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**Commercial Agriculture & Resilient Livelihoods
Enhancement Program (CARLEP)**

Ministry of Agriculture and Livestock



Investing in rural people



KOUFUKU INTERNATIONAL LIMITED
BUSINESS & INVESTMENT PLAN

Commercial Agriculture Resilience and Livelihood Enhancement Programme (CARLEP)
Ministry of Agriculture and Livestock
Wengkar, Mongar, Bhutan

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Abbreviations

AEZs	Agro-Ecological Zones
BAFRA	Bhutan Agriculture and Food Regulatory Authority
CARLEP	Commercial Agriculture Resilient Livelihood Enhancement Programme
COP	Cost of Production
CSR	Corporate Social Responsibility
CSR	Corporate Social Responsibility
DFCs	Dairy Farmer's Cooperatives
DFGs	Dairy Farmer's Groups
DHI	Druk Holding and Investments
FDI	Foreign Direct Investment
HR	Human Resource
HTST	High Temperature Short Time
ICT	Information and Communication Technology
IFAD	International Fund for Agricultural Development
IRR	Internal Rate of Return
ISO	International Organization for Standardization
KIL	Koufuku International Limited
KIPL	Koufuku International Private Limited
MCCs	Milk Collection Centres
MT	Metric Tonne
NMT	Not More Than
NPV	Net Present Value
NSB	National Statistics Bureau
PAT	Profit After Tax
PBIT	Profit Before Interest and Tax
RH	Relative Humidity
RLDC	Regional Livestock Development Centre
ROE	Return on Equity
SNBL	Shin Nippon Biotech Laboratories
SWOT	Strengths Weaknesses Opportunities Threats



Table of Contents

Acknowledgements.....	1
Abbreviations.....	2
1.0 Background	4
1.1 Introduction	4
1.2 Objective	5
1.3 Methodology	6
1.4 Vision, Mission, Core Values and Mandates	7
2.0 Overview of dairy production in Bhutan	8
3.0 Export and import substitution	10
4.0 Company overview	11
5.0 Role of KIL in Dairy value chain.....	13
6.0 KIL Performance	13
7.0 SWOT Analysis	15
8.0 Potential milk supply.....	18
9.0 Milk supply from producers	20
10.0 Dairy cooperatives or groups	23
11.0 Consumers perspectives	25
12.0 Wholesaler or retailers.....	28
13.0 Importers and exporters	30
14.0 Other findings.....	31
15.0 Findings from other studies	31
16.0 Raw milk cost of production	32
17.0 Major constraints at the plant.....	33
18.0 Details of Investment	36
19.0 Financial projection	39
20.0 Project Timeline	49
Table 22: Calculation of NPV, IRR and payback period (Amount in millions Nu.)	50
21.0 Recommendations	51
22.0 Conclusion	53
23.0 Annexure	55
23.1 Details of equipment	55
23.2 Milk flow forecast	58



1.0 Background


The principal objective of the assignment is the development of the overall business and investment plan for the Koufuku International Ltd. that will guide CARLEP in making viable investment priorities to the Processing Plant that serves as an assured market for fresh milk produced by the smallholder farmers in the eastern region.

1.1 Introduction

Koufuku International Private Ltd. (KIPL) is the first company that was established after the formation of DHI as one of its portfolios of companies among the dairy sector. It was founded as a joint venture between DHI and its Japanese partner, the Shin Nippon Biotech Laboratories (SNBL) in 2012 and started its operations in 2015. The company was initially founded with SNBL holding 70% of the shares and DHI the rest 30% in the company as a minority shareholder. However, the company ownership pattern changed in the beginning of 2017 with DHI becoming the major shareholder of the company owning 80% of its shares while SNB, Japan owned 20%. In 2020, the Company was further restructured with free transfer of shares from SNBL to DHI. The company's name was changed to Koufuku International Limited (KIL) and registered under the company Act of the Kingdom of Bhutan 2016.

The company was established at Chenary, Tashigang to provide market for the milk produced by the farmers in Tashigang and adjoining Dzongkhags by producing high end processed dairy products mainly Gouda Cheese for both export and domestic markets. The company was initially producing only Gouda cheese and most of what it produced was exported to Japan. However, with the market challenges for Gouda cheese in Japan, from 2017, the company shifted to domestic markets with product diversification for various products such as natural Gouda cheese, fermented cheese, Chugu (dried cheese), premium drinking yoghurt, stirred yoghurt, fruit flavored yoghurt, pasteurized & non-pasteurized butter. In 2019, Koufuku International Limited (KIL) also started manufacturing processed cheese from natural Gouda as main component of ingredients with the recruitment of consultants from India. The company produced processed cheese under flagship brand of "Druk Zambala Cheese".

When it started its operations, the company was operating at less than 12 % of its plant utilization capacity and today it is operating at over 90% plant utilization capacity. The plant at Chenary is collecting about 3600 litres milk a day from 19 milk cooperatives composed of 1500 micro-farms spread across Tashigang, Samdrup Jongkhar, Mongar and Trashiyangtse districts. The KIL processing plant at Chenary currently produces approximately 203 metric tons of Druk Zambala Cheese, 500,000 cups of stirred Swiss style yogurts, 6 metric tons of local cheese, 30,000 litres of drinking yogurt, 6 tons of salted and non-salted butter and 20,000 litres of whey health drink. KIL is



steadily expanding its business to reach out to more dairy cooperatives & groups covering more Gewogs and communities under six eastern dzongkhags providing milk market opportunities to unreached communities, while creating value for farmer's milk and searching for growth.

KIL recorded increased in milk supply in 2022, an increase of more than 60% compared to preceding year. KIL gained market share of 8.5% in 2021 substituting processed cheese import. KIL recorded growth in between 2019 to 2021 of 94.2 %, signifying consumer confidence gained to its products. There is immense market opportunity for the Koufuku to take advantage of domestic markets through instituting vertical coordination among the stakeholders to facilitate increased milk supplies to the plant. This also indicates a promising future for the dairy industries, sustainable rural livelihoods opportunities for the dairying communities, and also pathways for poverty reduction strategy for the marginal famers.

KIL targets to collect more than 4000 litres of milk daily from the region and produce more than 260 MT of processed cheese annually from 2023-2028 to reach domestic cheese self-sufficiency to 65% and above within 5 years period. To cope up with the plan targets and domestic market demands, KIL will need to expand and upgrade its technology to automatic cheese production line as well as for yoghurt production in order to enhance production efficiency, ensure food safety, reduce cost of production and improve business efficiency.

KIL serves as the center of milk dairy value chain in Eastern Bhutan providing ready market for the farmers' milk in the six eastern dzongkhags and accessing 40% of the total milk production in the country.

With huge market challenges, the company had to adopt various entry and sustenance strategies that are critical in the process of navigating the market place. Although the Chenagri Dairy Plant was only designed for Gouda cheese production, with minimal dairy equipment (cheese cooker and semi manual operated cheese filling machine), the company had to shift to production of processed cheese technology with semi-manual operation, which is still continued despite lots of regulatory concerns, business issues, and production challenges. The expansion project is aspiring to enhance production efficiency, reduce cost of production, and enhance food safety and hygiene, then to achieve economies of scale through upgraded production technologies.

1.2 Objective

The principal objective of the assignment is the development of the overall business and investment plan for the Koufuku International Ltd. that will guide CARLEP in making viable

investment priorities to the Processing Plant that serves as an assured market for fresh milk produced by the smallholder farmers in the eastern region.

1.3 Methodology

The study process involved looking from different perspectives such as through document reviews, detailed field survey, one-to-one consultations and interviews. Number of consultations were conducted with the relevant stakeholders such as KIL, Livestock Research Development Centre at Bumthang, Livestock Research Development Centre at Yusipang etc. The field consultations included consumers, retailers/whole sellers, exporters/importers, farmer's groups or cooperatives etc. Prior to field consultations, the overall methodology of the study along with the possible list of stakeholders and survey questions were highlighted in the inception report which was circulated to the members. In addition to the one-to-one field consultations, detailed survey was conducted to get the views of the beneficiaries or stakeholders within the limited time available for the study to understand the situation, issues and challenges including strategic areas of interventions required for the KIL. Then, based on the findings from the survey, Focus Group Discussions and interviews along with detailed literature reviews were conducted for business interventions.

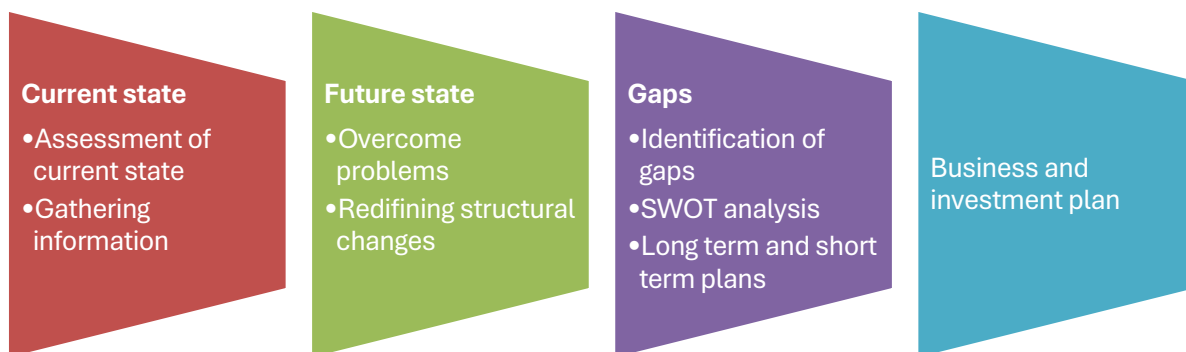


Fig 1: Methodology Framework

The methodology has been implemented through review of relevant documents, past study reports and consultation with key stakeholders as follows.

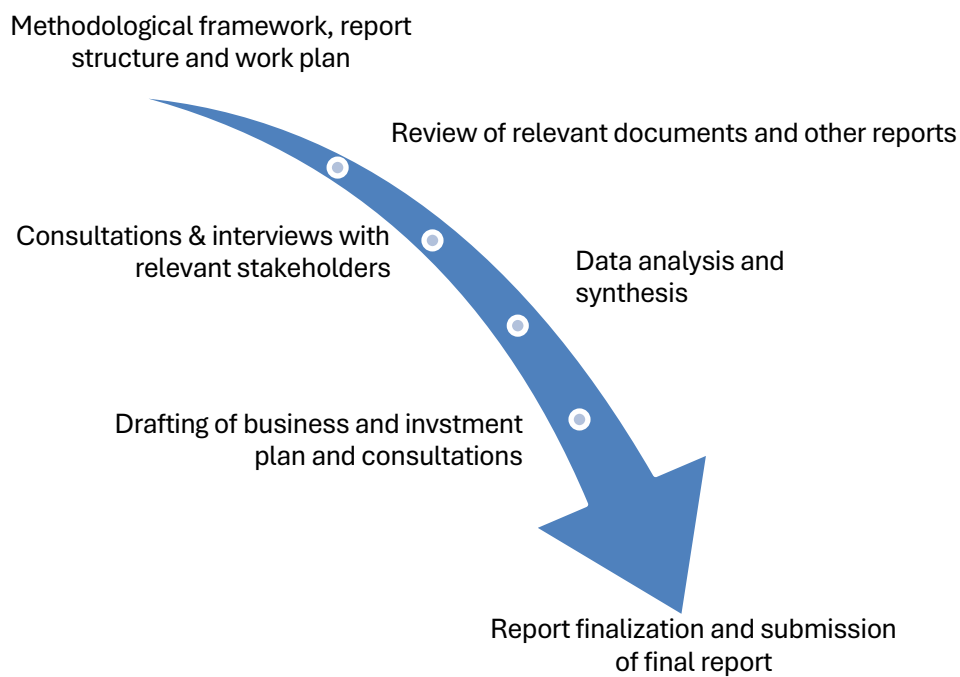


Fig 2: Overall process involved in the study

1.4 Vision, Mission, Core Values and Mandates

Vision: “To be the best customer-brand dairy company, reaching our products in every Bhutanese home, sustainably produced in support of the enhancement of rural livelihoods in Bhutan, with sustainable growth and value for all stakeholders”

Mission: The KIL is committed to serve the customers through creation of value for money providing the highest level of quality dairy products, services, and innovations.

Core values

Customer focus and people centred	We aim to ensure that our customers and consumers are satisfied at all times. We value our employees and other stakeholders as partners of our business and delight in seeing them succeed. We are committed to a long-term relationship guided by respect and compassion, and governed by fairness and accountability.
Accountability	We are in charge of what we do and are accountable for all activities
Integrity	KIL’s core values are firmly in place so that we can make our vision a reality. We make sure to make our decisions based on our company vision. We endeavor to create a positive, lasting social impact by engaging the communities we operate in as part of our value chain so that we mutually flourish.

Team work	As change is the only constant in life, we will not be satisfied with the status quo. We value the constant, passionate pursuit of creative solutions to improve the way we do things.
Excellence	Ensure excellence in service delivery as well as in professionalism

Mandates:

As per the articles of incorporation of the company, following are the mandates:

- a) To construct, complete and operate the dairy plants in Bhutan.
- b) To carry on the business of manufacturing, processing, packing, buying, selling, importing, exporting, transporting, distributing, dealing and acting as authorized agents for all types of dairy and dairy related products of any description.
- c) To acquire, operate and maintain farm, breed cattle or any other raw materials connected with the manufacture of dairy and other products, or value added products of the dairy.
- d) To build, acquire, merge, and amalgamate with other dairy plants or companies; and to upgrade, refurbish and increase the capacity of existing plant.
- e) To manufacture other products in the value chain such as packing bottles and to operate those venture also on commercial basis by selling the products and its related products within or outside Bhutan.
- f) To conduct technical feasibility studies, and detailed project reports for projects in dairy and other related fields.
- g) To diversify into related fields.
- h) Develop human resource capacity in development, construction, operation, maintenance and management of dairy and dairy related fields.
- i) Do all such other things as directed by the shareholder of the company or which may be necessary to attain the other above objects of the company

2.0 Overview of dairy production in Bhutan

Dairy farming plays an integral role and is an indispensable part of the agricultural production system in Bhutan. With an enabling policy support provided by the government to accelerate dairy development in the country, the dairy sector has made major advances in adoption of improved farming practices and rearing high yielding animals.

The annual milk production, butter and cheese increased to 57,546 MT, 2126 MT and 4,090.5 MT respectively in 2019 from 29,625 MT, 1,207.5 MT and 2,300.4 MT in 2012, an increase of 94%,

76% and 78 % respectively¹. Dairy farming in Bhutan is a smallholder system with operations at individual household level². The government undertook important development interventions towards a sustainable rural development by mobilizing smallholder dairy farmers into groups. This was intended to transform subsistence farming into more market led operation through collective action. Farmers' group development formally started in the country after enactment of the Cooperatives (amendment) Act of Bhutan 2009. However, as per the livestock census of 2022, the dairy production was 42,255 MT of milk (23% down); 1,508 MT butter (22% down); 2,382 MT cheese (24% down) and about 130 MT chugo (34% down) compared to 2021. The figure below shows the share of milk dairy production by dzongkhag in 2022 where Trashigang Dzongkhag produced the highest milk, butter and cheese during the same year.

Currently, there are about 242 Dairy Farmers' Groups (DFGs) and Dairy Farmers' Cooperatives (DFCs) as of June 2020 with 6,498 members spread across the country³. With the institutionalization of groups and cooperatives, the farmers were more organized to produce marketable volumes of dairy products. The distribution of DFGs and DFCs was recorded highest in the eastern region followed by western, west central and east central.

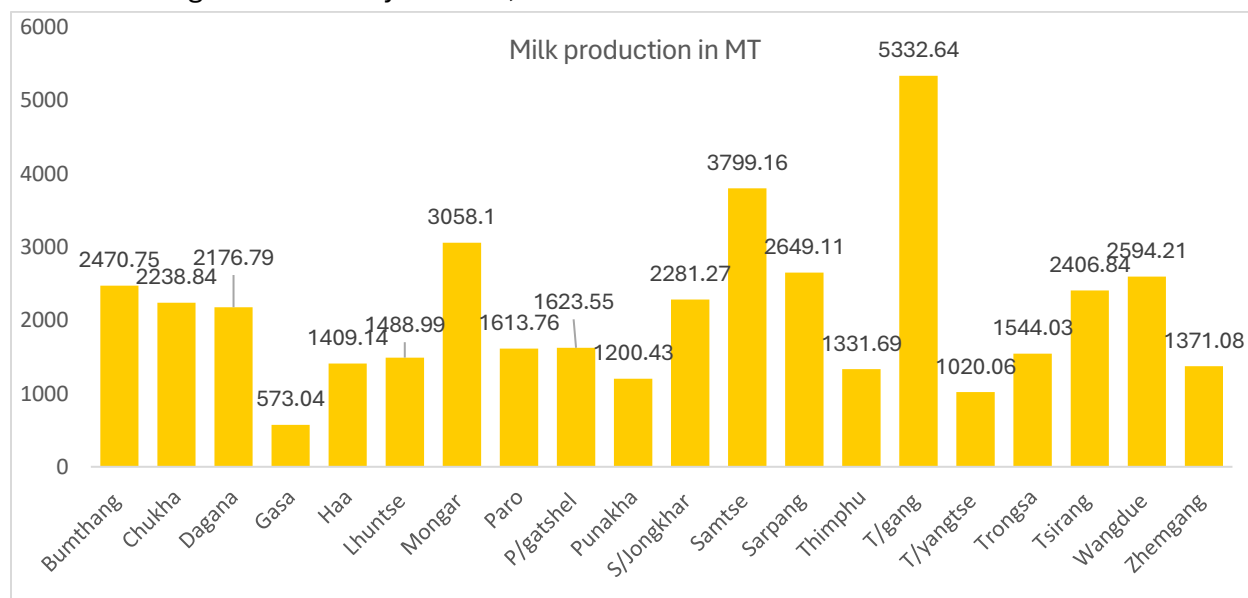


Fig 3: Overall milk production in the country in 2022 (Source: Livestock census 2022)

Members supply raw milk to respective Milk Collection Centers (MCCs) which is then transported to Milk Processing Units (MPUs) and processed into products and some portions are sold as pasteurized milk. Unsold milk is converted into products primarily butter and cheese and marketed.

¹ As per DOL statistics 2019

² Dendup et al. 2018

³ DAMC 2014; NDRDC 2019

In 2019-2020, average Farm Gate Price (FGP) paid to the members of DFGs and DFCs per litre of milk was Nu 36.85. Then the average sale price was Nu.45.54 per litre where the members were earning a profit margin of Nu 10 per litre of milk against the cost of milk production of Nu. 26.85 indicating DFGs and DFCs are profitable⁴. Nonetheless, the prices of milk in the open market were much higher as high as Nu. 70 per litre in some urban centres in 2020. The average FGP per kg of butter and cottage cheese were Nu. 316.99 and Nu. 269.28, while the average rate for butter and cheese at the market were Nu. 333.07 and 292.83 per kg respectively. These findings indicate that the members were earning good income by participating in DFGs and DFCs. It also suggests that the volume of milk that is traded via various intermediaries determines the number of jobs created, the higher the volume of milk, the higher the number of employments created. Hence, increasing the quantities of milk turnover by the DFGs and DFCs has the potential to create more employment opportunities in rural areas with potential to help to alleviate poverty and mitigate rural-urban migration.

3.0 Export and import substitution

Bhutan imported more than 2 billion Ngultrum worth of processed dairy products in 2022. Among all dairy products, Processed Cheese (Britannia & Amul, Go) brands constitute one of the highest import values at an average of Nu. 0.5 billion annually. There are also immense opportunities for UHT milk products including packaged toned milks, yogurts with extended shelf life, butter and nutritional health dairy products.


	Quantity (KGM)	Value (million Nu.)
Butter and related products	389.98	161.288
Cheese and related products	1,456.77	686.493
Milk and related products	130.074	1340.505
Total	1976.824	2188.286

Table 1: Import of dairy products in 2022
Source: Bhutan Trade Statistics, DRC, MoF, Bhutan

In 2022, the domestic milk production was 42,255 MT, butter 1,508 MT, cheese 2,382 MT and 130 MT chugo which was not adequate for the domestic demand. Thus, additional dairy related products worth of 2.188 billion was imported during the same year.

While India has large and well-developed dairy industry particularly the processed milk products, there are pockets of opportunities for KIL as shortages of specific products are felt in nearby local

⁴ Choden et al. (2021)



markets that the large companies in India are not able to reach at the moment. Currently, there is severe shortage of fresh milk, curd and ghee in the local Indian markets. Samdrup Jongkhar group cooperatives alone exports 1500 to 2000 litres of fresh milk to nearby towns in Daranga & Mela bazaar India. Therefore, with added milk, KIL can in near future market its products to major Indian cities through well-established market links.

KIL already has experience in international markets such as export of Gouda cheese to Japan and Yoghurts to India. Taking the strength of its experience, the KIL can explore international markets for its exotic products of high value targeting niche markets in the long run. While the quantities of export will not be in tons, KIL can focus on producing and supplying high end exotic cheese products targeting niche markets abroad. KIL can partner with local marketing and importing agents to penetrate the markets in other countries as well.

4.0 Company overview

KIL started its manufacturing operations since 2015 and commenced cheese processing in April, 2019. The company produces processed cheese with natural “gouda” as main ingredient under the brand name of “Druk Zambala Cheese”. The company also produces a wide variety of dairy products such as natural Gouda cheese, premium drinking yoghurt, stirred yoghurt, fruit flavored yoghurt, pasteurized & non-pasteurized butter. In 2012, KIL was founded as a FDI joint venture between DHI in Bhutan and Japanese partner, the Shin Nippon Biotech Laboratories (SNBL) with shareholding of 30:70. In 2017, the company shareholding changed, with DHI becoming the major shareholder in partner with SNBL and Sanyo Unyu, Japan with the shareholding of 80:14.99:5.01 respectively.

In February 2020, the company was further restructured with free transfer of shares from SNBL with 14.99% and Sano Unyu with 5.01% to DHI. In 2017, KIL became the first dairy company in Bhutan to be certified to ISO standard. Today, the company works with 19 milk Cooperatives & Groups covering 884 micro-farms or households under 3 districts of Tashigang, Mongar, and Samdrup Jongkhar delivering 1800 to 2000 litres of milk per day to the Dairy Plant.

The authorized share capital of the company is Nu. 300,000,000 (300,000 equity shares@Nu.100 each). The issued share capital is Nu.89,130,200 (891,302@Nu.100 each). The land occupied by the plant was leased from the government covering 4.2 acres with an agreement to pay Nu.18,295.20 per annum for a period of 30 years.

The company is governed by 5 board members including a chairman and the Chief Executive Officer of KIL and supported by about 29 people working in the company as shown below.

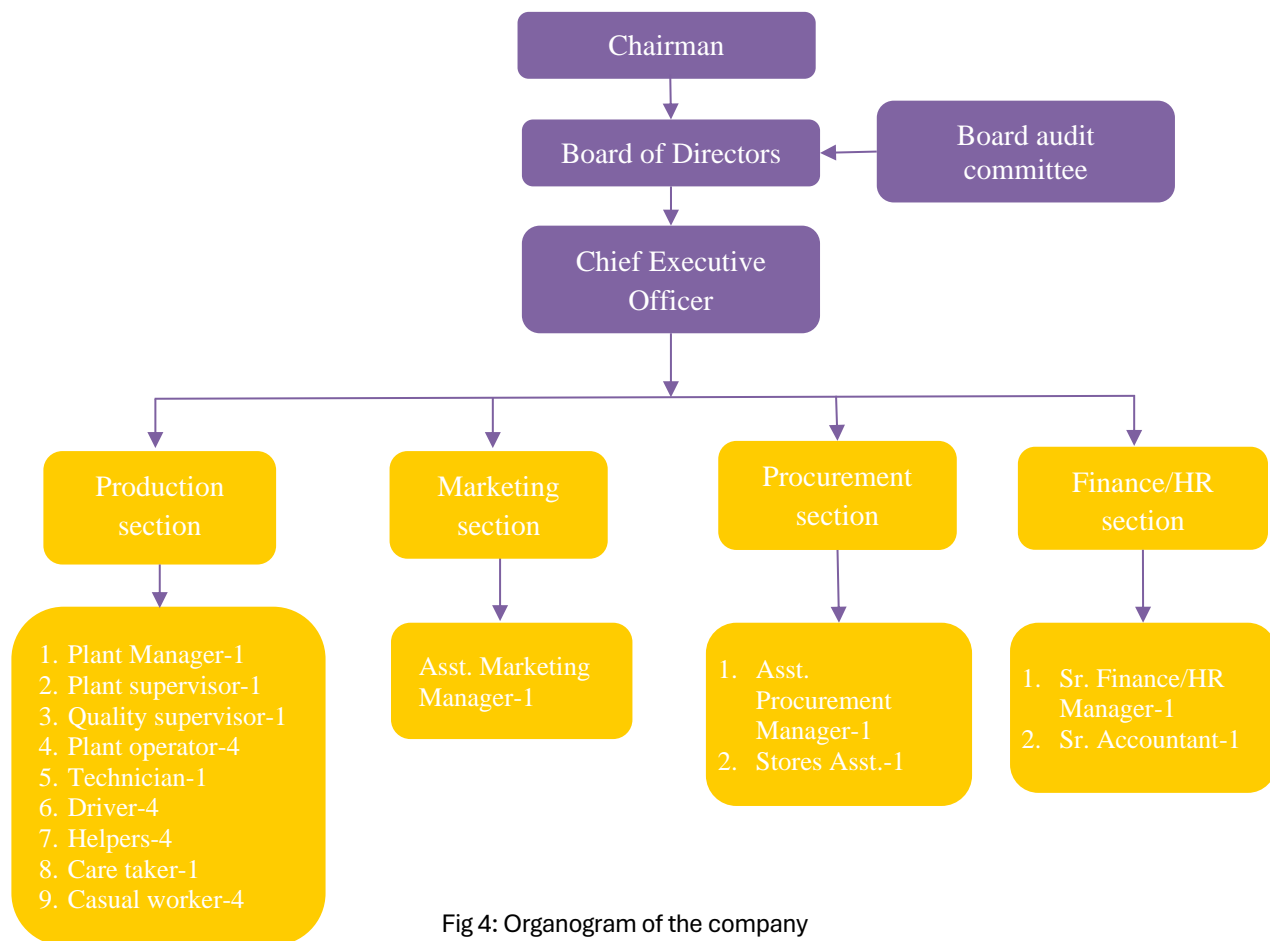


Fig 4: Organogram of the company

Sl.#	Manpower details	Nos
1	Chief Executive Officer	1
2	Finance/HR Manager	1
3	Marketing Manager	1
4	Procurement Manager	1
5	Plant Supervisor	1
6	Accountant	1
7	Store Assistant	1
8	Sales Executive	1
9	Quality Supervisor	1
10	Technician	1
11	Operator	4
12	Helper	4
13	Driver	4
14	Care taker	1
15	Casual worker	5
	Total	29

Table 2: Manpower list

5.0 Role of KIL in Dairy value chain

KIL plays a significant role in the dairy value chain especially in the eastern parts of Bhutan such as Trashigang and Monger. About 9 semi-commercial dairy farmers groups comprising of 900 households in Trashigang supply milk to KIL. The factory collects more than 1,700 litres per day from the three gewogs of Trashigang and spends about Nu 3.2 million monthly to purchase milk from these farmers. KIL pumps in about Nu 30,000 daily into the local economy which directly benefits the dairy farmers. KIL has directly benefited the local farmers and empowered the rural economy. It also encouraged farmers to expand their dairy farms and produce more ultimately boosting the local economy⁵.

In 2023, KIL facilitated dairy farmers in earning Nu. 40.98 million from milk sales which is an increase from Nu. 37.93 million in 2022. In addition to that, another income of Nu. 3.84 million was generated by engaging vehicles owned by the farmers/dairy groups in collecting milk from the collection points. Since its operation in 2015, KIL has played a pivotal role in enabling farmers to generate income through the sale of milk especially to 16 grassroots community/dairy groups comprising of 1004 households in Trashigang, Trashiyangtse, Mongar, and Samdrupjongkhar Dzongkhags. The company also provides employment to about 8 milk collectors/transporters who are deployed to collect and transport milk from the farmers.



Fig 5: Processing of milk in KIL

6.0 KIL Performance

KIL was able to bring back its limelight in 2023 with a profit of Nu.1.77 million from earlier years. The improved performance was mainly due to increased in inflow of milk where the company was

⁵ Kuensel report, 12th September 2023

able to procure about 1,108 MT in 2023 compared to 1,061 MT in 2022 with impressive growth of 4.43%. This increase not only indicates an expansion in operational capacity but also highlights the growing trust and active participation of all stakeholders in the dairy ecosystem.

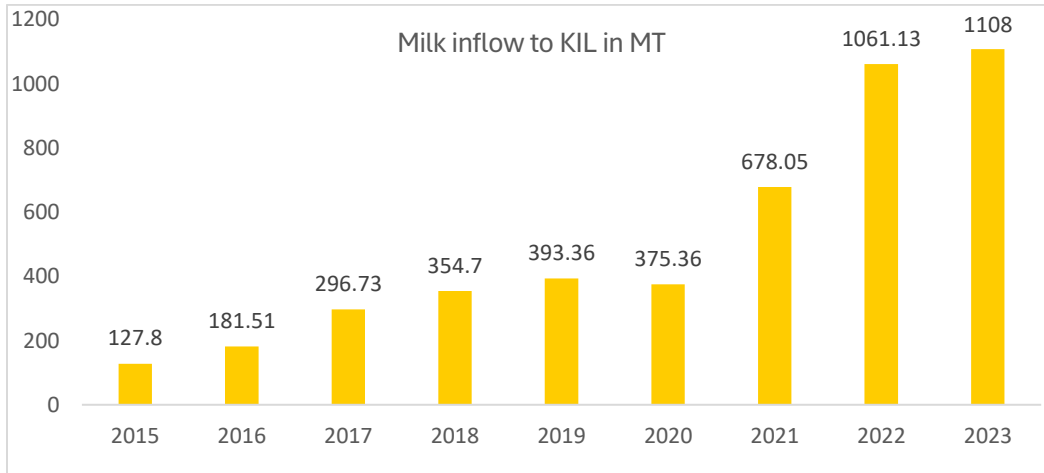


Fig 6: Milk flow to KIL

The production of processed Zambala cheese experienced a notable increase from 160.4 MT in 2022 to 203.74 MT in 2023 with remarkable increase of 27%. It also represents KIL's pivotal role in import substitution of processed cheese in the country. KIL was able to secure at least a 14% share of the total market for processed cheese in the country. The plant capacity is 4000 litres but currently, it receives about 3000 litres of milk and produce about 85 wheels of Gouda Cheese, 588 blocks (930g each) of normal processed cheese, 336 blocks (420g each) normal processed cheese, 88 blocks (930g) of cover processed cheese on daily basis.

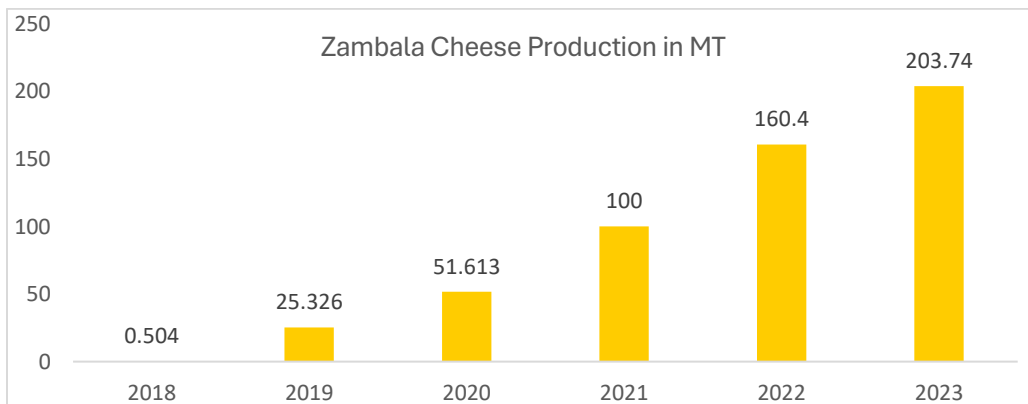


Fig 7: Zambala Cheese Production in KIL

In 2023, the company achieved a turnover of Nu.101.03 million, marking a significant increase from Nu.84.51 million in 2022, an impressive growth of 19.54%. The achievement was attributed due to increase in sale of Zambala processed cheese contributing to more than 95% of the revenue and

remaining 5% attributed by other products such as yogurt, butter and cottage cheese. The revenue trend since the establishment of the company in 2015 is illustrated in the figure below.

In 2023, corresponding expenditure of Nu. 97.81 million was incurred showing an increase of 2.17% from Nu. 95.73 million in 2022. This increase was due to the rise in raw material consumption, particularly in the case of milk and other ingredients. At the same time, Profit after Tax (PAT) has also increased to Nu. 1.77 million from a substantial loss of Nu. 11.85 million in 2022. This achievement was primarily attributed due to enhanced operational efficiency resulting from the rigorous implementation of cost-cutting measures and optimization. This stands in stark contrast to the substantial loss of Nu. 11.85 million incurred in 2022.

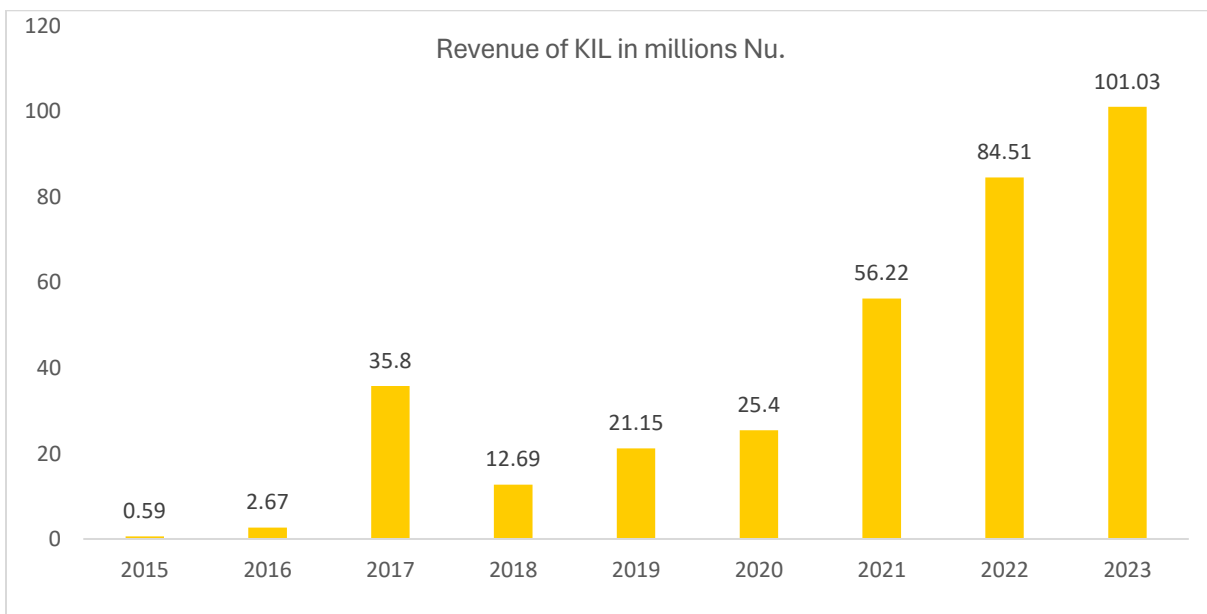


Fig 8: Revenue of KIL (million Nu.)

7.0 SWOT Analysis

SWOT analysis is a strategic planning tool that determines the agency's strengths, weaknesses, opportunities, and threats. Strengths and weaknesses are internal factor of the agency where it has its control whereas; opportunities and threats are external environment where the agency cannot control. Strengths of the agency are all about the area where it works well and has certain advantages. Similarly, weaknesses are about the area where agency's performance is weak and need a special attention. In addition, external factor threats refer to those factors that might harm or has negative effect on the operation of the agency (shown below).



Strengths	Weaknesses
<p>Governance, structures, systems, policies</p> <ul style="list-style-type: none"> a) Strong support from stakeholders especially farmers’ groups or cooperatives and others. b) Technical backstopping support from Department of Livestock, Research Centres and other partners c) Presence of basic production, processing and other infrastructure in place. d) Strong political will and support to promote domestic production and strengthen economic growth e) Only dairy processing plant with portfolio under DHI and ISO certified company f) Experience of exporting dairy products to international markets (Gouda cheese to Japan market) g) Well established collaboration with the farmers for supply of milk h) Conveniently located within the eastern region with feasible prospects for milk collection from all nearby districts along with good road network. <p>Human Resources</p> <p>Trained and experienced staff along with capacity development support from DHI</p> <p>Financial/Economic</p> <ul style="list-style-type: none"> a) Improved financial performance of KIL and commitment for financial sustainability 	<p>Governance, structures, systems, policies</p> <ul style="list-style-type: none"> a) Lack of input subsidies or price subsidies to achieve self-reliance and to generate employment in dairy sector. b) Limited space for smooth flow of material, storage facilities, air-conditioning, drainage etc. c) Lack of facilities for product quality control and facilities to meet food processing standard requirements. d) Lack of spare parts for the equipment or machines <p>Human Resources</p> <ul style="list-style-type: none"> a) No experts with specialised skills such as dairy technologist, quality analyst, research and product development, dairy equipment servicing engineers etc. b) Less investment in technology and HR capacity development. c) Limited technically qualified personnel along with industrial practical experience. d) No backstopping services for machinery maintenance and spares since the technology in place were outdated and sourced from Europe and elsewhere. e) Inadequate officials, quality control monitoring among others. f) Inadequate HR development strategies, performance management system or succession planning <p>Financial/Economic</p>

<p>b) Sound internal control system in place</p> <p>Dairy Development</p> <p>a) Milk production increasing over the years and many farmers are taking initiatives in dairy farming.</p> <p>b) KIL is important part of dairy value chain as per the focus of CARLEP</p> <p>c) Good number of dairy cooperatives or groups supplying milk to KIL</p> <p>Markets</p> <p>a) Whole sellers coming to KIL and taking the dairy products by themselves to the retailers.</p> <p>b) Very stable market for dairy products where demand overshoots production particularly for Druk Zambala cheese.</p> <p>c) Yogurt market for School feeding is growing steadily.</p>	<p>a) High cost of raw materials & production costs in general as compared to those in the neighbouring countries.</p> <p>b) Limited financial resources for investments in production technology machineries to achieve high production efficiency.</p> <p>Dairy Development</p> <p>a) Substantial seasonal fluctuation in milk production leading to lowering the plant utilization capacity.</p> <p>b) The haphazard distribution of dairy farmers makes it difficult for efficient milk collection and achieve economies of scale.</p> <p>Markets</p> <p>a) Company constrained with financial resources and hardly invested in marketing advertisement</p> <p>b) Relatively small domestic market and huge external import of dairy products pose strong competition.</p>
<p style="text-align: center;">Opportunities</p> <p>Governance, structures, systems, policies</p> <p>a) Opportunity to maximize synergies between KIL, Department of Livestock and other agencies</p> <p>b) Opportunity to access grant support for technology transfer</p> <p>c) Possible PPP model operation for KIL under DHI with Dairy Farmers</p> <p>d) Cooperatives ready to ensure adequate primary raw milk supply.</p> <p>Human Resource</p> <p>a) Young employees who have undergone short courses in specific</p>	<p style="text-align: center;">Threats</p> <p>Governance, structures, systems, policies</p> <p>a) Availability of imported dairy products in the domestic market impacts domestically produced dairy products</p> <p>b) Changes in government decision or policy on livestock or dairy products</p> <p>Human Resource</p> <p>a) Experienced employees leaving the company for other opportunities</p> <p>b) Lack of succession planning for different positions will be a threat</p> <p>Financial/Economic</p>

<p>product specialization and professional development which is advantage for KIL to retain expertise</p> <p>b) Being under DHI has advantage to attract qualified professionals for its growth.</p> <p>Financial/Economic</p> <p>a) Opportunity to access financial resources from DHI and financial institutions for investment.</p> <p>b) Institutional collaboration with CARLEP project (IFAD) for financial assistance for expansion and upgradation of KIL including dairy value chain development</p> <p>Dairy Development</p> <p>a) Opportunity for expansion and growth in other regions as KIL is steadily gaining people’s trust and popularity of its products in the market.</p> <p>b) Focus on import substitution of dairy products being organic in nature.</p> <p>Market</p> <p>a) International and regional market is steadily increasing for organic and natural products from Bhutan.</p> <p>b) Government’s focus on nutrition for children and school feeding program</p>	<p>Limited support for infrastructure expansion and diversification of products</p> <p>Dairy Development</p> <p>a) Climate change is impacting water source scarcity which has direct bearing on milk production.</p> <p>b) Shortage of feed & fodder in lean seasons impacts negatively in milk production.</p> <p>c) Pasture & fodder is a challenge and one of the bottlenecks for livestock development.</p> <p>d) If there is sudden increase in demand of milk from other parties with better price than KIL, then milk supply will be diverted from KIL</p> <p>Markets</p> <p>a) Cheap dairy imported products pose stiff market competition</p> <p>b) Competition from private firms who are into same business could be a market threat</p> <p>c) Government support to farmers’ cooperatives and youths enterprises in the production of similar products give more challenges for market competition.</p>
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8.0 Potential milk supply

As per the field survey (details provided in separate report) conducted in 6 Dzongkhags of eastern Bhutan, it was found that on average, each household produces 10.51 litres of milk per day, out of which about 6.19 litres were sold. This indicates that about 76.64% of the milk produced were sold

and 23.36% are retained for self-consumption or processing of milk products in the household. The highest daily production from each household is from Samdrupjongkhar with 15.14 litres followed by Pemagatshel with 11.44 litres per day. If we take number of households from each of the districts and calculate the total daily average production, it come to 362 thousand litres, which means in a month, there will be production of about 10,860 thousand litres of milk.

Dzongkhag	Household average daily milk production (ltr.)	Total households	Average daily production of milk (ltr.)
Lhuntse	3.43	3111	10670.73
Mongar	7.57	8640	65404.80
Pemagatshel	11.44	6075	69498.00
Samdrup Jongkhar	15.14	8053	121922.42
Trashi Yangtse	5.45	3982	21701.90
Trashigang	6.83	10720	73217.60
Total			362,415.45

Table 3: Average household daily milk production

The Bhutan Agriculture and Livestock Census 2022 provides detailed insights into yearly dairy production across several key Dzongkhags in eastern Bhutan, namely Pema Gatshel, Samdrup Jongkhar, Trashigang, Trashiyangtse, Mongar, and Lhuntse. These districts are of interest for milk collection by Koufuko International Limited. Trashigang, for instance, leads in milk production with 5,332,639 litres. Similarly, Samdrup Jongkhar and Mongar also play important roles, producing 2,281,269 litres and 3,058,103 litres of milk respectively. Pema Gatshel, Trashiyangtse, and Lhuntse contribute with their own unique production patterns, reflecting 1,623,552 litres, 1,020,060 litres, 1,488,994 litres respectively. This also provides potential to supply milk to KIL with production of 14,804 thousand litres in 2022 from the 6 eastern Dzongkhags.

Dzongkhag	Milk (Litre)	Butter (Kg)	Cheese (Kg)
Lhuentse	1,488,994	69,914	125,128
Mongar	3,058,103	112,821	202,169
Pema Gatshel	1,623,552	62,874	104,861
Samdrup Jongkhar	2,281,269	56,490	128,251
Trashi Yangtse	1,020,060	44,309	83,150
Trashigang	5,332,639	232,196	341,219
Total	14,804,617	578,604	984,778

Table 4: Annual production of livestock products

Source: Annual Livestock Census 2022, NSB.

9.0 Milk supply from producers

The average rate of milk per litre varies across 6 different dzongkhags, Samdrup Jongkhar has the highest average milk rate at Nu. 41.43, followed by Trashigang at Nu. 39.73, Trashi Yangtse at Nu. 39.67, Pemagatshel at Nu. 39.22 and Mongar at Nu. 37.21, while Lhuntse has the lowest at Nu. 32.5 per litre. So the average rate of milk sold by the farmers comes to about Nu.39 per litre.

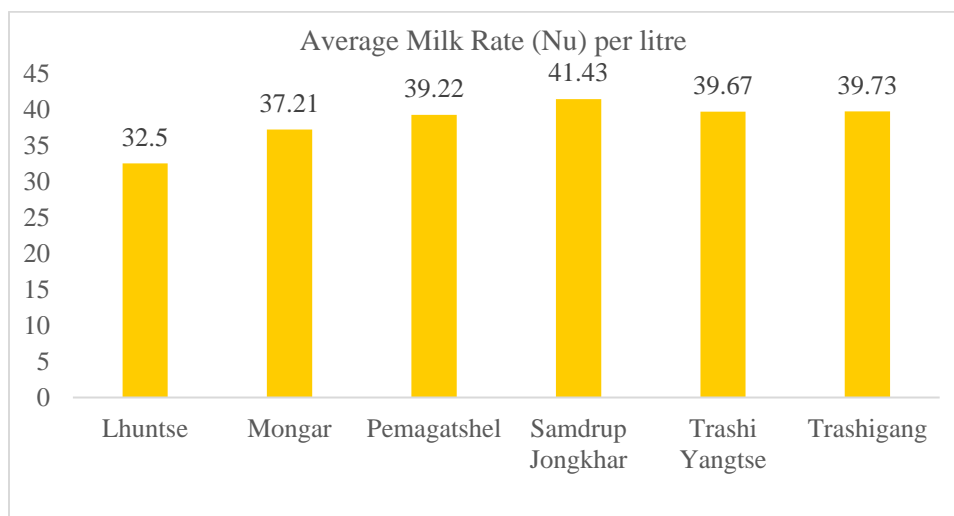


Fig.9: Average rate of milk by Dzongkhag

In Monger, people supply milk at Nu.38 per litre and each of the households supplies about 3 to 15 litres of milk per day by each household. In Samdrupjongkhar, they sell in between Nu.35 to Nu.55 per litre and supplies about 5 to 18 litres per day by each household. In the case of Trashiyangtse, they sell around 3 to 20 litres per day by some of the household at Nu. 38 per litre. Similarly, people from Trashigang supplies around 5 to 25 litres of milk per day by some of the households at Nu.38 per litre. In the case of Bumthang Swiss Cheese, they buy milk from the farmers at Nu.52 per litre at the moment and every year, they increase the rate by Nu.1 based on the market situation. Bumthang Swiss Cheese has been into operation for over 2 decades and the business is still continuing with proper relationship among the farmers who supply milk to the processing plant.

In terms of annual income generated from the sale of milk and its products, Mongar has the highest number of farmers who are making good income followed by Trashigang and Trashiyangtse. Most of them earn in between Nu.10,000 to 60,000 per year and in some cases, it goes beyond Nu.300,000 as in the case of Mongar, Trashigang and Pemagatshel as shown below.

Farmers distribute milk to various destinations but majority are directed towards milk collection centres constituting about 25% of the total distribution. Milk cooperatives receive about 8% of the supply, villagers or communities receive around 20%. On the other hand, KIL receives about 13%

of the milk collection, local markets receive around 3%, institutions like offices, schools and dratshangs receive about 10%. However, about 18% of them do not supply milk to anyone except for self-consumption.

While delivering the milk to the collection centre, most come by walk as indicated by 80%, around 15% use vehicles such as Bolero or other cars which cost them from Nu. 10,000 to Nu. 45,000 per month. On the other hand, about 70% use free transportation either facilitated by community or arrangement from institutions like KIL.

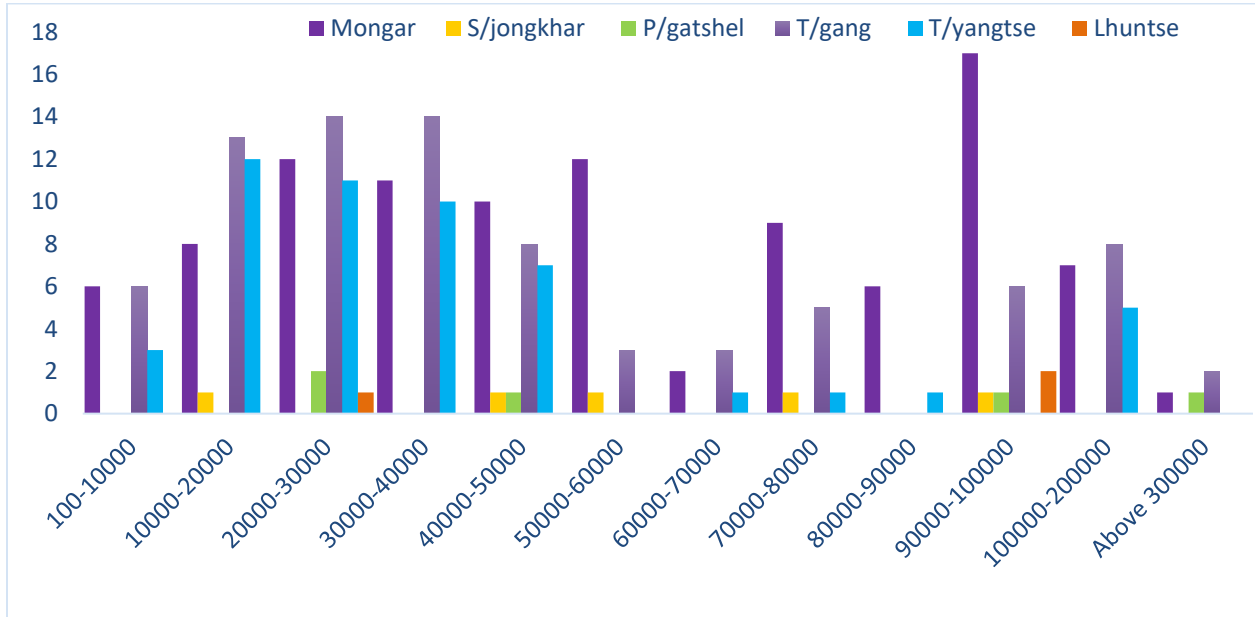


Fig.10: Annual income from sale of milk and its products

Although, there is not much of an issue during transportation of milk but about 15% highlighted

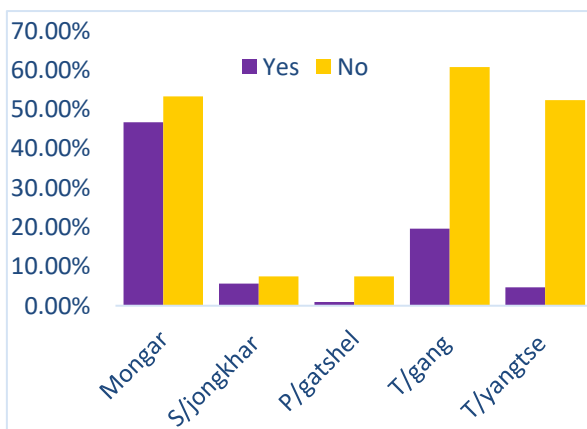


Fig.11: Supply of milk to KIL/collection centre

problems due to bad weather conditions which delays in reaching the milk to the collection centre. About 5% noted challenges related to facilities such as inadequate containers for transporting of milk safely, lack of refrigerator or chillers. Further, to maintain the quality of the milk, majority of them do keep milk in the refrigerator and in the milk jars while others do not take any measures rather takes directly to the collection centre.

Some farmers are not able to supply milk to KIL or to the milk collection centre due to longer distance from the village, selling milk to the nearby markets, low milk production, low rate of milk

offered by KIL, difficult to supply during the off season, not able to meet the demand within the locality or community, non-availability of milk collection from KIL in most of the areas.

In terms of milk quality issues while delivering to the milk collection centre or in the processing plant, majority of the farmers do not have any issues. However, few of them do face milk quality issues mainly due to the following:

- a) Milk collector not arriving on right time and problems of transporting milk to the collection centre deteriorates the milk quality.
- b) Milk being kept overnight from the morning hours due to shortage of chiller or due to transportation problem.
- c) Sometimes, there are road blocks which forces farmers to carry milk by themselves and delays in reaching to the collection centre on time.
- d) In some cases, the collection centre is far from the village and it is not possible to deliver milk on time to the collection point.

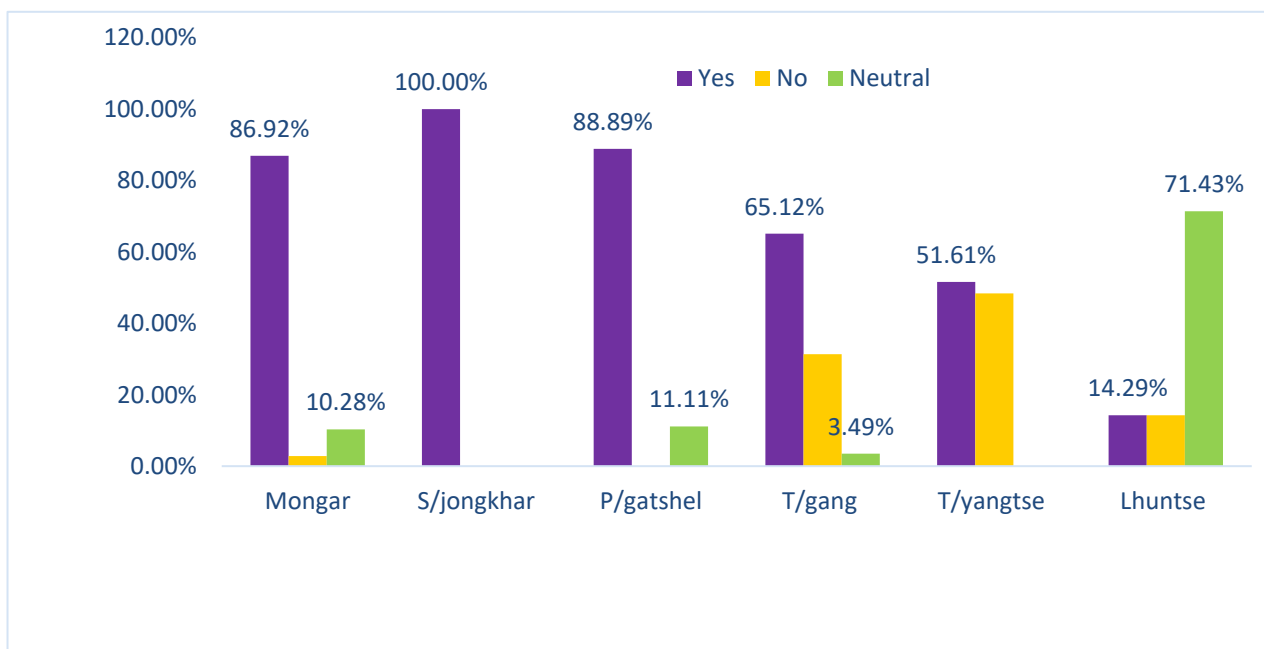



Fig.12: Continuous supply of milk

Despite the challenges, majority agrees to continuously supply milk over the years. In the case of Trashiyangtse, more than 50% are willing to supply while 50% are not. The people of Lhuntse are uncertain as 70% have indicated neutral. Those who are not willing to supply milk are because of the following:

- 
- a) There are issues like cattle only produce milk when they gave birth, then after few years, the milk production gets reduced and stops.
 - b) Sometimes when cattle gets caught with diseases then the production of milk is less and sometimes there isn't any milk production.
 - c) During winter the cattle produces less milk compared to summer due to less feeds.
 - d) Raising of more cattle require more time as it involves lot of work. Further, people are not able to make much profit by selling milk and its products, rather it is worth to carry out farming activities which can earn good amount by selling the farm produce.
 - e) In certain areas, they do not have milk collection centres and is not convenient to sale milk.

In order to bring about efficiency in milk supply, there is need to undertake the following:

- a) **Rate increase:** About 35% of respondents expressed a desire for higher rate for milk supply. This indicates that the current rates are perceived to be low as compared to supplying milk to elsewhere.
- b) **Timeliness:** 25% of respondents suggested collectors to arrive on time for milk collection and to ensure timely payment.
- c) **Quality and facility improvements:** 15% have mentioned about the need for improvements in milk quality which requires facilities like refrigerators at milk collection centres, and even the provision of high-quality cows.
- d) **Communication and engagement:** 20% have suggested for better communication and engagement between farmers and milk collectors. This includes listening to farmer's concerns, setting fixed collection time and maintaining transparent communication about the milk quality and payment.
- e) **Infrastructure development:** About 10% have mentioned the need for infrastructure development such as proper milk houses or centres nearer to their villages. This would reduce transportation challenges and improve overall operational efficiency.

10.0 Dairy cooperatives or groups

Several dairy milk cooperatives or groups were interviewed in six eastern districts. It was found that they collect fresh milk ranging from 20 litres to 800 litres per day. Mostly, they sale fresh milk and also produce products ranging from yogurt, paneer, butter and cheese. They are able to sale milk on an average of 60 to 500 litres per day, 5kg to 13kg of butter and from 4kg to 20kg of cheese per day.

The collection of milk varies among the cooperatives in various Gewogs. Orong stands out with the highest average daily collection of 1060 litres, followed by Yangner with 800 litres and Nanong with 570 litres. These areas are the major contributors to milk production. On the other hand, Norbugang has the lowest daily milk collection with just 20 litres, Kurtoed and Yurung also reported low collection of 60 and 50 litres of milk respectively.

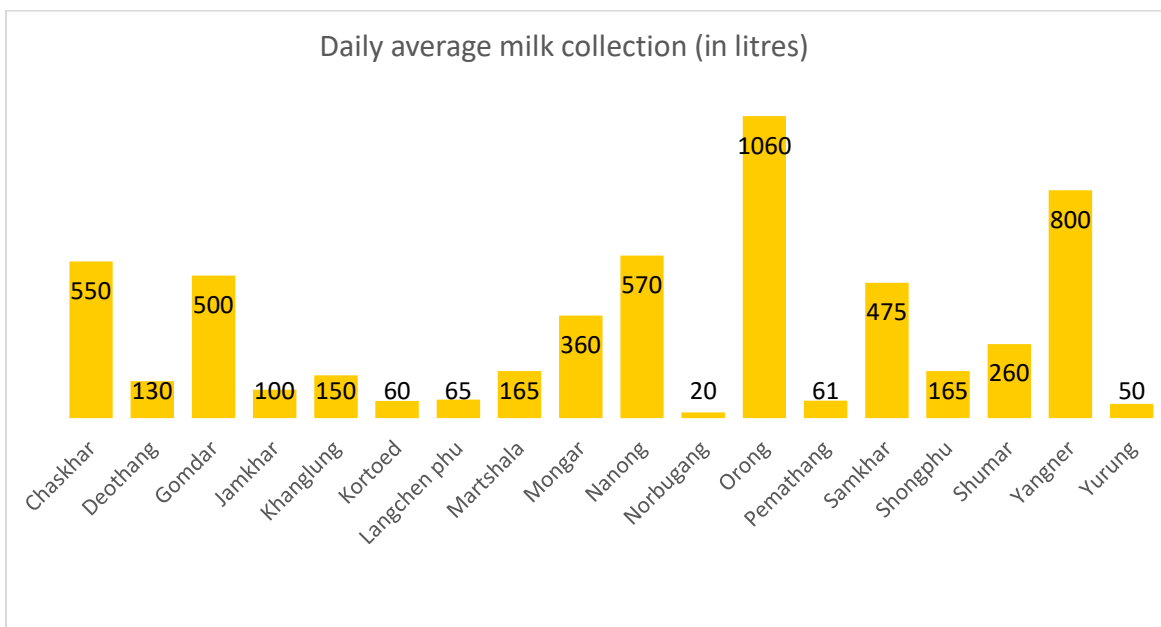
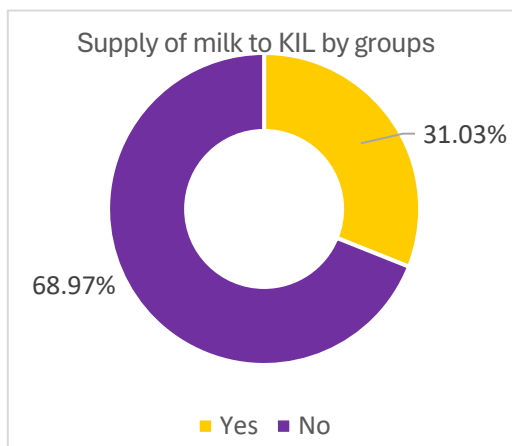


Fig. 13: Average daily milk collection by cooperatives

Cooperatives collect milk in the morning in can buckets where villagers come and drop milk in bottles. They also do the quality checking of milk in some cases. In some of the cooperatives, they



have hired milk collectors who collect milk from the collection points. The average milk rate across the cooperatives/groups is Nu.43 per litre but varies from Nu. 20 in Kurtoe to Nu. 65 at Kanglung per litre. In the case of local cheese, the average price is Nu.44 per piece and the price ranges from Nu. 25 to Nu.70 per piece. For the butter, the average rate is Nu.407 per kg and it ranges from Nu. 300 to Nu. 500 per kg.

Fig. 14: Milk supply to KIL

About 69% of the cooperatives are not supplying their collected milk to KIL while the remaining 31% indicated that they do. They are not supplying milk to KIL due to economic considerations,

logistical challenges, communication gaps etc. Those who supply milk to KIL are able to deliver on average of 50 litres to 400litres per day at Nu.37 or Nu.38 per litre. While selling to other customers, they fetch about Nu.50 to Nu.55 per litre of milk. The cooperatives are able to earn annual income of Nu. 500,000 to Nu. 2,800,000.

Some of the cooperatives feel that the rates offered by KIL are low which discourages them from supplying milk. Further, several cooperatives face logistical issues which hinders their ability to supply milk to KIL. Others say that their production is low and in some cases there is absence of a dedicated collector from KIL. Few others are not aware of KIL and there was no awareness being created from KIL for potential supply of milk to them. Thus, most of the cooperatives prefer to sell their milk in the locality where they receive better price and is profitable.

However, there is willingness from the cooperatives to supply milk to KIL as indicated by 86% while 14% are not willing to do so. Thus, 40% have expressed their satisfaction with the relationship with KIL while 24% of the cooperatives or groups do not have relationship with KIL and they are not supplying milk to the company due to low rates. Several respondents highlighted the importance of improved communication and building stronger business relationships with KIL. They emphasize the need for clearer rules, friendlier interactions, and more supportive communication channels. There is a need to improve rates for milk, ensure timely payments and support farmers with better infrastructure and logistics.

11.0 Consumers perspectives

Insights were gathered from a diverse groups of consumers focusing on their dairy product purchasing habits from the 6 eastern districts. It was found that about 8.5% purchase dairy products on daily basis, 46.8% buy on a weekly basis and 44.7% of consumers purchase dairy products on monthly basis.

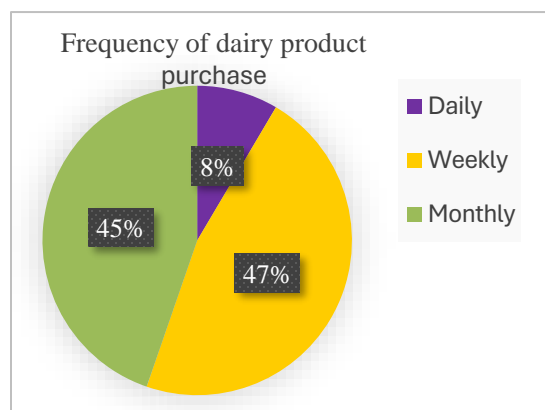


Fig.15: Frequency of dairy product purchase

Among the consumers, fresh cheese is preferred by 46.93%, followed by milk 42.98% and organic butter 33.33%. Cheddar cheese is preferred by 26.75% while both salted and unsalted butter is preferred by 21.93%. Plain yogurt is preferred by 19.30%, cottage cheese by 13.16% and Gouda cheese by 9.65%. Less frequently chosen items included fruit yogurt by 5.70%, sweet yogurt by 3.95%, mozzarella cheese by 2.19%, and both Druk Zambala cheese and Amul cheese by 0.88%.

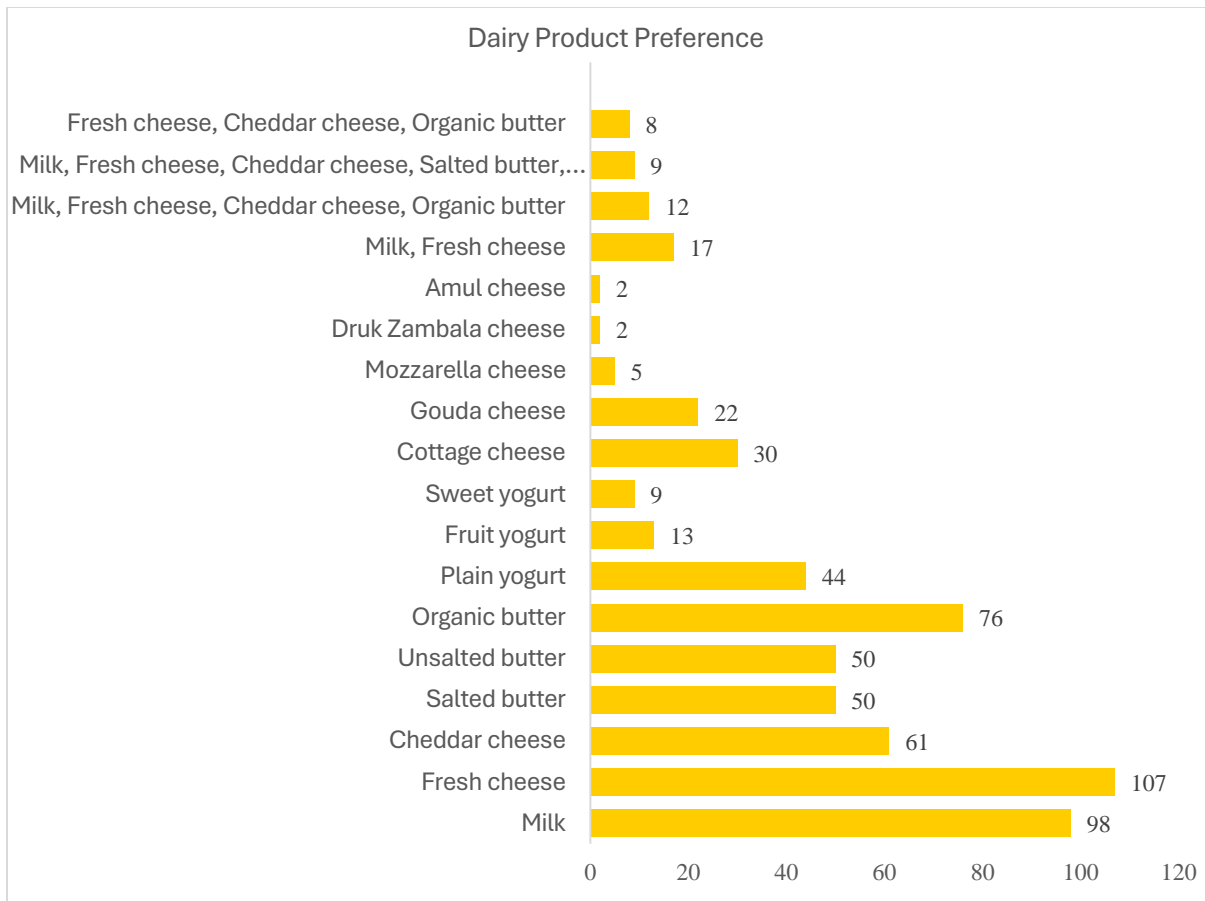


Fig. 16: Dairy product preference

About 24.60% of consumers prefer to purchase dairy items from both grocery stores and farmer's markets. Another 15.87%, indicated preference of buying dairy products from grocery stores and local farmers. About 1.59% prefers to buy from grocery stores or outlets, 5.56% buys from grocery stores along with cooperatives and the rest buy from farmer's markets, outlets or cooperatives.

Product quality and safety are considered extremely important by majority of the consumers when purchasing dairy products as expressed by 84%. In terms of quality and safety of KIL products, about 87% have not encountered any issues. Many consumers highlighted their satisfaction with the freshness, taste, and overall quality of the products, particularly the Druk Zambala cheese. Some consumers have mentioned specific issues, such as Druk Zambala cheese becoming hard if not stored properly, which could affect its taste and texture after a few days. Others said when added to curry, it makes the dish taste overly sweet and appears like milk is being added to the cheese. Few of the consumers have encountered cheese developing mole when not used immediately.

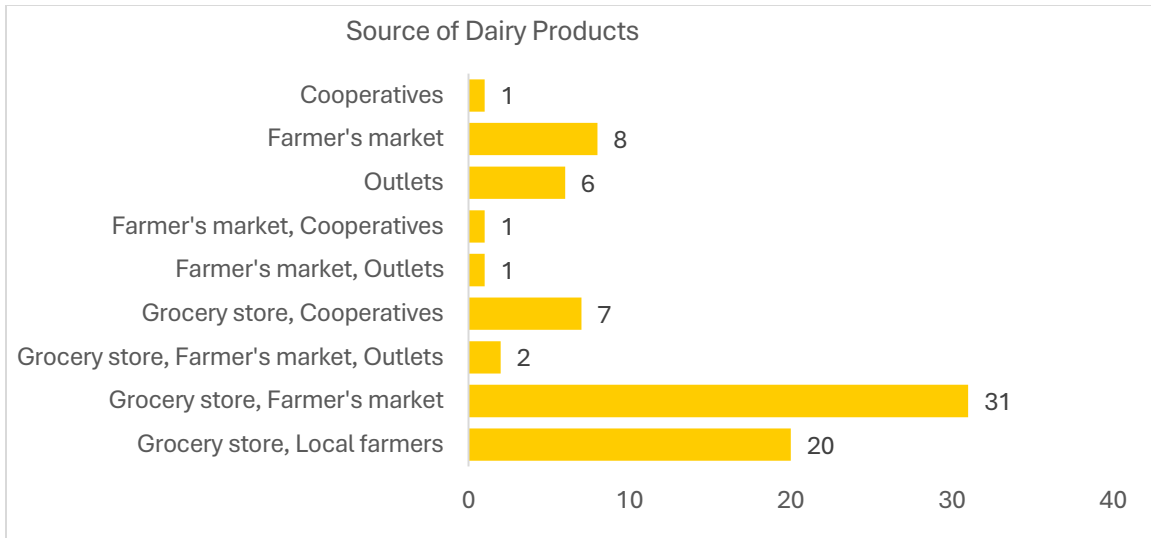


Fig. 17: Source of dairy product purchase

The factors which influences consumers decision on choosing the brand of dairy products is mainly on the basis of taste, health benefits, country of origin of product, product availability and price as indicated by 29%. This is closely followed by advertising, reputation, price and packaging with 20%. Further, 25% of the consumers based on reputation, advertising, taste etc., then packaging, advertising, reputation with 17%. Advertising plays a substantial role where effective campaigns not only raise awareness but also shape positive brand associations in consumers' minds. The remaining 4% are neutral in the decision for selection of brand of the dairy products.

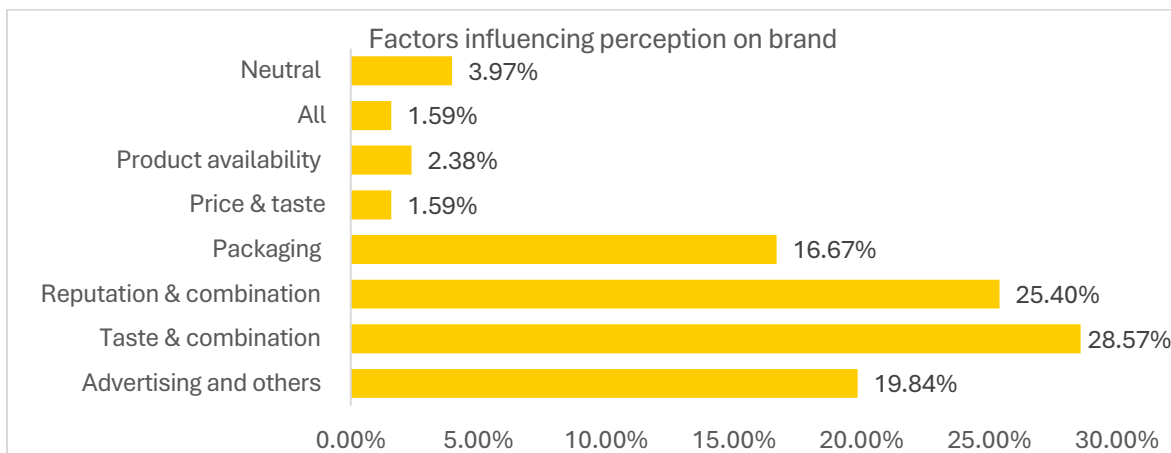


Fig. 18: Factors influencing perception on brand

Based on the feedbacks provided by consumers regarding KIL products, here are some insights and suggestions to consider.

- a) Several consumers appreciate the quality of KIL products but suggest maintaining consistency, especially concerning taste and texture of items like Druk Zambala cheese.

- b) There are concerns about the packaging and shelf life of certain products, such as Druk Zambala cheese developing mole when not refrigerated. Improving proper packaging can ensure longer shelf life.
- c) There is demand for more variety in products. Suggestions include producing sliced cheese, flavoured yogurt, and even bottled milk with a longer shelf life comparable to imported ones.
- d) Improving the supply chain to ensure consistent availability of products, especially in remote areas, was a common suggestion. Enhancing distribution networks could help to capture more market share.
- e) Many consumers expressed a desire for more advertising and marketing efforts by KIL. Increasing brand visibility and educating consumers about their product benefits could attract more customers.
- f) Many consumers expressed a preference for locally produced dairy products, citing reasons such as supporting the local economy, trust in production practices, and affordability if priced competitively with imported products.
- g) Consumer's value locally produced dairy products for its perceived quality, freshness, and the assurance that it is free from unknown additives or chemicals commonly found in imported products.

12.0 Wholesaler or retailers

The whole sellers and retailers import dairy products such as Amul Taaza, Amul Gold, Keventer, Go milk, Milk Mist, Britannia milk and cheese, Nestle milk, Amul cheese and butter brands etc. In terms of product type, they have products like Druk Zambala cheese, local cheese, Sonai doodh premium milk, Britannia cheese both slice and block, Amul cheese, Amul butter etc.

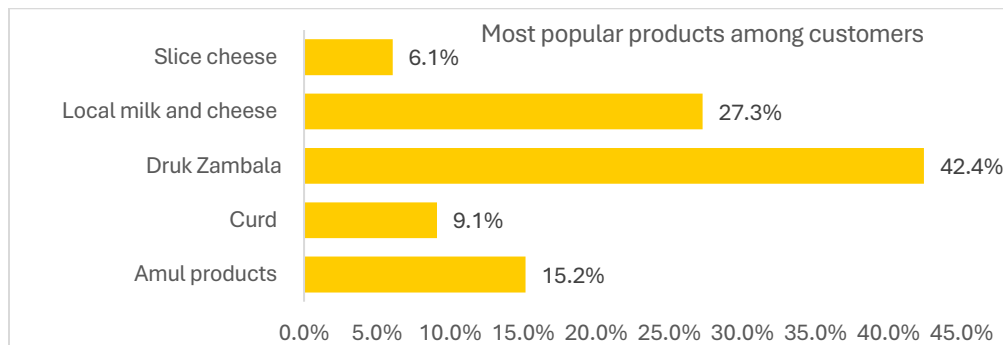
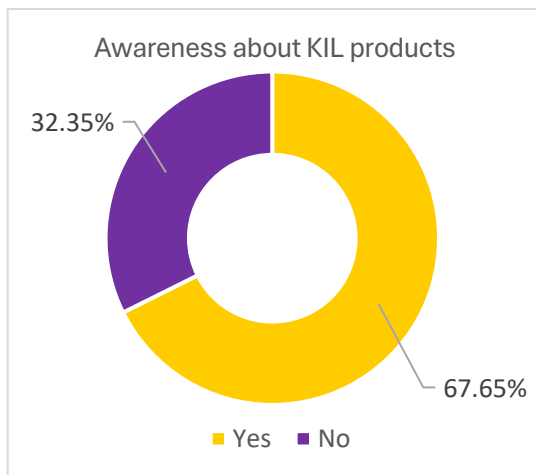


Fig. 19: Popular products among customers

Among the customers, the most popular products are Druk Zamabala cheese as indicated by 42%, followed by 27% for local cheese and butter or milk, 15% for Amul products, 9% for curd and 6% for slice cheese.

They sourced products from different areas such as Druk Zambala cheese from KIL, other products from FCB, dealers, nearby shops, suppliers and producers especially for the milk, local butter and cheese. Thus, about 95% of the whole sellers or retailers are happy with the suppliers but 5% are not happy mainly in terms of non-delivery of products on time and causing un-necessary delays in supply. Then, in terms of factors influencing purchasing decision of various products is attributed by customer preference and demand, advertisement, reputation of brands, cheaper price as in the case of Indian products etc.



About 68% of whole sellers and retailers are aware about the KIL products but 32% are not aware about its products in the market. This indicates that if the whole sellers or the retailers are not aware of the KIL products, then how the consumers will come to know about it. In some cases, they have just heard about KIL products but they do not keep in stock. However, those who know about the KIL products, it is mostly the Druk Zambala cheese which is also based on the customer demand. Now, most customers seems to prefer to buy only Druk Zambala cheese compared to Amul cheese.

Fig. 20: Awareness about KIL products

There is opportunity for the KIL products since people are more conscious about health and locally produced ones are organic in nature. Further, if local products are being stocked up in the shops, then definitely people will buy when they see different products. Also, there are demands from the institutions like schools, dratshangs and health centres.

In terms of advocacy and promotion, shop keepers do tell the customers that local produce cheese doesn't affect health like imported cheese whereas, Amul cheese causes pain in hands and legs. Sometimes, they do paste a poster of Druk Zambala cheese at the wall of entry to the shop. Sometimes, they also promote through social media like in Facebook, WeChat etc. to attract customers. So there is need of continuous supplies, well packed with assurance on food safety and hygiene with good quality and standard in the near future.

13.0 Importers and exporters

Mostly, they do import products like Amul Taaza, Amul butter and cheese, Go Milk, Britannia cheese both block and slice, yogurt, paneer among others. They purchase almost 6 to 7 cartoons of Amul Taaza and Amul cheese. The cost of the milk ranges from Nu.75 to Nu. 85 per bottle or Nu.55 to Nu.70 per litre. For the yogurt, it cost between Nu. 30 to 50 per piece and purchased about 2000 containers per month, then about 148 packets of paneer in a month. Most of the products are sourced from India.

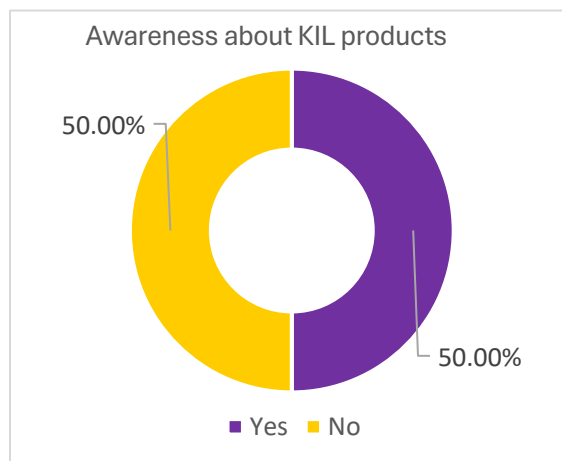


Fig. 21: Awareness about KIL products

Importers and exporters are satisfied with the current suppliers and in fact they would love to see improving their relationships in the coming years. They are able to influence whole sellers and retailers through advertisement and to convince them about the products. However, even among the importers and exporters, some of them are not aware about the KIL's dairy products as shown in the figure below.

They aspire to market KIL products but have no idea since KIL have not done adequate marketing to the importers/exporters. It is also that the KIL products have not reached in their community to be supplied to the businesses. Then in terms of demand for the dairy products, it is now moving towards yogurt and milk.

The challenges faced by the importers/exporters is that they are not able to get dairy products supplies on time and there are shortages of supplies. Even in terms of dealers, there are lesser number of dairy product dealers in the market. However, there is opportunity for future in terms of employment generation and income for both the intermediary actors in the dairy value chain as well as the farmers.

So in order to improve the services in future, it is recommended to produce good quality products, safe and hygienic food with adequate advertisement including good packaging. There is need of good transportation and continues marketing of products so that it can reach out to large stakeholders. The importers/exporters need enough supplies to stock up the products and it should be durable and long lasting.



14.0 Other findings

KIL is unknown to many people so as the reputation and products offered by the company, in that way people are consuming imported products. Due to lack of awareness, most farmers have not supplied milk to KIL. If they know about the products of KIL, consumer would switch to KIL products rather than imported ones in the market. There is limited information about KIL with limited marketing and communication, especially the illiterate ones are more unaware of KIL products. KIL products are organic in nature and is better for consumption than the imported products available in market.

Since the imported products are widely available in the market, there are choices but on the other hand, local products are limited which offers better choice in the market for the general consumers and also that the products from KIL are not reachable to most of the people. Moreover, most people have already built their trust on imported ones rather than domestically produced products.

KIL supply chain lacks little behind because KIL is not able to supply their products in bulk and to most of the farmers. Thus, to bring about trust in their products, KIL will have to supply as many dairy products as possible to the farmers. They need to interlink the dairy farmer's needs to supply sufficient milk to KIL so that they can supply more milk and also reach out to more people. Further to strengthen the relationship between KIL and dairy farmers, they need to negotiate the price range and support each other and build stronger network and communication.

The company should maintain good price and quality of its products including how to deal with expired products. For the farmers, if the milk is to be sustainable in future, high breeds needs to be introduced with assistance from the Department of Livestock. There is also need of mass market advertisements for their brand reputation since most of the farmers as well as other stakeholders working in the value chain are not aware of KIL products, leave aside the consumers.

KIL needs to offer milk with better price so that supply remains continuous from the dairy farmers. On the other hand, dairy farmers needs to raise more cows and breeds to generate sufficient milk production along with support from the government. The supply chain needs to be strengthened between KIL and the dairy farmers. KIL tentatively needs to open its subsidiaries in all dzongkhags to function properly and to meet the needs and demands of people. Government and public as well as dairy farmers should support KIL to diversify or expand its business in future.

15.0 Findings from other studies

As per the customer survey 2022, about 87% of the distributors purchase KIL dairy products directly from KIL and the rest 8% purchase from wholesaler or distributors. In terms of products,

66% of customers brought Zambala block cheese followed by 20% Cup Yogurts. Some request more distributors to reduce the price or make it equivalent to other brands with robust packaging since most distributors have complained about their packaging getting damaged and eventually damaging the products.

As per the market study analysis 2022, about 89% of the potential distributors are interested to sell the KIL dairy products and about 86% of the potential customers are interested to buy if it were made available in their locality that too from the retailer and wholesaler (92%). The main factor influencing their (both distributors and customers) buying decision is if the product prices are made reasonable. Therefore, Koufuku may focus on strategizing product pricing to make it competitive with other dairy product brands in the market.

16.0 Raw milk cost of production

To determine the cost of production per litre of milk involves the following steps⁶:

- a) A simple cost-benefit analysis carried out in the selected cattle rearing districts representing four Agro-Ecological Zones. In each AEZ, two Dzongkhags (two Gewog from each Dzongkhag) that accounts to eight district and 16 sub-districts were selected for the study. A total of 320 dairy units, 80 each from four AEZs were randomly sampled.
- b) The overall average annual capital investment per dairy unit under smallholder farming system in Bhutan was Nu. 27,258. The highest investment cost was accounted for cow purchase of 38%, followed by 33.63% on farm machinery and equipment.
- c) The overall, annual average variable cost recorded was Nu. 2, 14,052 per dairy unit, with labour constituting the highest cost of 65%, followed by feed cost of 31%.
- d) The overall average cost of production (CoP), farm gate price and profit margin recorded for litre of milk were Nu. 26.85, Nu. 38.7 and Nu.11.9 respectively. The CoP was higher in cooler regions (Nu. 38.9/litre)

Average milk production cost (Nu./litre) and profitability of diary units in different AEZs

Items	Cool temperature	Warm temperature	Dry subtropical	Wet subtropical	Total
Cost of production	38.9	19.8	31	17.9	26.85
Farm gate price	41.8	35.5	38.6	38.9	38.71
Profit margin	2.9	15.6	7.6	21	11.87

Table 5: Average cost of milk production

⁶ Cost of production of diary inputs, NDRDC, Department of livestock, Yusipang, 2021

Further, CoP also significantly differed between the herd sizes ($p < 0.05$), where the CoP of smaller herd size (1-5 milking cows) was almost three times higher than the bigger herd size of 6-10 milking cows. However, CoP was not affected by location of the dairy units.

Comparison of average milk production costs by herd size and location of dairy units

Variable	Category	N	Mean±SE	Sig (2 tailed)
Herd size	1-5 cows	290	28.28±2.51	0.04
	6-10 cows	26	20.92±1.86	
Location of dairy unit	Near market	202	25.83±3.04	0.56
	Distant from market	114	28.65±3.54	

Table 6: Comparison of average COP of milk by heard size and location


17.0 Major constraints at the plant

The milk processing plant at Chenary has been solely designed for the production of Gouda cheese at the initial stage which itself is a restriction on the diversification of products. As the processing plant was planned to produce only Gouda cheese, there is high chance of products cross contamination when producing other products in the same room. There are no adequate safeguards for air contamination controls in the production facility. The doors and windows are not airtight and the concept of materials and personnel flows was not integrated in the production facility.

Production room: The processing plant has just one room for processing all the products. The machines are placed very close to each other because of lack of space and the room has no airtight environment to control air contamination and post production contamination. The cheese vats, the pasteurizer, the butter churner, the cheese processing kettle, the yogurt filling & sealing machine and steam boiler are all placed in the same room as there is no other processing room within the facility. There is an immediate need to expand the production room requiring major renovation including air decontamination systems after every production to ensure that the working environment is free of microbes that will contaminate the products during and after the production.

Ripening room: While the production of different types of cheese requires relative humidity (RH) of 75-95%, the humidity within the ripening room is below 50% because of the poor humidity of the place and the dry air being pumped inside the room to cool the room and maintain the temperature between 11 to 14°C. While the temperature control required for the ripening of the cheese is effectively maintained, the RH required cannot be maintained. There is immediate need to install humidifying technology to increase and maintain the humidity above 80%.

Entrance to production room & changing rooms: The existing entrance to production room has only single small room each for male and female without adequate space for lockers and air



showers for clean rooms. There is a need to redesign the changing room with adequate changing facilities and to decontaminate the shoes while entering the production area. The changing room must have lockers for the staff to store their cloths and personal items while entering the production area.

Raw material store: The present raw material store consists of only two rooms placed at extreme proximity from each other. The store room at the end has no separate entrance and it has to enter from the ripening room which increases the chances of products contamination when accessing this store room. The other store room also has yogurt incubator in the same room thereby increasing the chances of products contamination during production. To avoid the risk of cross contamination, the store has to be relocated to one extreme of the building and the current store proximity to ripening room will have to be converted to ripening room to create space for cheese processing at current ripening room.

Rapid milk quality testing lab: Milk testing is an essential component of quality assurance in manufacturing. KIL currently has facility for Milk adulteration test (Lactometer/milk density/ S.G.), PH test, C.O.B, Alcohol and coli-form test only. Basic milk testing equipment for Acidity test, Resazurin test, Gerber butterfat test and Gerber lactometer test needs to be upgraded with basic facilities covering for all common mandatory quality assurance tests. For ensuring milk quality there are equipment and supplies for rapid tests as well as sophisticated machinery for complex analysis. Common mandatory quality assurance tests at the dairy plant are crucial for milk industry.

Microbiology laboratory: Throughout dairy production process, specific tests should be carried out to ensure the quality and safety of dairy products from milk, yogurt, cheese, butter, ice cream, etc. Milk and dairy products provide a favorable environment for a large range of bacteria, yeasts and molds, it is therefore important to monitor these organisms to help prevent spoilage or potential pathogenic contamination. To ensuring compliance with regulatory standards of BAFRA, ISO, HACCP & FSSAI, dairy processing, manufacturing and quality control requires testing of specific microorganisms indicated in above.

In addition to that, major constraints are with the machines or equipment of the company:

- a) **Aging Machines and equipment:** There is a significant risk of machine break down which may result into the downtime of the plant due to the old machines and equipment.
- b) **Non-availability of technical experts and spare parts:** Technical expertise for major maintenance of equipment is not available coupled by the time consumed in exploring spare parts. This is due to the equipment being manufactured a decade ago.

- c) **High landing price of Milk:** The present landing price for raw milk stands at approximately Nu. 45 per liter, whereas farmers receive only Nu. 38 per liter. This elevated landing price is primarily attributed to the substantial transportation costs due to the use of large milk tankers for fetching relatively small quantities of milk, owing to the absence of smaller tankers.
- d) **Unsuitable Plant Layout:** The processing of Gouda cheese, processed cheese, and yogurt occurs within the same facility. The present layout not only falls short of recommended standards but also significantly contributes to cross-contamination, leading to compromising on quality and increasing waste and recalls. Accordingly, there is a need to come up with dedicated product line in the company.
- e) **Optimize the high landing price of milk-**the company is deploying smaller tankers to longer-distance milk collection centers. Additionally, there is a focus on preventive maintenance of tankers to reduce maintenance costs as well as focussing on preventive maintenance of machines or equipment through stocking of critical spare parts along with technical expertise from India.

Critical equipment for processing of Gouda, processed cheese, butter, and yogurt have exceeded their useful lifespan and urgently require replacement as there are no back up equipment for the same. There is lack of major periodic servicing due to the absence of trained technicians in the vicinity along with the non-availability of spare parts. It also takes longer time to order customized ones as these equipment were manufactured decade ago and the brands are obsolete. If the breakdown of the equipment takes place, then will halt the production. Thus it is high time to replace these manually operated one to semi or fully automate ones for improving efficiency and productivity.

Equipment	Yr. of purchase	No. of yrs. in use	Useful yrs.
HTST Pasteurizer	2015	8	8
Cheese Cooker	2015	8	8
Steam Boiler	2015	8	6
Yoghurt Cup filling Machine	2018	5	6
Butter Churner	2015	8	8
Videojet Machine	2018	5	6

Table 7: Equipment details

With the increased demand for processed cheese and yoghurts, there is huge challenge in meeting the market demand with the current set of old machineries and human resources. The future success and long term survival of the KIL is critically dependent on its ability to quickly transform itself with the investment in process mechanization with cost-effective modern technologies and know-how development to improve the current situation.

18.0 Details of Investment

Details of each of the equipment in KIL is described below.

Pasteurizer: This equipment has been under operation since 2015 on daily basis. So without the spare parts, it is taking more time to achieve required temperature & flow due to lack of critical spare parts. So the breakdown of the equipment may lead to complete shutdown of the plant since there is no spare pasteurizer as well as technical experts for conducting maintenance. Further, there is need of Bactofuge, which will remove bacterial spores and bacteria from the milk. This equipment will ensure excellent product quality. Bacteria like clostridium butyricum (a spore forming bacteria) spoils the flavor of Gouda cheese and product quality. Such equipment itself is going to cost around Nu. 12.5 million.



Thus, stocking up of critical spare parts is essential as well as to replace the present HTST with higher capacity machine (3000L/H) with Bactofuge along with clarifier and separator which will cost around Nu.40 million.

Cheese cooker and related equipment: This is the only Cheese Cooker available since 2015 and is manually operated. It is labor intensive and taking increased cook time of about 4-5 minutes. There is no critical spare parts available readily in the market mainly the carbon filter and also no



technical expert to carry out major maintenance. This will also lead to complete shutdown of the plant in case of break down as there is no spare cooker. With the increasing daily milk intake of 4000 to 8000 litres or more, the cheese cooker has to be in continuous operation for 14 to 15 hours a day. So the solution is to stocking up of critical spare parts as well as to replace with the new cooker with its other components (filler & sealing) and to keep the present one as spare in case of breakdown which will cost about Nu.27 million.

Further, with the increasing change in food habits especially in the urban centers for fast foods like pizza, pasta, sandwiches, burger etc., there is huge market demand for sliced cheese. Most of the customers ask for sliced cheese, which they use for multi-purposes. So again, there is need of slicing equipment which is expected to cost around Nu. 4.5 million.

KIL currently has 4 number of cheese pressing machines with the capacity to operate only 2000 litres per shift but with the increasing milk intake, it's being used for 24 hours with 2 shifts system for day and night. So KIL needs to put additional 4 units of cheese pressing machine which will enable intake of 4000 to 8000 litres of milk and cope up with increasing milk flow. This is going to cost around NU. 0.75 million.

KIL's processing plant at Chenary is located in a very dry place with Relative Humidity (RH) measuring as low as 40% whereas the ideal cheese ripening RH requirement is between 75% to 95%. If there is provision for humidifier technology will improve the RH for cheese ripening room and enable to produce range of different cheeses requiring varying RH conditions. Procurement of such technology is going to cost around Nu.0.3 million.



Steam Boiler: Diesel power is used for cooking the processed cheese which cost around Nu.45000/month for the fuel. It is also not producing uniform amount of steam which results into inconsistent composition of cheese. There is also objection from NEC and recommended to use electric operated generator which will also reduce cost of stream generation with the high price of fuel. Also non-availability of technical expertise to carry out major maintenance is a constraint. So in case of break down, it will lead to complete shutdown of the plant as there is no spare steam boiler.



So there is a need to replace the equipment with the new steam Boiler which will cost around Nu.1.5 Million.

Yogurt machine: There is frequent breakdown of the machine and spare parts are not available in the local

market and its operation is labour intensive with manual operation. Presently, there is wastage due to malfunction of sealing machine where the company has lost production of 400 ML of plain yogurt until the arrival of sealing machine from India. If not maintained properly, it will contribute to complete halt of yogurt production in case of break down. In order to cater Airlines and high end hotels, KIL has planned to fully atomize the Yoghurt processing line for food safety, security and to achieve production efficiency.

So it is necessary to have stocking up of critical spare parts as well as to replace the present manual machine with an automatic yogurt production line for plain and stirred yogurt will cost about Nu.10 or 2 million.

Mirco laboratory testing: KIL currently do not have microbiology lab for testing antibiotic, fat, viscosity, protein and moisture content. Plant laboratory will be able to carry out quick analysis of antibiotics, aflatoxin M1 or moisture in milk at the milk reception point so as to assure milk quality and product quality. In order to avoid irreversible damage, all microbiological testing has to be done quickly to identify these contaminants. Common test formats for microbial food testing are ELISA assays, real-time PCR tests, nutrient plates and agar plates and other basic lab testing equipment. Initially only basic equipment will be procured to conduct basic tests. This equipment is going to cost around Nu.2 million.

Details of the investment required for upgradation of the equipment are shown in the table below.

Sl. No.	Equipment required for up-gradation	Unit	Qty.	Amount (million Nu.)
1	Processed Cheese Station upgrade (Processed Cheese machines) - Stephan Cheese cooker/Lekkerkerker UHT model, With Cheese filler	set	1	12.50
2	In line Processed Cheese filling, sealing & automatic packing machine	set	1	16.80
3	In line Cheese slicing & Packaging machine	set	1	4.50
4	HTST Pasteurizer line with Cream separator	no.	1	9.00
5	Bactofuge (Bacterial spores clarifier)	no.	1	12.50
6	Cheese pressing machine	set	4	0.75
7	Electric Steam boiler	no.	1	0.80
8	Humidifier for cheese ripening room	no.	2	0.30
9	Cold Storage	No	1	1.00
10	Mozzarella Cheese Making Machine Turnkey	No	1	3.00
11	Ice cream Machine Turnkey [300L/batch]	No	1	0.60
12	Bulk Milk Chiller 2000 L	no	1	1.00

13	Milk reception station at KIL with instant chilling plates and CIP tanks (Milk weighing tank, Weighing scale, Milk dump tank with cover connected with weighing scale and computer control system)	no.	1	1.00
14	Stainless Steel Moulds/plastic mould	nos.	120	1.380
15	SS Gouda moulding desk	nos.	2	0.15
16	Cheese brining vat -500 litres	nos.	2	0.170
17	Layers SS Rack Trolley	nos.	3	0.135
18	Stainless steel Transport Trolley	nos.	2	0.070
19	Fully Automatic Yoghurt Processing line	set	1	10.00
20	Micro Laboratory Equipment for Product Testing			2.00
21	Utility Van	no.		4.00
22	Solar as alternative power supply	no.		2.00
	Total			83.66
	Infrastructure development 30% by KIL			30.00
	Grand total (million Nu.)			113.66

Table 8: Investment details for up-gradation

In addition to the equipment that are to be invested by CARLEP, there are infrastructure development works as proposed below:

- a) Extension of Gouda ripening room and installation of new AC
- b) Cheese filling and packaging room (Conversion of existing store)
- c) Major renovation of both exterior and interior ceilings & flooring
- d) Milk tanker cleaning station
- e) Construction of new store
- f) Extension of cold storage
- g) Construction of marketing and sales outlet
- h) Construction of toilets for production staff
- i) Surrounding concreting/black topping
- j) ETP renovation and RCC roofing

Thus, the total investment required is Nu. 113.66 million, which includes Nu. 83.66 million investment from CARLEP for the equipment upgradation and Nu.30 million to be invested by KIL for infrastructure development.

19.0 Financial projection

Based on the existing cost of milk and daily milk collection including processing for production of processed cheese and yogurt, following assumptions are considered for the financial analysis.

Assumption (daily milk collection and cost per litre)

	Daily Average	Monthly Average
Daily Average Milk Collections (ltr)	3855	119,505.00
Milk Cost (Nu) per Liter	38	4,541,190.00

Table 9: Assumption for daily milk collection

Production Details (Output)	Yield (%)/gms/cups
Milk conversion for Gouda cheese	98.00%
Milk conversion for Yogurt	2.00%
Gouda cheese (kgs) Production	8.50%
Process cheese (Pcs)	930gms
Gouda consumption per batch of processed cheese	12gms
Processed cheese production per batch	28gms
Yogurt output in cups per litre milk	10cups

Table 10: Processing assumptions

Inventory of finished goods	30 days
Account Payable	30 days
Account Receivables	30 days
Working days in a year	330 days

Table 11: Assumptions for complete delivery of products

The cost of milk supply to the plant has been calculated based on the assumption of the above inputs and the milk supply forecast is being made over 5 years period (details of milk flow forecast is given in annex). It is found that the cost of milk will increased from Nu. 59.779 million in 2024 to Nu.95.352 million in 2028 as shown in the table below.

Forecast of milk cost

	2024	2025	2026	2027	2028
Daily average milk collections (ltr)	1,573,150.00	1,646,150.00	1,846,900.00	2,091,450.00	2,270,300.00
Milk cost (Nu) per ltr.	59,779,700.00	64,199,850.00	73,876,000.00	87,840,900.00	95,352,600.00
Total milk cost	59,779,700.00	64,199,850.00	73,876,000.00	87,840,900.00	95,352,600.00

Table 12: Forecast for cost of milk

Accordingly, production of processed cheese and yogurt is being calculated based on the inputs provided above. The details of production of both processed cheese and yogurt are shown below.

Production forecast (yield in %, gms or cups)

Production (Output)	2024	2025	2026	2027	2028
Milk conversion for Gouda cheese (98%)	1,541,687.00	1,613,227.00	1,809,962.00	2,049,621.00	2,224,894.00
Milk conversion for Yogurt	31,463.00	32,923.00	36,938.00	41,829.00	45,406.00
Gouda Cheese (kgs) Production	131,043.40	137,124.30	153,846.77	174,217.79	189,115.99
Process Cheese (Pcs) 930gms					
Gouda consumption per batch of p. cheese (12gms)	10,920.28	11,427.02	12,820.56	14,518.15	15,759.67
Processed cheese production per batch (28gms)	305,767.92	319,956.69	358,975.80	406,508.17	441,270.64
Yogurt output in cups per ltr. Milk (10cups)	314,630.00	329,230.00	369,380.00	418,290.00	454,060.00

Table 13: Import of dairy products in 2022

The revenue earned by selling processed cheese and yogurt including the corresponding expenses incurred while processing are calculated below.

Table 14: Income and expenses for processed cheese and yogurt

	2024	2025	2026	2027	2028
Selling price of processed cheese	505.00	510.00	515.00	520.00	525.00
Revenue earnings from processed cheese	154,412,800.44	163,177,911.05	184,872,535.28	211,384,245.80	231,667,087.75
Yogurt selling price	22.00	22.00	22.00	22.00	22.00
Revenue earnings from yogurts	6,921,860.00	7,243,060.00	8,126,360.00	9,202,380.00	9,989,320.00
Revenue from 2 key products	161,334,660.44	170,420,971.05	192,998,895.28	220,586,625.80	241,656,407.75
Cost of ingredients & packaging per net pack	175.00	180.00	190.00	200.00	220.00
Total processed cheese processing expenses	55,060,250.00	59,261,400.00	70,182,200.00	83,658,000.00	99,893,200.00
Cost of ingredients & packaging per cup	12.00	14.00	14.00	15.00	15.00
Total yogurt processing expenses	3,775,560.00	4,609,220.00	5,171,320.00	6,274,350.00	6,810,900.00
Total processing expenses for 2 key products	58,835,810.00	63,870,620.00	75,353,520.00	89,932,350.00	106,704,100.00

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Plant and Equipment (Processed Cheese)										
Gross	33,050,000.00	29,745,000.00	26,770,500.00	24,093,450.00	21,684,105.00	19,515,694.50	17,564,125.05	15,807,712.55	14,226,941.29	12,804,247.16
Addition										
Useful Life	10	10	10	10	10	10	10	10	10	10
Depreciation	3,305,000.00	2,974,500.00	2,677,050.00	2,409,345.00	2,168,410.50	1,951,569.45	1,756,412.51	1,580,771.25	1,422,694.13	1,280,424.72
Accumulated Depreciation	3,305,000.00	2,974,500.00	2,677,050.00	2,409,345.00	2,168,410.50	1,951,569.45	1,756,412.51	1,580,771.25	1,422,694.13	1,280,424.72
Closing value	29,745,000.00	26,770,500.00	24,093,450.00	21,684,105.00	19,515,694.50	17,564,125.05	15,807,712.55	14,226,941.29	12,804,247.16	11,523,822.45
Plant and Equipment (Yogurt)										
Gross	10,000,000.00	9,000,000.00	8,100,000.00	7,290,000.00	6,561,000.00	5,904,900.00	5,314,410.00	4,782,969.00	4,304,672.10	3,874,204.89
Addition										
Useful Life	10	10	10	10	10	10	10	10	10	10
Depreciation	1,000,000.00	900,000.00	810,000.00	729,000.00	656,100.00	590,490.00	531,441.00	478,296.90	430,467.21	387,420.49
Accumulated Depreciation	1,000,000.00	900,000.00	810,000.00	729,000.00	656,100.00	590,490.00	531,441.00	478,296.90	430,467.21	387,420.49
Closing value	9,000,000.00	8,100,000.00	7,290,000.00	6,561,000.00	5,904,900.00	5,314,410.00	4,782,969.00	4,304,672.10	3,874,204.89	3,486,784.40
Vehicle										
Gross	4,000,000.00	3,500,000.00	3,062,500.00	2,679,687.50	2,344,726.56	2,051,635.74	1,795,181.27	1,570,783.62	1,374,435.66	1,202,631.21
Addition										
Useful Life	8	8	8	8	8	8	8	8	8	8
Depreciation	500,000.00	437,500.00	382,812.50	334,960.94	293,090.82	256,454.47	224,397.66	196,347.95	171,804.46	150,328.90
Accumulated Depreciation	500,000.00	437,500.00	382,812.50	334,960.94	293,090.82	256,454.47	224,397.66	196,347.95	171,804.46	150,328.90
Closing value	3,500,000.00	3,062,500.00	2,679,687.50	2,344,726.56	2,051,635.74	1,795,181.27	1,570,783.62	1,374,435.66	1,202,631.21	1,052,302.30
Plant & Machinery (Ice-Cream)										
Gross	600,000.00	540,000.00	486,000.00	437,400.00	393,660.00	354,294.00	318,864.60	286,978.14	258,280.33	232,452.29
Addition										
Useful Life	10	10	10	10	10	10	10	10	10	10
Depreciation	60,000.00	54,000.00	48,600.00	43,740.00	39,366.00	35,429.40	31,886.46	28,697.81	25,828.03	23,245.23
Accumulated Depreciation	60,000.00	54,000.00	48,600.00	43,740.00	39,366.00	35,429.40	31,886.46	28,697.81	25,828.03	23,245.23
Closing value	540,000.00	486,000.00	437,400.00	393,660.00	354,294.00	318,864.60	286,978.14	258,280.33	232,452.29	209,207.06

Plant & Machinery (Milk Reception)										
Gross	36,010,000.00	32,409,000.00	29,168,100.00	26,251,290.00	23,626,161.00	21,263,544.90	19,137,190.41	17,223,471.37	15,501,124.23	13,951,011.81
Addition										
Useful Life	10	10	10	10	10	10	10	10	10	10
Depreciation	3,601,000.00	3,240,900.00	2,916,810.00	2,625,129.00	2,362,616.10	2,126,354.49	1,913,719.04	1,722,347.14	1,550,112.42	1,395,101.18
Accumulated Depreciation	3,601,000.00	3,240,900.00	2,916,810.00	2,625,129.00	2,362,616.10	2,126,354.49	1,913,719.04	1,722,347.14	1,550,112.42	1,395,101.18
Closing value	32,409,000.00	29,168,100.00	26,251,290.00	23,626,161.00	21,263,544.90	19,137,190.41	17,223,471.37	15,501,124.23	13,951,011.81	12,555,910.63
Civil Structure (KIL Investment)										
Gross	30,000,000.00	27,000,000.00	24,300,000.00	21,870,000.00	19,683,000.00	17,714,700.00	15,943,230.00	14,348,907.00	12,914,016.30	11,622,614.67
Addition										
Useful Life	10	10	10	10	10	10	10	10	10	10
Depreciation	3,000,000.00	2,700,000.00	2,430,000.00	2,187,000.00	1,968,300.00	1,771,470.00	1,594,323.00	1,434,890.70	1,291,401.63	1,162,261.47
Accumulated Depreciation	3,000,000.00	2,700,000.00	2,430,000.00	2,187,000.00	1,968,300.00	1,771,470.00	1,594,323.00	1,434,890.70	1,291,401.63	1,162,261.47
Closing value	27,000,000.00	24,300,000.00	21,870,000.00	19,683,000.00	17,714,700.00	15,943,230.00	14,348,907.00	12,914,016.30	11,622,614.67	10,460,353.20
Gross Asset as per Proposal	83,660,000.00	66,947,614.00	51,094,328.00	36,012,669.50	21,624,108.56	7,858,139.14	(5,348,544.67)	(18,052,787.33)	(30,305,634.39)	(42,152,926.64)
Addition	0	0	0	0						
Depreciation	16,712,386.00	15,853,286.00	15,081,658.50	14,388,560.94	13,765,969.42	13,206,683.81	12,704,242.67	12,252,847.06	11,847,292.25	11,482,906.52
Accumulated Depreciation	16,712,386.00	15,853,286.00	15,081,658.50	14,388,560.94	13,765,969.42	13,206,683.81	12,704,242.67	12,252,847.06	11,847,292.25	11,482,906.52
Closing Value	66,947,614.00	51,094,328.00	36,012,669.50	21,624,108.56	7,858,139.14	(5,348,544.67)	(18,052,787.33)	(30,305,634.39)	(42,152,926.64)	(53,635,833.16)

Table 15: Asset schedule with the investment

The operational cost such as cost of employee, other administrative charges including operation and management of the plant and the office were included as follows.

Table 16: Operation and administration cost

Particulars	2024	2025	2026	2027	2028
	2.5% Annual Increment				
Employee Cost	10,463,405.03	10,724,990.16	10,993,114.91	11,267,942.78	11,549,641.35
Administrative Expenses					
Board Sitting Fees	504,000.00	504,000.00	504,000.00	504,000.00	504,000.00
Audit Fees	55,000.00	60,000.00	60,000.00	60,000.00	60,000.00
Printing & Stationaries	250,000.00	257,500.00	265,225.00	273,181.75	281,377.20
Travelling Cost	918,000.00	936,360.00	955,087.20	974,188.94	993,672.72
Electricity- Office	144,000.00	144,000.00	144,000.00	144,000.00	144,000.00
Fuel-Office vehicle	120,000.00	120,000.00	120,000.00	120,000.00	120,000.00
Advertisement & Publicity	-	-	1,000,000.00		
Hospitality & Entertainment	120,000.00	120,000.00	150,000.00	250,000.00	120,000.00
Telephone & Internet	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00
Total (A)	2,126,000.00	2,156,860.00	3,213,312.20	2,340,370.69	2,238,049.93
Operations					
Fuel -Milk Tanker	2,586,133.27	2,624,925.27	2,664,299.15	2,704,263.63	2,744,827.59
Fuel - Marketing Van	180,000.00	180,000.00	180,000.00	180,000.00	180,000.00
Electricity Factory	676,500.00	693,412.50	710,747.81	728,516.51	746,729.42
R& M -Milk Tankers	922,500.00	945,562.50	969,201.56	993,431.60	1,018,267.39
Detergents & Chemicals	922,500.00	945,562.50	969,201.56	993,431.60	1,018,267.39
Hiring Charges	615,000.00	630,375.00	646,134.38	662,287.73	678,844.93
Total (B)	5,902,633.27	6,019,837.77	6,139,584.46	6,261,931.08	6,386,936.72

It is assumed that the sources of fund for this upgradation will be through grants worth about Nu. 83.66 million, through CARLEP for the equipment or machines to improve the production of processed cheese and yogurt of KIL. Accordingly, profit and loss statement as shown below indicates both revenue and expenditure increases over the years along with PAT in the next 5 years. ROI is also showing positive and increases to 5.52% in the fifth year.

Table 17: Profit and loss statement

	2024	2025	2026	2027	2028
Particulars					
Income from processed cheese	154,412,800.44	163,177,911.05	184,872,535.28	211,384,245.80	231,667,087.75
Income from Yogurts	6,921,860.00	7,243,060.00	8,126,360.00	9,202,380.00	9,989,320.00
Income from Others	1,428,448.90	1,428,448.90	1,428,448.90	1,428,448.90	1,428,448.90
Total Revenue	162,763,109.34	171,849,419.95	194,427,344.18	222,015,074.70	243,084,856.65
Expenditure					
Raw Milk Cost	59,779,700.00	64,199,850.00	73,876,000.00	87,840,900.00	95,352,600.00
Employee Cost	10,463,405.03	10,724,990.16	10,993,114.91	11,267,942.78	11,549,641.35
Administrative Cost	2,126,000.00	2,156,860.00	3,213,312.20	2,340,370.69	2,238,049.93
Operations Cost	5,902,633.27	6,019,837.77	6,139,584.46	6,261,931.08	6,386,936.72
Ingredients & Packaging	58,835,810.00	63,870,620.00	75,353,520.00	89,932,350.00	106,704,100.00
Total	137,107,548.30	146,972,157.92	169,575,531.57	197,643,494.56	222,231,328.00
Opening of stocks					
Cost of Manufacturing	8,832,474.99	8,029,522.72	7,299,566.11	6,635,969.19	6,032,699.26
Closing of finished goods	802,952.27	729,956.61	663,596.92	603,269.93	548,427.21
Cost of Goods Sold	8,029,522.72	7,299,566.11	6,635,969.19	6,032,699.26	5,484,272.05
EBITDA	25,655,561.04	24,877,262.03	24,851,812.61	24,371,580.14	20,853,528.65
Depreciation	16,712,386.00	15,853,286.00	15,081,658.50	14,388,560.94	13,765,969.42
EBIT	8,943,175.04	9,023,976.03	9,770,154.11	9,983,019.21	7,087,559.23
Interest	8,279,298.00	8,279,298.00	8,279,298.00	7,242,086.50	5,382,498.00
EBT	663,877.04	744,678.03	1,490,856.11	2,740,932.71	1,705,061.23
Tax (30%)	199,163.11	223,403.41	447,256.83	822,279.81	511,518.37
PAT	464,713.93	521,274.62	1,043,599.28	1,918,652.89	1,193,542.86
in millions Nu	0.46	0.52	1.04	1.92	1.19
Operational Efficiency	84.24%	85.52%	87.22%	89.02%	91.42%
ROI	0.56%	0.78%	2.04%	5.33%	5.52%
RoE	39.01%	43.76%	87.60%	161.06%	100.19%

The balance sheet is shown below indicating the financial position which allows to see the assets owned by the plant. Others who would be interested in the balance sheet include current investors, potential investors, company management, suppliers, some customers, competitors and government agencies.

Table 18: Balanced sheet or statement of Financial Position

	2024	2025	2026	2027	2028
Property plant and equipment	81,532,502.20	80,003,734.63	77,649,267.67	76,064,224.88	77,343,337.64
Other non-current assets					
Total non-current assets	81,532,502.20	80,003,734.63	77,649,267.67	76,064,224.88	77,343,337.64
Account receivables	12,464,322.57	13,361,105.27	15,415,957.42	17,967,590.41	17,967,590.41
Inventories	12,464,322.57	13,361,105.27	15,415,957.42	17,967,590.41	17,967,590.41
Other current assets					
Cash and cash equivalent	112,085,627.77	8,279,298.00	8,279,298.00	7,242,086.50	5,382,498.00
Total current assets	137,014,272.91	35,001,508.53	39,111,212.83	43,177,267.33	41,317,678.83
Total current and non-current assets	218,546,775.11	115,005,243.16	116,760,480.50	119,241,492.21	118,661,016.47
Long-term borrowings	45,719,090.50	45,719,090.50	46,756,302.00	48,615,890.50	46,756,302.04
Other non-current liabilities					
Total non-current liabilities	45,719,090.50	45,719,090.50	46,756,302.00	48,615,890.50	46,756,302.04
Account payables	15,622,674.54	17,675,213.11	20,183,188.61	22,098,623.33	20,183,188.70
Other current liabilities					
Total current liabilities	15,622,674.54	17,675,213.11	20,183,188.61	22,098,623.33	20,183,188.70
Share Capital	119,130,200	119,130,200	119,130,200	119,130,200	119,130,200
Retained earnings	1,737,080.86	2,798,494.73	4,327,262.30	6,681,729.26	5,154,346.51
Total Shareholders' equity	120,867,281	121,928,695	123,457,462	125,811,929	124,284,547
Total liabilities and shareholders' equity	182,209,045.90	185,322,998.33	190,396,952.91	196,526,443.09	191,224,037.26

The cash flow statement is also calculated and is shown below.

Table 19: Cash flow statement

	2024	2025	2026	2027	2028
PAT	464,713.93	521,274.62	1,043,599.28	1,918,652.89	1,193,542.86
Add: Depreciation	16,712,386.00	15,853,286.00	15,081,658.50	14,388,560.94	13,765,969.42
Add: Interest	8279298.00	8279298.00	8279298.00	7242086.50	5382498.00
Change in working capital	(2,868,303.67)	(13,343,306.18)	(1,537,088.58)	(4,821,342.36)	(6,702,836.31)
Changes in current assets	(17,664,949.97)	(13,808,020.11)	(2,058,363.20)	(5,864,941.64)	(8,621,489.20)
Change in current liabilities	14,796,646.30	464,713.93	521,274.62	1,043,599.28	1,918,652.89
Tax paid					
Cash flow from operating activities	22,588,094.26	11,310,552.44	22,867,467.20	18,727,957.97	13,639,173.97
Purchase of plant property and equipment					
Capital work in progress					
Cash flow from Investing activities	-	-	-	-	-
Debt repayment	3,285,483.00	8,279,298.00	8,279,298.00	8,279,298.00	7,242,086.50
Equity investment					
Dividend paid					
Interest expenses	0.00	0.00	0.00	0.00	0.00
Cash flow from financing activities	3,285,483.00	8,279,298.00	8,279,298.00	8,279,298.00	7,242,086.50
Net change in cash	19,302,611.26	3,031,254.44	14,588,169.20	10,448,659.97	6,397,087.47
Opening cash balance	89,468,588.50	108,771,199.76	111,802,454.20	126,390,623.40	136,839,283.37
Closing balance	108,771,199.76	111,802,454.20	126,390,623.40	136,839,283.37	143,236,370.84

Table 20: Different financial ratios

Sl.	Ratios	Basis	2024	2025	2026	2027	2028
I	Liquidity ratios						
1	Current Ratio	Current Assets/ Current Liabilities	8.75	1.98	1.94	1.95	2.05
2	Quick Ratio	(Current Assets - Inventory-Pre-Paid Expenses)/ Current Liabilities-Bank Overdraft	0.91	0.62	0.61	0.58	0.57
3	Cash ratio	Cash and cash equivalents / Current Liabilities-Bank Overdrafts	7.16	0.47	0.41	0.33	0.27
II	Profitability ratios						
1	Net Profit Ratio	(Net Profit / Sales)	0.05	0.05	0.05	0.04	0.03
2	Return on Assets	Net Profit / Total Assets	0.05	0.04	0.08	0.08	0.06
3	Return on Equity	PAT / Total Equity	0.00	0.00	0.01	0.02	0.01
4	Return on Capital Employed	PBIT / Capital Employed	0.08	0.08	0.08	0.08	0.06
III	Efficiency ratios						
1	Asset turnover Ratio	Sales / Average Total Assets	0.74	1.47	1.64	1.82	2.05
IV	Solvency ratios						
1	Solvency Ratio	(PAT+ Depreciation)/(long Term Liabilities+ Short Term Liabilities)	0.34	0.36	0.35	0.35	0.31
2	Interest Coverage Ratio	(PBIT +Interest)/Interest	2.08	2.09	2.18	2.38	2.32

20.0 Project Timeline

The project timeline has been drawn based on the assessment and the financial investment analysis above. This is to ensure smooth implementation of the project.

Table 21: Project timeline

Project activities	Months							
	1	2	3	4	5	6	7	8
Securing investment	■							
Correspond with suppliers		■						
Supplier selection			■					
Signing of contract			■					
Place supply order				■				
Delivery of equipment/machines				■	■			
Installation						■		
Testing and commissioning							■	
Operation								■
Submission of completion report								■

Table 22: Calculation of NPV, IRR and payback period (Amount in millions Nu.)

	Capital cost	Raw milk cost	Employee cost	Admin cost	Operating cost	Other cost	Total cost	Revenue from P. cheese	Revenue from Yogurt	Revenue from others	Total revenue	Net cash flow
2024	83.66	59.779	10.463	2.126	5.902	58.835	220.77	154.412	6.921	1.428	162.761	-58.00
2025	0	64.199	10.724	2.156	6.019	63.87	146.97	163.177	7.243	1.428	171.848	24.88
2026	0	73.876	10.993	3.213	6.139	75.354	169.58	184.872	8.126	1.428	194.426	24.85
2027	0	87.840	11.267	2.340	6.261	89.932	197.64	211.384	9.202	1.428	222.014	24.37
2028	0	95.352	11.549	2.238	6.386	106.704	222.23	231.667	9.989	1.428	243.084	20.86
2029	0	107.252	11.838	2.344	6.513	123.919	251.87	256.518	10.954	1.428	268.9	17.03
2030	0	120.638	12.134	2.455	6.643	143.911	285.78	284.034	12.012	1.428	297.474	11.69
2031	0	135.694	12.437	2.571	6.775	167.129	324.61	314.503	13.172	1.428	329.103	4.50
2032	0	152.629	12.748	2.692	6.910	194.093	369.07	348.239	14.445	1.428	364.112	-4.96
2033	0	171.677	13.066	2.819	7.047	225.407	420.02	385.595	15.840	1.428	402.862	-17.15
									NPV			29.021
									IRR			30%
									Payback period			3.34




21.0 Recommendations

Based on the situational analysis and outcome from the field survey, following are some of the recommendations for business improvement.

- a) As pointed out by most of the consumers, retailers and even farmer's groups, there is need to make KIL products more accessible/available in the market. Some request more distributors in their region/area as well since it seems there is none at present.
- b) There is increasing use of processed cheese mainly for different purposes such as in cooking, pizza and other recipes in various stages of food. Thus, KIL in future will have to look into diversification of its products mainly for import substitution.
- c) KIL will also have to improve production process especially in terms of packaging such as through semi-automation which will save lot of manpower as well as quality of packaging which is very important for both domestic as well as for international market.
- d) Lack of concentrate feeds access to dairy farmers impacted negatively to animal production experiencing drastic milk supply decline to the Plant. Either KIL investment in Animal Feed or to collaborate with the Department of Livestock on the feed part will help to bring about tremendous financial benefits to dairy farmers as well as to KIL for providing strong synergies for KIL business. Besides, there is also an opportunity, if KIL can also come up with its own feed production for the interest of long-term business sustainability with quality and affordable feed to dairy farmers.
- e) The other option to increase milk flow to the plant will be KIL's investment to Cow leasing program. At least 30-40% of the net profit from the business operation should be reinvested into procurement of Dairy Cows and Leasing Dairy Cows to farmers through special cost sharing mechanism and recover cost through monthly installment basis from the milk. This new approach of investment strongly fits into KIL's CSR benefiting the most disadvantage sections of dairy farmers interested in farming. Farmers have limited access to credits from the financial institutes. The fund invested in procurement of milking cows will be recovered on monthly installment basis through milk and reach out with similar scheme to unreached. This new innovative approach of investment will help to ensure increased and consistent milk supply from the farmers under formal legal agreement.
- f) Another option for long term sustainability of the plant will be to establish own dairy farm in different locations which can be operated by groups of farmers but for the plant. All operation and management can be outsourced to third party but they will have to supply milk only to KIL.

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- g) In order to enhance and scale up production capacity as well as to incorporate the principles of Good Manufacturing Practices with total quality assurance system, the existing production facilities need to be upgraded and create additional new infrastructure through extension of existing building. The existing production structure or area will need to be modified to facilitate the smooth flow of processes and boost production. Modifying and strengthening effluent treatment plant.
 - h) As per the individual performance, tailor-made training programs will need to be facilitated for staff both for in-country & ex-country. A short specific training courses will benefit the organization to fill up the specific positions and job performance and it's also a tool for successive HR planning. Lack of trained manpower like Dairy Technologists or Dairy experts in the company limits exploiting opportunities in product innovations and product diversification activities.
 - i) There is need of Research and Development for innovation of new products that can compete with the best companies in the country and the region. Research and development is required for products development, technological innovation and process optimization.
 - j) About 89% of the potential distributors are interested to sell the KIL dairy products and about 86% of the potential customers are interested to buy if products are made available in their locality that too from the retailer and wholesaler (92%). Treating this as a match in the supply chain, KIL could put more effort into making their products available to the localities of Bumthang, Lhuntse, Tsirang, Zhemgang, and Dagana districts as the market potential mean for both potential distributors and the potential customers are shown higher in those districts over the others.
 - k) Looking at the potential distributors and the customers' preference response result, Zambala Cheese Block is highly preferred followed by unsalted/salted butter and Gouda Cheese. Koufuku may continue or enhance their product attributes, accessibility, and prices to keep the existing market intact as well to enhance the market base as these attributes are ranked highest by both distributors and consumers.
 - l) About 35% of respondents expressed a desire for higher milk rates. They believe that an increase in rates would lead to more success, better income, and overall development of their community. This indicates that the current rates are perceived as inadequate. This is a major risk factor for the company since if somebody provides better price, farmers will move to that client which will lead of complete disruption of the plant. So it is necessary to work out fresh milk rates from time to time so that it is beneficial to both KIL and the farmers for long term relationship.

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- m) There is also a need for better communication and engagement between farmers and milk collectors. This includes listening to farmer's concerns, setting fixed collection time and maintaining transparent communication regarding milk quality and payment issues.
 - n) In some cases, it has been mentioned that there is need for infrastructure development such as proper milk collection houses or centres nearer to their villages for convenience. Some have also mentioned about the need of refrigerator at the milk collection centres to maintain the quality of milk. This would reduce transportation challenges and improve overall operational efficiency during milk collection.

22.0 Conclusion

KIL came into an operation from 2015 with collection of 400-500 liters of milk every day from few dairy farmers' groups in Trashigang and processed Gouda cheese and yoghurts. The company initially produced only Gouda cheese for export market to Japan while yoghurt market was targeted to schools. Today, the company produces processed cheese under the brand name "Druk Zambala Cheese", salted and non-salted butter, stirred yoghurt, set yoghurt, gouda cheese and cottage cheese. It plays a vital role in value addition to primary raw milk in the dairy value chain. Currently, it collaborates with 16 Milk Groups, comprising 1004 micro-farms/households across four Dzongkhags of Trashigang, Mongar, Trashiyangtse, and Samdrup Jongkhar) for raw milk supply to the plant. The company produces 8000 kgs of Druk Zambala cheese in a month from which only 36 % of the existing market demand is being fulfilled at the moment. If the company receives the milk to run the desired capacity (4000 litres milk) then the company will be able to fulfil 70-80 % of the existing market demand. There is currently 64 % demand supply gap mainly because of insufficient milk supplied by the farmer groups linked with KIL.

Over the years, KIL recorded increased milk supply in 2022 with the increase of more than 60% compared to preceding years. KIL was able to gained market in substituting processed cheese import with the market growth over the years. Slowly, it is gaining popularity among the consumers over the imported cheese. There is immense market opportunity for the KIL to take advantage of domestic markets through instituting coordination among the stakeholders to facilitate increased milk supplies to the plant. This is supported by 89% of the potential distributors interested to sell the KIL dairy products and about 86% of the potential customers are interested to buy if the products are made available in their locality. Moreover, now the people are more conscious of heath and KIL cheese being organic in nature attracts more consumers to their preference.

However, to cope up with the planned targets and domestic market demands, KIL will need to expand and upgrade its technology into more efficient cheese production line as well as for related products in order to enhance production efficiency, ensure food safety, reduce cost of production

and improve business efficiency. The equipment and the machines existing have already served their life and are in need of replacement. Production equipment and machineries have already started giving problems along with non-availability of critical spare parts due to obsolete brands in the market. It is timely to upgrade the technology and come up with more advance equipment for production improvement through investment support from CARLEP.



23.0 Annexure

23.1 Details of equipment

Gouda processing Technology							
Technical Items	Qty (Nos)	Technical Items/machines	Technical Specification	Application of the Technology	Company	Qty	Cost(Nu)
Chillers	2	HTST machine	HTST machine inclusive of instant heating process in line with cream separator and milk reception chillers. 1200 ltrs/hr milk flow rate.	Used for gouda processing and milk pasteurization.	MGT	1	800000
HTST machine	1	Bacteriofuge	Semi manual	For microbial separation of milk	MGT	1	100000
Two cheese vat	2	Stainless steel molds	3 kg	Moulding of gouda cheese	MGT	100	50000
Pressing machine	4	Pressing machine	32 molds	pressing machine used for whey separation from cheese	MGT	2	20000
Gouda mould	60	Butter churner	25 kg	Production of butter(100 % fat) from separated cream	MGT	1	50000
Butter mold	30	Humidifier	Ultra-sonic humidifier, soundless and rust proof	Maintaining of humidity in ripening room (99%)	NCT	2	24000
Butter churner	1	Stainless working desk	Stainless steel, non-corrosive	Used for Gouda Moulding	MGT	4	25000
AC (blue Star)	2	Ripening room or cold storage room for ripening of cheese (Puf panel)	Well-furnished or SS coated room.	Ripening of cheese.	MGT	1	60000
		Rack trolley SS	5 to 6 layers	carrying cheese and butter	MGT	2	5000
		Brining solution trolley	500 liters	preparation of brining solution	MGT	3	100000
		Butter mold SS	2 kg size butter mold	For butter processing.	MGT	30	4000
		Batch pasteurizer for paneer processing	500 liters	For batch wise heating of milk for paneer production.	MGT	1	25000
		paneer mold	3 kg	paneer processing	MGT	25	4000
		paneer vat	500 liters	paneer processing	MGT	1	20000

		paneer pressing machine	32 molds	paneer packing	MMCPL	1	200000
		paneer packing equipment	1 kg 10 kg packing machine	paneer Packing	MMCPL	1	300000
		Pasteurized milk packing machine set	500 liters hr	pasteurize milk packing machine	Greater noida	1	300000
		Ghee machine	1000 liters	ghee processing	Greater noida	1	250000
			Total				13920000

Yogurt Processing							
Technical Items	Qty (Nos)	Technical Items	Technical Specification	Application of the Technology	Company	Qty	Cost(Nu)
Sealing filling machine	1	Pasteurizer	500 litres	Pasteurization of milk before yogurt processing	MGT	1	260000
conveyer	1	Chillers	2000 litres	Used for chilling of milk.	MGT	1	200000
Video jet printing machine	1	Homogenizer	1000 litres per hr flow rate	Homogenizing the yogurt into uniform structure	MGT	1	260000
		Conveyer	2000 cups per hr	MFD printing of our product	MGT	1	200000
		Bottle blower machine	semi- automatic machine	For blowing plastic into its required shape	MGT	1	200000
		Air compressor machine		for yogurt filling	MGT	1	200000
		paneer coagulation tank	500 litres	paneer processing	MGT	1	100000
		Milk storage tanks -2 to 3 nos (1000 liters per hrs.)		milk string purposes	MGT	1	400000
		Printing machine (video jet)	2000 cups per hr	MFD printing of our product	MGT	1	100000
		Yogurt pump	Technical Specification	movable pump	MGT	1	50000
		Incubator set	breath 10 m and 20 m length	for incubation purposes	MGT	1	250000
		Cold storage room	breath 10 m and 20 m length	For storing finished goods.	MGT	1	
			Total				2220000


Milk reception					
Technical Items	Technical Specification	Application of the Technology	Company	Qty	Cost(Nu)
Milk weighing tank	2000 kg	Milk weighing	MGT	1	200000
Weighing scale	2000 ltrs	milk amount measurement	Intect India export private limited	1	70000
Milk dump tank with cover	1000 ltrs	milk receiving tank	Intect India export private limited		45000
Drip saver	5 cans capacity	To remove excess water from the milk can	Intect India export private limited	1	50000
Can washer	3 cans	washing can	Intect India export private limited	1	65000
Milk pump	2000 liters/hrs	transporting milk from milk tanker to chillers	Intect India export private limited	1	500000
Raw milk silo	2000 liters	excess storage of milk	Intect India export private limited	1	200000
Milk testing laboratory (preliminary testing laboratory)	well-furnished glass house	instant milk testing laboratory	Intect India export private limited	1	
		Total			1130000

Laboratory equipment				
Laboratory Testing	Equipment	Purpose	Qty	cost
COB	Burner , beaker	To find milk coagulation	1	5000
pH meter	Digital pH meter	to measure pH of cheese and milk	1	45000
Alcohol test	Alcohol gun	to find freshness of milk	1	20000
Acidity	Burettes, burette stand beaker dropper	to find milk acidity	1	20000
Reassurance	Water batch , test tubes 10 ml , 1ml pipette, lovibond comparator, measuring cylinder, conical flask,	to find milk quality	1	2000
Fat test(Gerber butter fat)	Gerber centrifuge , Gerber barometer with appropriate stoppers , Gerber milk pipette ,	To find milk fat percentage	1	100000
Lactometer/ density	Gerber lactometer, measuring cylinder for holding sample	to measure water adulteration	1	5000
Inhibitor activity	Incubator / oven / water bath/ beaker / test tubes		1	2000
Phosphatase test	Water batch (controllable, comparator, test tubes and pipette, filter paper, litmus paper.	to find phosphatase content	1	2000
Microbiological test	Incubator, petri dishes and test tubes, durham tubes. Sampling bottles. Microbiological kamps, autoclave, top loading balance, spatula, stericas/ wire loops, refrigerator and thermometer.	to find microbial count.	1	50000

Viscosity test	Viscometer/ Rheometer, water bath, beaker	to find viscosity of milk	1	20000
Peroxide(H ₂ O ₂) test			1	20000
Brix test	Brix meter		1	30000
Laminar Air flow	biosafety level 1	to create aseptic condition	1	2000000
	Total			2321000

23.2 Milk flow forecast

Milk group	Daily 2023	2024	2025	2026	2027	2028
Samkhar Gewog						
Khapti	300	300	300	300	320	350
Domkhar	100	100	100	100	120	150
Yenangbrangsa	100	100	100	100	120	150
Rangshikhar	250	250	250	250	270	300
Pam	0	150	150	150	150	200
Rolong	5	10	10	10	20	20
Rongthong	0	150	150	150	170	200
Uzorong	150	150	150	150	170	200
Phongmey	0	0	0	150	150	200
Radhi	0	0	0	150	150	200
Saling	0	0	0	150	150	200
Lungtenzampa	80	80	80	80	100	100
	985	1290	1290	1740	1890	2270
Shongphu Gewog						
Chaling	150	150	150	150	170	200
Chnagmey	100	100	100	150	150	170
Gongsaphangma	100	100	100	150	150	170
	350	350	350	450	470	540
Yangner gewog						
Gongthung	500	550	550	550	600	600
	500	550	550	550	600	600
Mongar Dzongkhag						
Ngatshang Gewog	250	250	250	250	270	270
Yadi	20	20	20	20	50	50
Chaskhar Gewog	250	250	250	250	250	250
Balam Gewog	200	200	250	200	250	250
	720	720	720	720	820	840
Trashiyangtse						
Jamkhar	100	100	100	100	150	170
	100	100	100	100	150	170
S/jongkhar Dzongkhag						
Gomdar	400	400	400	400	450	450
Orong	300	300	300	300	350	350
Shokshing	200	200	200	200	250	250
Nublang farm	0	100	200	200	250	250



Yarphu	150	150	200	200	250	250
Jangchubling	150	150	200	200	250	250
	1200	1300	1500	1500	1800	1800
Daily average milk (ltr.)	3,855	4310	4510	5060	5730	6220