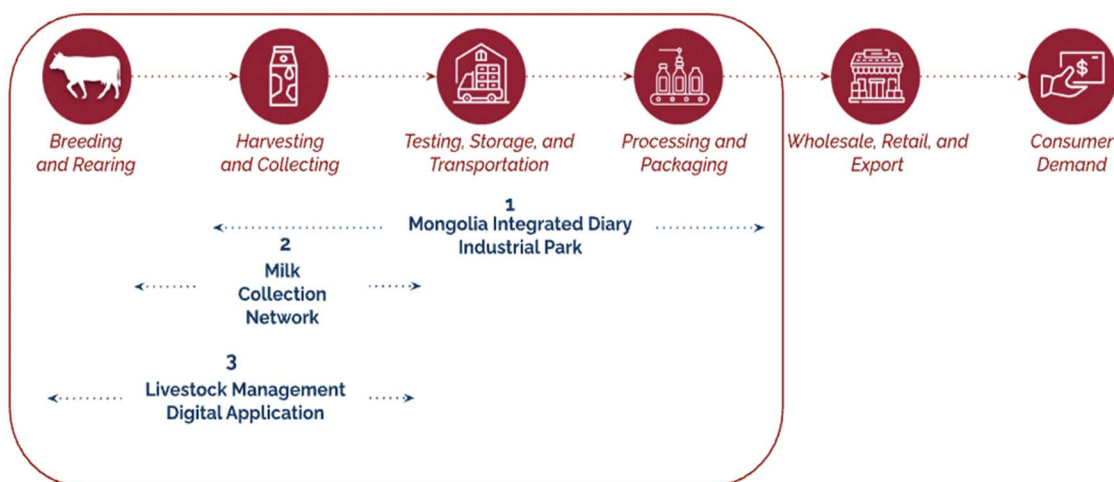
Similar to the Industrial Park, the storage infrastructure will be technology-enabled and connected to both the herder communities and processors. The software system will provide tracking and reporting for each collection route, a 'producer' portal that will enable real-time communication between herder communities and collection centers and plan collection schedules. This system is critical to the prevention of leakages due to delays and poor collection infrastructure.

This model helps establish market linkages and organize collection processes for herder communities. Furthermore, this has benefits for processing businesses in that it increases sourcing potential and improves quality management which is especially integral for export-oriented businesses.

### Initiative 3: Livestock Management Digital Application

The Livestock Management Digital Application serves as the link between the three stakeholders- nomadic herder communities, satellite collection networks, and industrial park processing units. The features of this application are intended to incentivize herder communities through provision of livestock management services and social security incentives, and improve collection processes through real-time transmission of information about collection activity, weather conditions, and herder locations.

Figure 8: Initiatives mapping to the Supply Chain



### 9.2. Initiative 1 - The Mongolian Integrated Dairy Industrial Park (MIDIP)

<b><i>The Mongolian Integrated Dairy Industrial Park (MIDIP)</i></b>	
<b><i>Overview</i></b>	
<p>The Mongolian Integrated Dairy Industrial Park (MIDIP) will be a part of a larger integrated agricultural, industrial park. The MIDIP will focus on transforming the agriculture industry by utilizing dairy best practices, leading technologies, and healthy livestock. The MIDIP project aims to achieve three main objectives:</p> <ol style="list-style-type: none"> <li>1) Create socio-economic value</li> <li>2) Enhance sustainability by using sustainable practices</li> <li>3) Improve productivity</li> </ol>	
<b><i>Rationale</i></b>	
<p>The MIDIP will play a critical role in improving competitiveness, productivity, and food safety, leading to positive economic transformation, regional development, and prosperity of the agriculture industry in Mongolia.</p>	
<b><i>Stakeholders</i></b>	
<b>Stakeholder</b>	<b>Role</b>
Ministry of Economy and Development	Owner
Dairy private companies	Implementer, Beneficiaries
Supermarkets and other retail stores	Beneficiaries
<b><i>Financing</i></b>	
<ul style="list-style-type: none"> <li>● Primary Cost: Costs of consulting, planning, imported livestock and construction.</li> <li>● Financing Partners: The Mongolian government with the support of any of the development banks</li> </ul>	

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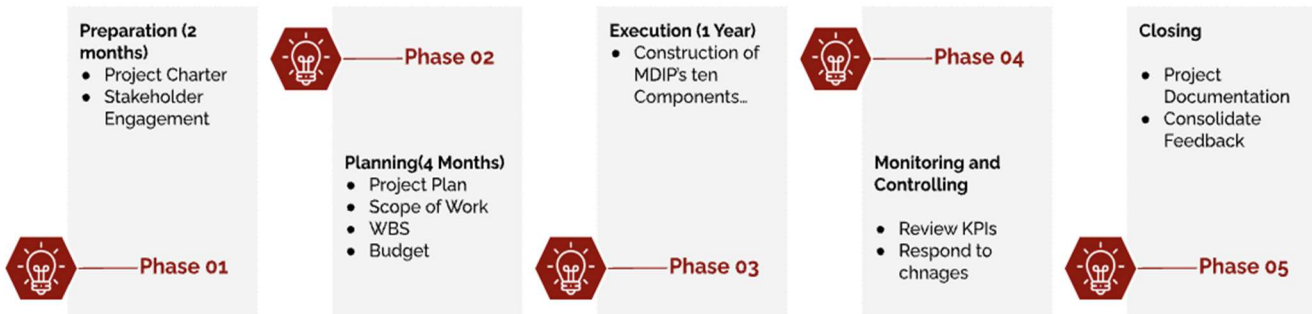
<b>Risks and Mitigation</b>	
<b>Risk</b>	<b>Mitigation</b>
Low buy-in from the Mongolian central	Involve and engage the central government in the planning phase and reassure them that this project will create economic
Low interest from potential customers	Measure the demand and plan the milk production and marketing campaign accordingly
Production Deficiencies	Ensure the usage of best practices and continuous monitoring and controlling

<b>Case Study</b>
<p>In China, the Dairy Silicon Valley, also known as Yili Future Intelligence and Health Valley, is an ambitious initiative aimed at revolutionizing the dairy industry. The project seeks to construct a smart city that utilizes the latest technologies, such as automated milkers and vehicles, alongside residential areas, hospitals, and transportation. The expected outcomes of the project include improving the quality of cows' production and reducing carbon emissions. The estimated cost of the initiative is around \$82 million, and it is set to be completed by 2022.</p> <p>Meanwhile, in Mongolia, the Ministry of Economy and Development is leading the Agriculture, Logistics, Supply, and Production Center project. The initiative aims to enhance sustainable food supply and security in the region by establishing milk processing areas, industrial zones, and hotels. The expected cost of the project is approximately \$4.8 million, and the timeline for completion is yet to be determined.</p> <p>Both initiatives reflect a growing trend of leveraging technology to improve sustainability and efficiency in agriculture. The Dairy Silicon Valley project seeks to incorporate the latest advances in automation and smart cities to improve the dairy industry's overall environmental impact. The Agriculture, Logistics, Supply, and Production Center project, on the other hand, seeks to enhance the overall agricultural supply chain, thereby improving food security in the region.</p>

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## Implementation

The three objectives will be achieved through The Project Management Institute's five phases: <sup>70</sup>



Strategic KPIs			
Related Objective	Indicator	Target	Reference
Create socio-economic value	# of created jobs	70	Similar projects in other countries. <sup>71</sup>
Enhance sustainability by using sustainable practices	% decrease in carbon emissions	TBD	N/A
Improve productivity	Various indicators used to measure industrial productivity such as: <sup>72</sup> <ol style="list-style-type: none"> <li>1) % enhanced efficiencies</li> <li>2) # of equipment wear</li> <li>3) \$ Maintenance Cost</li> <li>4) % Full-quality products</li> </ol>	TBD	N/A

<sup>70</sup> "What Is Project Management?" Project Management Institute, accessed April 14, 2023, <https://www.pmi.org/about/learn-about-pmi/what-is-project-management>.

<sup>71</sup> "CCIDA Approves Cayuga Milk Ingredients Industrial Park Land Purchase," Cayuga Economic Development Agency, last modified November 4, 2022, <https://cayugaeda.org/2022/11/04/ccida-approves-cayuga-milk-ingredients-industrial-park-land-purchase/>.

<sup>72</sup> Carl-Fredrik Lindberg, Sieting Tan, Jinyue Yan, and Fredrik Starfelt, "Key Performance Indicators Improve Industrial Performance," *Energy Procedia* 75 (August 1, 2015): 1785–90, <https://doi.org/10.1016/j.egypro.2015.07.474>.

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	5) % operation time		
<b>Operational KPIs</b>			
\$ amount of received funding			
% completion rate of the project management plan			
# of private sector companies interested in participating in the project			
# of interested residents who wish to live in the MIDIP			
% of approvals on needed legislation			
# of customers (supermarkets and other retail stores) interested in buying from the MIDIP			
# of new livestock			
% enhanced waste management practices			

### 9.3. Initiative 2 - Milk Collection Network

#### ***Milk Collection Network***

##### ***Overview***

Milk in Mongolia is collected by herder families who produce small quantities for local consumption or sale. Transportation to processing facilities is challenging due to rugged terrain. In 2018, only 10% of milk produced was processed in dairy factories. A recommendation is to build cold storage facilities and collection points to address transportation challenges and preserve dairy product quality. This can increase shelf life and minimize wastage.

To improve the efficiency of the milk collection process, a mobile app could be developed to facilitate communication between farmers, cooperatives, and milk processing facilities. The app could allow farmers to schedule milk pickups, track the quality and quantity of their milk deliveries, and receive payment electronically. The milk collection centers also act as satellite collection networks that support a consistent and reliable source of milk for the industrial park. Within

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<p>the industrial park, milk is further processed that may include pasteurization, homogenization, and other processes required to convert the raw milk into finished dairy products.</p>	
<p><b>Rationale</b></p>	
<p>Cold storage facilities and collection points aim to address the significant challenge of inadequate infrastructure to support the dairy sector. Cold storage and collection points are critical components of the dairy supply chain, ensuring that dairy products are stored and transported under appropriate conditions, minimizing spoilage and ensuring high quality.</p>	
<p><b>Stakeholders</b></p>	
<p><b>Stakeholder</b></p>	<p><b>Role</b></p>
<p>The Government of Mongolia</p>	<p>Policy and regulatory support</p>
<p>Private sector - dairy processing companies and transport companies</p>	<p>Provide technical assistance</p>
<p>Herders and Communities</p>	<p>Beneficiaries</p>
<p><b>Financing</b></p>	
<ul style="list-style-type: none"> <li>● Primary Cost: Constructions of Cold storage, collection points, license approval</li> <li>● Financing Partners: Development partners and private sector</li> </ul>	
<p><b>Risks and Mitigation</b></p>	
<p><b>Risk</b></p>	<p><b>Mitigation</b></p>
<p>Financial risk on construction and operation</p>	<ul style="list-style-type: none"> <li>● Conduct feasibility studies and risk assessments</li> <li>● Implement effective financial management and budgeting practices,</li> </ul>
<p>Technical Risk in construction and operation (site selection, engineering)</p>	<ul style="list-style-type: none"> <li>● Engage engineers and technical experts to design and construct</li> <li>● Undergo testing and quality</li> </ul>

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	<p>control measures before being operational</p> <ul style="list-style-type: none"> <li>● Train &amp; equip staff adequately</li> </ul>
Regulatory Risk such as delays in obtaining permits, changes in regulatory requirements, political instability	Engage with the government and relevant regulatory bodies at the earliest stages, and ensure that all necessary permits and approvals are obtained before construction and operation begin
<b>Case Study: Afghanistan</b>	
<p>The Integrated Dairy Scheme (IDS) is a project implemented by FAO in Afghanistan to improve the dairy sector in the country. The main objective of the project is to increase milk production, improve milk quality, and enhance the livelihoods of rural communities<sup>73</sup>. IDS focuses on three main areas<sup>74</sup>:</p> <ol style="list-style-type: none"> <li>1. Improving milk production: it aims to improve the productivity and quality of milk produced by rural herders in Afghanistan. This includes providing training and technical assistance on good dairy farming practices, animal health, and milk quality control.</li> <li>2. Enhancing milk collection and processing: it aims to improve the efficiency and effectiveness of milk collection and processing systems in Afghanistan. This includes setting up milk collection centers and processing facilities, as well as providing training on milk processing and value addition.</li> <li>3. Developing market linkages: it aims to develop stronger linkages between rural herders and local and international markets. This includes working with private sector actors to identify market opportunities for dairy products and to develop marketing strategies that can help to increase the value of dairy products for rural herders.</li> </ol>	

<sup>73</sup> Food and Agriculture Organization, *15 Years in Afghanistan a Special Report: 2003-2018*, by Jenna Jadin (Bangkok: Food and Agriculture Organization, 2016), <https://www.fao.org/documents/card/en/c/CA1433EN>.

<sup>74</sup> Food and Agriculture Organization, *Empowering women in Afghanistan Reducing gender gaps through Integrated Dairy Schemes*, by Ruxandra Boros and Anni McLeod (Rome: Food and Agriculture Organization, 2015), <https://www.fao.org/reduce-rural-poverty/resources/resources-detail/fr/c/468302/>.



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### Case Study: Afghanistan

The project organized rural herders into cooperatives at the village level. The herders are paid weekly for the milk they deliver to milk collection centers, which provides them with a stable source of income<sup>75</sup>. The village cooperatives have their own milk collection centers, which are linked to district-level collection centers. The district centers have refrigerated rooms for cooling the milk immediately after it is brought in, and the cooled milk is transported to provincial milk processing plants using refrigerated trucks<sup>76</sup>.

The milk processing plants, which have been built with support from the FAO, contain high-quality computerized equipment, refrigerated rooms, laboratories, and packaging equipment. These facilities allow Afghan dairy products to be properly transported, treated, and stored. The IDS project has helped to improve the livelihoods of Afghan rural herders by providing them with training, inputs, and a stable source of income. It has also helped improve the quality of Afghan dairy products and increase their market share, which is important for the country's economic development.

### Implementation

The strategy for enhancing milk collection includes several key components.



The strategy for enhancing milk collection focuses on creating an efficient and reliable milk collection system. By establishing milk collection centers, providing milk chilling equipment, transportation, training and support, incentives, digitalization of milk collection, and linking the milk collection points to the greater supply chain in the industrial park, the recommendation aims to improve the quality

<sup>75</sup> Food and Agriculture Organization, *15 Years in Afghanistan*.

<sup>76</sup> Food and Agriculture Organization, *15 Years in Afghanistan*.

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and quantity of milk collected, improve inclusion of rural herders in the formal supply chain, and to increase reliable source of income of rural herders.

Strategic KPIs		
Related Objective	Indicator	Target
Improve storage and transportation infrastructure for rural herders	# of cold storage and collection points that have been built in different regions	To be determined
Improve the quality of milk used in dairy products, making them more attractive to buyers	% increase of milk processed through dairy factories	20
Improve the accessibility of herders to collection points	# decrease in distance between herders to the nearest collection point (in kilometers)	15
Increased in herders' income	% of herders' income generated from milk sales	25
Operational KPIs		
# of time taken to collect milk from rural herders to collection points		
% of space utilized in the collection point		
# of time taken to transport milk from collection points to processing facility		

### 9.4. Initiative 3 - Digital Application to enhance livestock management capacity

#### Digital Application to enhance livestock management capacity in the dairy sector

##### Overview

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The use of technologies is a global trend in the agriculture sector as it enables farmers and other stakeholders within the supply chain to improve food production. In the Mongolian scenario, current problems related to milk production by herders, like animal health and quality, could be significantly enhanced by creating a mobile technology focused on management capacity, herd health, and dairy collection.

This recommendation could be implemented by adding features through the creation of a mobile app that is integrated into eMongolia, with six main features:

- 1. Personalized information about herders' cows, camels, and sheep:**
  - a. Herders could input their information (e.g., location, number of animals, number of offspring, number of injured animals or with low productivity, information about collection, etc) and receive daily recommendations and step-by-step tasks.
- 2. Access to best practices for keeping a healthy and productive animal, as well as essential tasks for better farm management** (e.g., appropriate and simple solutions to avoid animal stress during harsh winter, how to improve milk quality, importance of vaccinations and feeding, etc).
- 3. Access to veterinarians to chat and video**, which includes the possibility to schedule appointments with veterinarians, vet-to-vet connections, and live dairy collection information. This feature could also include a guide of common problems with cows in Mongolia and recommendations of when contacting a veterinarian is needed.
- 4. Milk collection system:**
  - a. Herders - companies: mainly focused on dairy collection;
  - b. Herders - herders and cooperatives: farmers could connect with each other to share information and best practices.
- 5. Real-time information about the weather;**
- 6. Training and accessible online courses with dairy experts.**

As part of this recommendation, the SIPA team found it important to create incentives to increase the number of app users, what could be done through social services (e.g., free annual health check-ups for families) or other benefits (e.g., number of free vet appointments per year after subscription). Moreover, the app could be an essential data source for future policies focused on dairy production.

### *Rationale*

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The creation of a digital platform is related to key and strategic issues. According to the UNDP, “to ensure food security for future generations, agriculture needs to become more sustainable – environmentally, economically, and socially – through applying technology, digital and innovation.” In addition, the dairy industry will play a critical role as per capita consumption is expected to increase from 87 kilograms per person to 119 kilograms per person by 2067.

Thus, the adoption of innovative and technological initiatives for the dairy sector represents a strategic move for the Mongolian government not only in terms of global trends but also in topics like regional development and economic transformation.

### *Stakeholders*

Stakeholder	Role
The Government of Mongolia	<p>The central government will play an essential role in implementing this Initiative and include bodies such as:</p> <ul style="list-style-type: none"> <li>- Ministry of Food, Agriculture, and Light Industry (MOFALI), especially with respect to the services for dairy farmers, such as veterinary services.</li> <li>- Ministry of Economy, for funding the project.</li> <li>- Ministry of Digital Development and Communications.</li> <li>- Ministry of Health.</li> <li>- Government bodies responsible for food security and animal health (e.g., General Agency for Specialized Inspection, General Authority for Veterinary Services, and National Committee on Food Safety).</li> </ul>
Local governments	Essential to disseminate information about the app and direct communication with herders.
Herders and Communities	Herders are the primary beneficiaries of the Initiative. They should participate and engage in the entire process of this

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	Initiative, especially during the design of the mobile device, in order to include the herders' perspectives and preferences, as well as during the evaluation of the mobile device through feedback.
Private sector	Dairy processing companies and transport companies if the mobile app includes features involved with the collection of milk.
Development partners (multilateral agencies, donor agencies, and international organizations)	Financial assistance and the initial development and support of the initiative. They should play a critical role in building government support.

### ***Financing***

It is complex to estimate a potential cost as app development costs vary considerably, depending on the complexity, features and functionality of the app. Simple apps with basic functionality can cost between \$10,000-50,000 while more complex apps with an extensive range of features can cost over \$100,000. However, such variability may be overcome with a project pilot to test the most useful and low-cost features the herders would actually use. Once the app has proven values to the users, funds for upkeep and additional features will be easier to raise. In addition, integrating the app into eMongolia allows developers to take advantage of existing Application Program Interfaces (API), data storage structures, user authentication mechanisms, and cloud infrastructure. Furthermore, leveraging the existing digital infrastructure will ensure scalability and improved performance for the app, while reducing maintenance costs. The services to be included on the app, such as veterinary and other animal health training services, may also benefit other sectors dependent on animal husbandry. In addition, organizations such as the World Bank and the Asian Development Bank may also be interested in funding as the project is directly related to central issues in the food security debate.

### ***Risks and Mitigation***

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<i>Risk</i>	Mitigation
Internet connectivity issues that create barriers to app usage	<ul style="list-style-type: none"> <li>● Pilot in locations with strong internet connection</li> <li>● Prioritize app stability when allocating developer resources</li> <li>● Coverage expansion should take into consideration internet connectivity</li> </ul>
Slow adoption by herders	<ul style="list-style-type: none"> <li>● Develop an effective marketing plan</li> <li>● Design a simple user interface to ensure a smooth and easy to use experience</li> </ul>
Slow adoption by veterinarians and dairy sector	<ul style="list-style-type: none"> <li>● Develop effective communication tools to explain to the dairy sector the benefits of the app</li> <li>● Provide incentives for private veterinarians to support the app through participating in knowledge share features and design consultancy.</li> </ul>
<b>Case Study: United States of America</b>	
<p>In general, while governments (e.g., US) have invested in digital technologies for animal husbandry<sup>77</sup>, most solutions have been driven by the private sector. Considering limited data availability, it is difficult to estimate financial success. Nevertheless, research on the potential of veterinary telehealth finds that it is more cost-effective at least as it pertains to dermatology<sup>78</sup>. Furthermore, rural farms are already using digital solutions to collect and exchange patient information, enable early decision-making and support for less experienced colleagues in procedures like surgery, and monitor animal health.<sup>79</sup></p> <p>One such, private sector actor is VetNOW, a US-based company founded in 2017 that provides digital solutions to veterinarians and animal owners. VetNOW connects vets with livestock farmers and management groups and provides</p>	

<sup>77</sup> “Veterinary Services Grant Program,” National Institute of Food and Agriculture, United States Department of Agriculture, last modified March 29, 2023, <https://www.nifa.usda.gov/grants/funding-opportunities/veterinary-services-grant-program-0>.

<sup>78</sup> Remedios López-Liria et al., “Teledermatology versus Face-to-Face Dermatology: An Analysis of Cost-Effectiveness from Eight Studies from Europe and the United States,” *International Journal of Environmental Research and Public Health* 19, no. 5 (February 22, 2022): 2534, <https://doi.org/10.3390/ijerph19052534>.

<sup>79</sup> Carlton Gyles, “Veterinary Telemedicine,” *The Canadian Veterinary Journal* 60, no.2 (February 1, 2019): 119–122, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6340261/>.

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guidance and information on how to improve milk production efficiency and herd health. This gives rural veterinarians access to information, saves costs and time by replacing unnecessary in-person visits, and gives producers easy access to information on making their production more efficient through monitoring and consultancy. Adapting some of these functions for the Mongolian context may provide direction in developing the key features of the app<sup>80</sup>.

Some of these functions include:

1. **Virtual Health visits:** VetNOW's telemedicine ensures animals are seen much quicker because veterinarians don't need to travel to the farms. This helps identify health issues much faster and increases time efficiency. The livestock management app on eMongolia could help veterinarians evaluate the health of an animal quicker through video-conferencing, reducing the travel-time barrier involved in rural visits.
2. **Veterinarian Network:** They digitally connect university students with professors. The livestock management app on eMongolia could similarly connect less experienced veterinarians in rural communities with more experienced ones to help share best practices and medical advice.
3. **Workflow consulting:** VetNOW provides solutions to improve production efficiencies through one-on-one consultations. While such a consultation may be too resource intensive for eMongolia, the app could be used as a knowledge base for general best livestock rearing and dairy practices to improve efficiency and animal health.

### Implementation

The strategy includes the following key components.



<sup>80</sup> "Who We Serve," VetNOW, accessed April 14, 2023, <https://vetnow.my.canva.site/production-animal-landing-page>.

## Section 3: Sub-Sector Recommendation

As previously mentioned, the central government should be the owner of this initiative. However, as a previous step of the brainstorming process, it is necessary to build support for the initiative within the public administration, a role that could be performed by development partners. In addition, ongoing communication with herders is also highly encouraged. Their involvement while defining the features, creating wireframes and prototypes, as well as providing constant feedback is important to meet user expectations and guarantee the success of this initiative. It is also worth mentioning that this initiative requires expertise in mobile app development and knowledge of the dairy industry and its specific needs in the Mongolian context.

Strategic KPIs
# of users of the mobile device. It will help to determine the extent to which the recommendation has been successful and needs to be an ongoing measure.
Online surveys with herders to address satisfaction with the app and collect feedback. Number of complaints made to the ombudsman should also be considered to continuously improve the app and measure its quality.
Increase in the quality of dairy products: measure the improvement in the quality of dairy products produced by herders that are members of the device. This is a long-term KPI and will demonstrate the effectiveness of the initiative in improving the quality of dairy products.
# of vet appointments/year.
Amount of financial resources (% of government budget and/or international donations) destined to the mobile device.

Livestock Management App : Features			
	<i>Feature</i>	<i>Description</i>	<i>Supply Chain Challenge</i>



## Section 3: Sub-Sector Recommendation

1	<b>Personalized information about herders' cows, camels, and sheep</b>	Herders could input their information (e.g., location, number of animals, number of offspring, number of injured animals or with low productivity, information about collection, etc) and receive daily recommendations and step-by-step tasks.	Low animal productivity
2	<b>Access to best practices for keeping a healthy and productive animal, as well as essential tasks for better farm management</b>	Provide appropriate and simple solutions to avoid animal stress during harsh winter, how to improve milk quality, importance of vaccinations and feeding	Low animal productivity
3	<b>Access to veterinarians to chat and video</b>	Enables herders to schedule appointments with veterinarians, vet-to-vet connections, and live dairy collection information. This feature could also include a guide of common problems with cows in Mongolia and recommendations of when contacting a veterinarian is needed.	livestock diseases, low productivity.
4	<b>Milk collection system</b>	Provides real-time milk collection information to herder communities.	Milk spoilage, Milk quality issues.
5.	<b>Real-time information about the weather;</b>	Provides real-time and upcoming weather information,	Livestock health
6	<b>Training and accessible online courses with dairy experts</b>	Recorded video training sessions on animal rearing, breeding and milking best practices.	Low productivity.

## 10. Conclusion

The research conducted by the SIPA team identified the dairy sector in Mongolia as a high potential sector for economic diversification and sustainable development. Untapped livestock resources, ability to meet nutritional needs, and global demand for dairy products from Mongolia offer opportunities for addressing food security concerns, creating employment opportunities, reducing inequalities, and promoting regional development.

However, there are significant challenges across the dairy supply chain, including low productivity, poor milk quality, logistical challenges, and inadequate investment, which are compounded by lack of political support and constraints of the nomadic lifestyle. To overcome these challenges, the SIPA team proposed three innovative, inclusive, and growth-enhancing initiatives.

The Mongolian Integrated Dairy Industrial Park (MIDIP) addresses challenges in the harvesting, collecting, storage, transportation and processing phases of the supply chain. It aims to improve livestock productivity and generate economic mass across different regions in Mongolia. The Dairy Industrial Park offers basic infrastructure to dairy processors, enabling them to establish intensive farming and technology-enabled operations in strategically advantageous locations that facilitate exports and regional development. Given that nomadic communities are spread across Mongolia, the Milk Collection Network provides access to technology-equipped collection and storage facilities. This network not only minimizes leakages, but also increases earning opportunities for nomadic herders and provides improved access to markets through integration with the Dairy Industrial Park. Finally, the Livestock Management Digital Application serves as a link between nomadic herder communities, satellite collection networks, and industrial park processing units by providing livestock management services, social security access and real-time collection information to herder communities.

The SIPA team recommends integrating these proposed initiatives into the work plan of the UNRCO as actionable tasks and activities to leverage the potential of the dairy sector in Mongolia for sustainable economic and social development. Economic diversification in Mongolia is a complex endeavor. Nonetheless, with strategic interventions and support, the dairy sector can become a key driver of inclusive growth and development in the country.

## ANNEX : Alternative Potential Sub Sector - Renewable Energy

As surfaced in the team's sectoral identification, Mongolia has many avenues of sustainable development it can pursue with the goal of economic development. The team chose a renewable energy strategy to provide an alternative economic diversification recommendation for further research. While renewables did not score as high in our sectoral identification, the team wanted to highlight its untapped potential in the country due to its vast wind resource, the potential for import substitution and export, a successful case study in a similar country, Kazakhstan, and wind energy development's alignment with the sustainable development goals.

### Opportunities and Benefits

Mongolia's renewable energy resources are estimated to be able to provide as much as 2,600 gigawatts (GW) of electricity, far exceeding Mongolia's current generation capacity of about 1 GW<sup>81</sup>. The National Renewable Energy Laboratory (NREL) did a wind energy analysis on Mongolia to show that it has the potential to produce 2.5 trillion Kilowatt-hours (kWh) per year. For context, China uses 289.61 billion kWh of energy in a year. Developing the country's renewable energy resources would not only give it energy independence but also create a lucrative export<sup>82</sup>. However, renewable energy currently accounted for only 2 % of its total energy supply (TES) in 2019, with bioenergy accounting for 70 % of the renewable energy supplies followed by wind at 21 %, solar at 5 %, and hydro at 4 %<sup>83</sup>. Furthermore, this small amount of renewable energy is largely unavailable to poorer rural communities<sup>84</sup>. With the country's high potential for renewable energy production, there is a big portion of the population that can be targeted for renewable energy expansion.

Despite having abundant resources to produce electricity, Mongolia still imports approximately 15 % of its TES mainly from Russia and China (according to information from 2019),<sup>85</sup> <sup>86</sup> because it lacks sufficient generation capacity to meet its own needs. In addition, due to the lack of refining capacity, Mongolia exports crude oil and

<sup>81</sup> Oyunchimeg Chogdon et al., *Energy Sector Current Status, Recent Developments and Energy Policies in Mongolia* (Berkeley, CA: Nautilus Institute for Security and Sustainability, May 16, 2021), <https://nautilus.org/napsnet/napsnet-special-reports/energy-sector-current-status-recent-developments-and-energy-policies-in-mongolia-2/>.

<sup>82</sup> Dennis Elliott et al., *Wind Energy Resource Atlas of Mongolia*, (Washington, D.C.: National Renewable Energy Laboratory, August 2001), <https://www.nrel.gov/docs/fy01osti/28972.pdf>.

<sup>83</sup> "Energy Profile: Mongolia." International Renewable Energy Agency, last modified August 2020, [https://www.irena.org/-/media/Files/IRENA/Agency/Statistics/Statistical\\_Profiles/Asia/Mongolia\\_Asia\\_RE\\_SP.pdf](https://www.irena.org/-/media/Files/IRENA/Agency/Statistics/Statistical_Profiles/Asia/Mongolia_Asia_RE_SP.pdf).

<sup>84</sup> United Nations, "United Nations Sustainable Development Cooperation Framework (2023-2027) Mongolia.", 7-8.

<sup>85</sup> "Energy Profile: Mongolia."

<sup>86</sup> Chogdon et al., *Energy Sector*.

imports oil products, despite having modest oil reserves<sup>87</sup>. Although the growth rate of renewable energies in the TES has increased considerably at the rate of 30.8 % between 2014-2019, it is nevertheless outstripped by the growth in non-renewable sources, mainly coal, at the growth rate of 58.5 % during the same period<sup>88</sup>. The government has set targets to increase the share of generation capacity from renewable energy sources to 20 % by 2023 and 30 % by 2030 and to build export-oriented power plants<sup>89</sup>.

By putting efforts towards utilizing Mongolia's renewable energy resource, three benefits can be gained. First, it would also create a sustainable industry that generates employment and revenue for the country. Additionally, investing in renewable energy could reduce Mongolia's dependence on imports of energy, saving the country money. Finally, as Mongolia's renewable energy potential exceeds its domestic demand, it could possibly become a net exporter of energy, creating new trade opportunities and strengthening its economy. Mongolia has enough renewable energy resources to power both itself and China, if fully utilized.

## Case Study - Kazakhstan

The World Bank counts landlocked Kazakhstan as a “peer” of Mongolia based on several factors including economic structure, size of the population, economic development, and income per capita<sup>90,91</sup>. Described as central Asia's “economic leader”, Kazakhstan had an oil-driven economic boom. However, the government realized that its economy suffers from an overreliance on oil and extractive industries and has made initial attempts to diversify its economy by targeting sectors like transport, pharmaceuticals, telecommunications, petrochemicals, and food processing for greater development and investment<sup>92</sup>.

In 2013, President Nazarbayev launched his ambitious ‘Green Economy’ agenda under the 2050 national strategy, which set renewable capacity targets for 2020,

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<sup>87</sup> Chogdon et al., *Energy Sector*.

<sup>88</sup> “Energy Profile: Mongolia.”

<sup>89</sup> Chogdon et al., *Energy Sector*.

<sup>90</sup> United Nations, *Common Country Analysis 2021: Mongolia* (Ulaanbaatar: United Nations, March 16, 2022),

<https://mongolia.un.org/en/174973-common-country-analysis-2021-mongolia#:~:text=The%20United%20Nations%20Country%20Team,the%20development%20progress%20of%20Mongolia>.

<sup>91</sup> World Bank, *Mongolia: Systematic Country Diagnostic* (World Bank Group, 2018),

<https://documents1.worldbank.org/curated/en/576101543874150141/pdf/mongolia-scd-final-version-november-2018-11282018-636792121231072289.pdf>.

<sup>92</sup> “Kazakhstan,” The World Factbook, Central Intelligence Agency, accessed April 14, 2023, <https://www.cia.gov/the-world-factbook/countries/kazakhstan/>.

2030, and 2050, as well as a goal to be carbon neutral by 2060. Kazakhstan's commitment to carbon neutrality by 2060 will require it to move away from coal<sup>93</sup>.

Similar to Mongolia, Central Asian countries like Kazakhstan lack adequate financial incentives for large-scale projects, and current grid structures lack the capacity to support large-scale renewable power<sup>94</sup>. Despite some positive institutional and legislative changes in the last several years, investors remain concerned about the weak banking sector, corruption, bureaucracy, and arbitrary law enforcement<sup>95</sup>. However, when it comes to renewable energy, Kazakhstan has found a solution to increase investment.

The United States Agency for International Development (USAID) did a case study on Kazakhstan's market-based energy auctions. Over the last several years, auctions emerged as a best practice to facilitate competitive renewable energy price setting, lower costs, expand access to affordable and sustainable energy, and increase the transparency of energy procurement. The Kazakhstan government decided to switch from feed-in tariff (FiT) procurement to renewable energy auctions in 2017. This move aimed to hasten the progress toward achieving the country's renewable energy targets and take advantage of the decreasing prices of renewable energy<sup>96</sup>. These auctions have allowed for competitive pricing, greater access to renewable energy, and greater industry-wide transparency. The Government of Kazakhstan added over 1,000 megawatts (MW) of renewable energy projects in Kazakhstan through competitive auctions, with bid prices coming in between 23 and 64 % below previous renewable tariff ceilings, lowering the cost of renewable energy while still bringing in investment and expanding renewable energy production.

USAID identified several key features of the program that lead to its success<sup>97</sup>:

- Price ceilings were set at the level of the feed-in tariffs that had been adopted by a government resolution in 2014. Therefore, the price per unit of renewable energy was never more than the FiT program allowed.
- Due to the FiT program, there were a good number of renewable projects that were in development and could compete in an upcoming auction.

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<sup>93</sup> Ariel Cohen, "Central Asia To Green Its Economies," *Forbes*, June 28, 2021, <https://www.forbes.com/sites/arielcohen/2021/06/28/central-asia-to-green-its-economies/?sh=26483c0a35dd>.

<sup>94</sup> Cohen, "Central Asia."

<sup>95</sup> Central Intelligence Agency, "Kazakhstan."

<sup>96</sup> "Kazakhstan Renewable Energy Auctions Case Study," United States Agency For International Development, accessed April 14, 2023, <https://www.usaid.gov/energy/auctions/kazakhstan-case-study>.

<sup>97</sup> "Kazakhstan Renewable Energy Auctions Case Study."

- “Careful setting of capacity caps, location and grid integration, reduced concessions to investors, dealing with foreign exchange indexation, and attracting non-traditional developers.”

Similar programs across the region have succeeded in bringing in investment.<sup>98</sup>

## SDG Alignment

Renewable energy development hits several sustainable development goals including SDG 7: Affordable and Clean Energy, SDG 13: Climate Action, SDG 9: Industry, Innovation and Infrastructure, SDG 11: Sustainable Cities and Communities, SDG 12: Responsible Consumption and Production, and SDG 17: Partnerships for the Goals. A cross-cutting solution like this should provide incentive for international development agencies to provide support whether financial or technical towards renewable energy expansion.

## Further Research

The government of Mongolia may be able to learn from Kazakhstan's energy auctions. To explore this, Mongolia should connect with feed-in tariff partners and other renewable energy developers to gauge interest. The auction should cap prices at the feed-in-tariff price, market to a diverse group of developers, and ensure locations offered are easily integrated into the grid.

Further research into renewable energy strategy in Mongolia should understand: how energy auctions might work in the Mongolian context; how to bring in development support towards renewable energy projects; the capacity required to use renewable energy for import substitution; and how to work towards a long-term goal of exporting renewable energy.

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<sup>98</sup> Cohen, “Central Asia.”

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