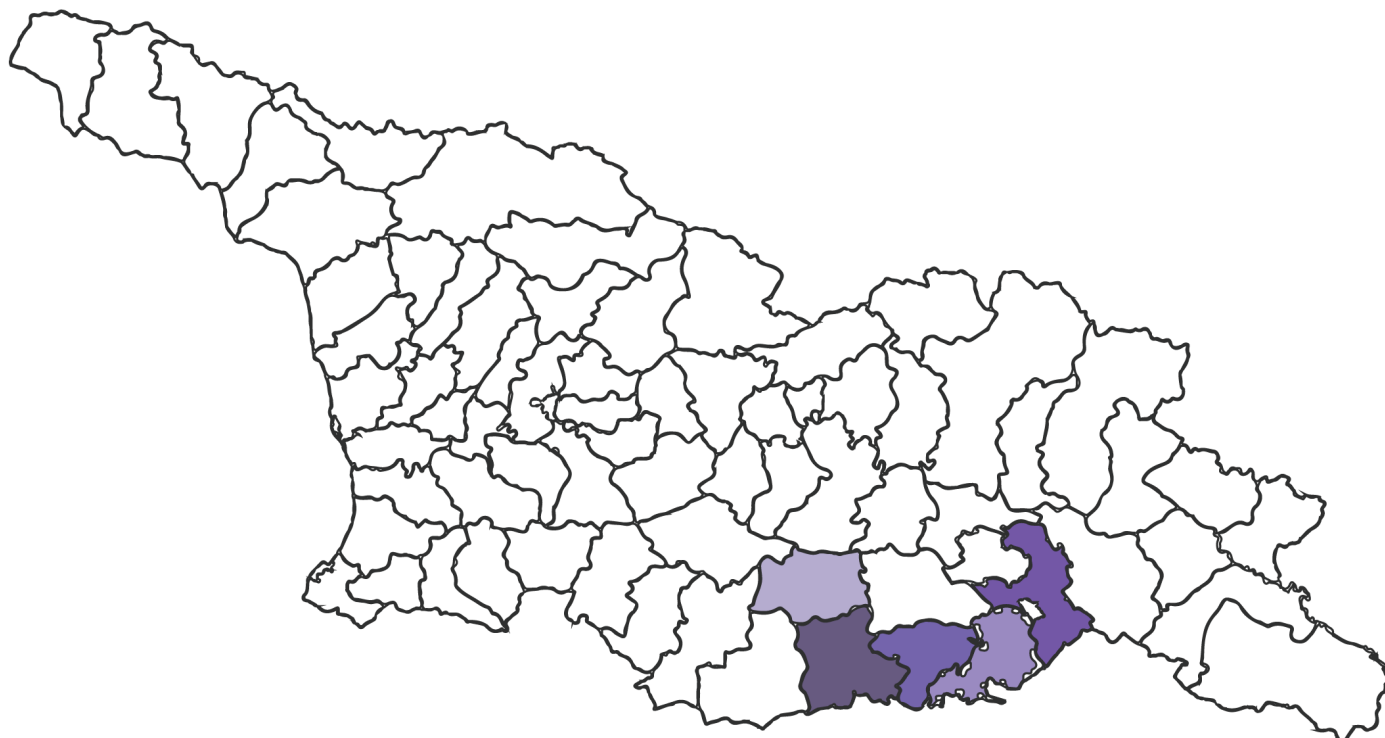




WHEAT AND FLOUR VALUE CHAIN IN THE MUNICIPALITIES OF MARNEULI, BOLNISI, GARDABANI, DMANISI AND TSALKA

USAID UNITY THROUGH DIVERSITY PROGRAM
2023





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1. Introduction

The USAID Unity Through Diversity Program, implemented by UNA-Georgia and led by USAID, is a five-year initiative aimed at integrating ethnic and religious minorities into various aspects of Georgian society. PMCG, as a subcontractor of UNA-Georgia, contributes to expanding and strengthening socio-economic connections between the majority and minority communities, with the objective of establishing mutually beneficial business relationships.

One component of the program focuses on conducting value chain assessments in specific ethnic and religious minority municipalities. These assessments aim to identify gaps in each stage of production within the wheat and flour value chains and provide recommendations for increasing the integration of ethnic minorities into the value chain. Additionally, the assessments aim to explore opportunities for integrating the regional value chain into national or international value chains.

In the report, separate chapters are dedicated to examining each of the value chain actors within the wheat and flour sectors in Marneuli, Gardabani, Dmanisi, Tsalka, and Bolnisi municipalities. These chapters provide detailed insights into various aspects of the value chain, focusing on specific topics and actors involved. The topics covered include:

- Methodology: Examining the quantitative and qualitative analytical approaches employed in the study of the wheat and flour value chains in the selected municipalities.
- Sector Overview in Georgia: Reviewing sector trends, consumption, production, import, export, prices, productivity, and other parameters.
- Value Chain Actors: Overviewing the value chain actors and providing an understanding of the value chain processes.

Furthermore, a comprehensive SWOT analysis is carried out to evaluate the robustness of the wheat and flour value chains in the designated municipalities. This analysis thoroughly assesses the strengths, weaknesses, opportunities, and threats, both internal and external, that have the potential to influence the prosperity and advancement of these value chains. This assessment serves as a foundation for crafting pertinent suggestions and strategic approaches for enhancement.

The report furnishes strategic recommendations aimed at fostering the growth of the wheat and flour value chains in Marneuli, Gardabani, Dmanisi, Tsalka, and Bolnisi, with a specific emphasis on integrating ethnic minorities into the value chain and linking the regional value chain with national or global counterparts. The overarching objective is to support the sustainable advancement of the wheat and flour sector within these municipalities, focusing on critical aspects such as wheat planting, harvesting, maintaining quality standards, and ensuring food safety.

By addressing existing challenges, capitalizing on available opportunities, and promoting collaboration among key stakeholders, the report seeks to unleash the latent potential of these municipalities. The ultimate aspiration is to stimulate economic expansion and generate positive outcomes for consumers and local communities alike. Through the effective implementation of these recommendations, the wheat and flour industry in these regions can thrive, leading to increased economic prospects and improved livelihoods, all while meeting market demands for high-quality products.

2. Methodology

The investigation into the wheat and flour value chain within the designated municipalities of Gardabani, Marneuli, Bolnisi, Tsalka, and Dmanisi employed a blend of quantitative and qualitative analytical approaches. This study encompassed both desk research and field research, along with the careful selection of interviewees based on their direct pertinence to the value chain. Subsequent interviews were conducted as part of this comprehensive research methodology.

The research started with an extensive desk research phase. This involved reviewing existing literature, reports, and studies related to the wheat and flour value chain in the target municipalities. The purpose was to gather background information, identify gaps in knowledge, and understand the existing research landscape. Before the shortlisting of the wheat and flour sector, all of the sectors were assessed using three criteria: Concentration of produced products¹, import substitution, export potential and infrastructure/warehouse accessibility. Following the identification of sectors that obtained the highest scores, additional desk research and validation workshops were conducted to enhance the understanding of the sectors' influence on the local community, the integration of minority groups within the broader society and economy, and their alignment with municipal priorities.

After a comprehensive assessment of the aforementioned factors, the wheat and flour value chain emerged as the sector with the most promising prospects and strengths within the municipalities of Marneuli, Gardabani, Dmanisi, Tsalka, and Bolnisi. We conducted field research to gather primary data, aiming to attain a firsthand and direct comprehension of the wheat and flour value chain dynamics. This research phase involved on-site visits to the specified municipalities, where we directly engaged with key stakeholders integral to the value chain. These stakeholders encompassed seed suppliers, farmers, and representatives from flour mills. The rigorous selection of these participants significantly contributed to the representativeness and relevance of the study.

We developed interview guides and questionnaires to maintain consistency and cover the pertinent topics. The interviews aimed to gather qualitative insights, perspectives, and experiential knowledge from the participants concerning the wheat and flour value chain. Addressing the language barriers present in the municipalities, some of the interviews had to be conducted in Russian, particularly focusing on Marneuli.

A crucial aspect of the study was the implementation of triangulation, a method employed to bolster the credibility and dependability of the results. This approach involved merging various data sources, encompassing both quantitative and qualitative data, to yield a more thorough comprehension of the wheat and flour value chain. The National Statistics Office of Georgia, Geostat, played a central role as the primary source for quantitative data.

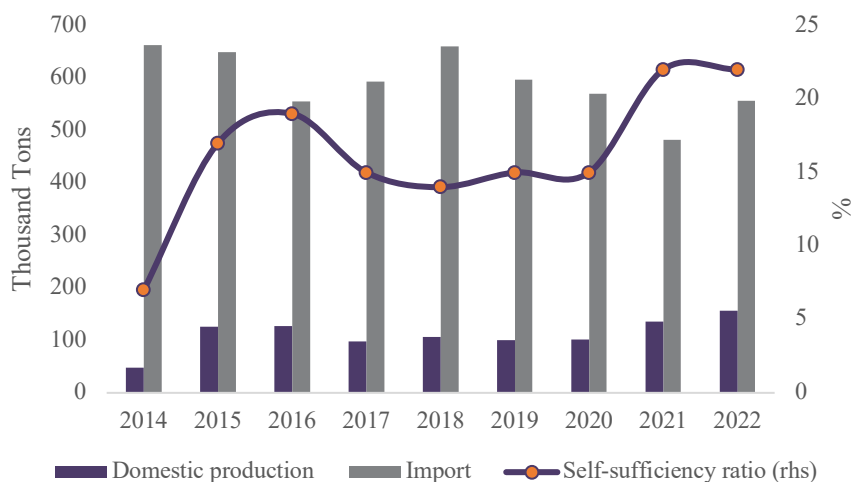
¹ Location Quotient (LQ) regional analysis method was used.

3. Sector Overview in Georgia

Wheat, a staple cereal crop, occupies a central position in global agriculture, food production, and trade. Its significance is rooted in its role as a primary source of calories and nutrition for a substantial portion of the world's population. As a versatile crop, wheat serves as a fundamental ingredient in various food products, making it an essential component of diets in numerous regions. Beyond its dietary importance, wheat is a critical driver of economic activity, contributing to the livelihoods of millions of farmers and serving as a key export commodity for many nations, while for Georgia, it is one of the most important imports.

Ensuring the safety and security of wheat resources is of paramount importance due to the far-reaching implications of any disruptions in supply. The stability of wheat production and distribution systems is crucial to maintaining food security and stability in many regions. Adequate resources of wheat are essential to meet the demands of a growing global population, safeguard against food price volatility, and mitigate the risks of food shortages.

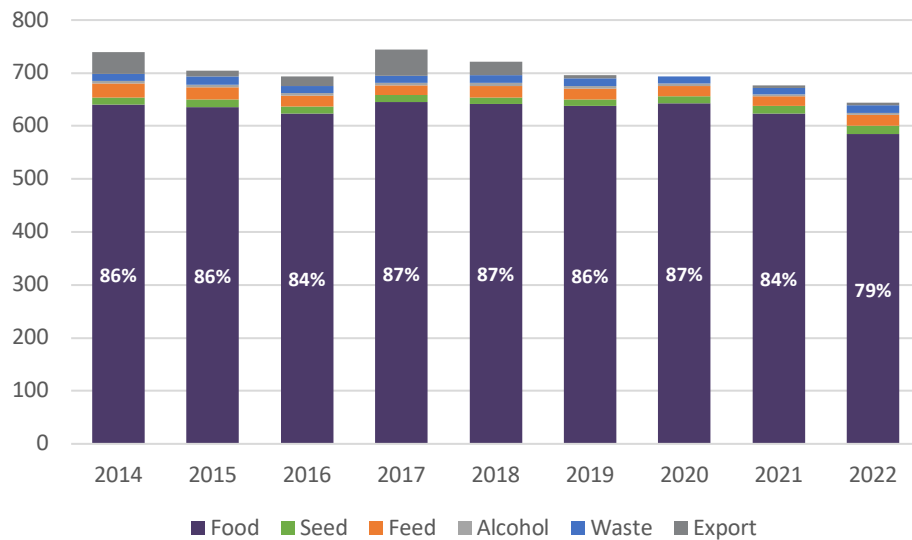
Graph 1: Balance sheet for wheat and wheat-related products



Source: Statistics Office of Georgia

In the year 2022, the aggregate utilization of wheat and its derivatives by the Georgian populace surpassed 714 thousand tons. Of this total, a mere 157 thousand tons were generated within the country, leaving the remaining 557 thousand tons to be imported. This imports-to-domestic production ratio translates to a self-sufficiency level of 22%. While this ratio does not denote complete self-reliance, it has demonstrated a notable upward trajectory over the past decade, rising from a mere 7% in 2014 to the aforementioned 22% in 2022. This upward trend in self-sufficiency can be attributed to two principal factors: a reduction in the import volume of wheat-related products and an escalation in domestically cultivated wheat output. However, it's imperative to recognize that certain additional factors, not easily observable within the available data, also contribute significantly to the inflation of the self-sufficiency ratio. **Among these factors, one noteworthy aspect is the heightened importation of flour and akin wheat-derived products, coupled with the accumulation of surplus wheat stocks observed in the year 2022.**

Graph 2: Balance sheet of wheat and wheat products by use in thousand tons

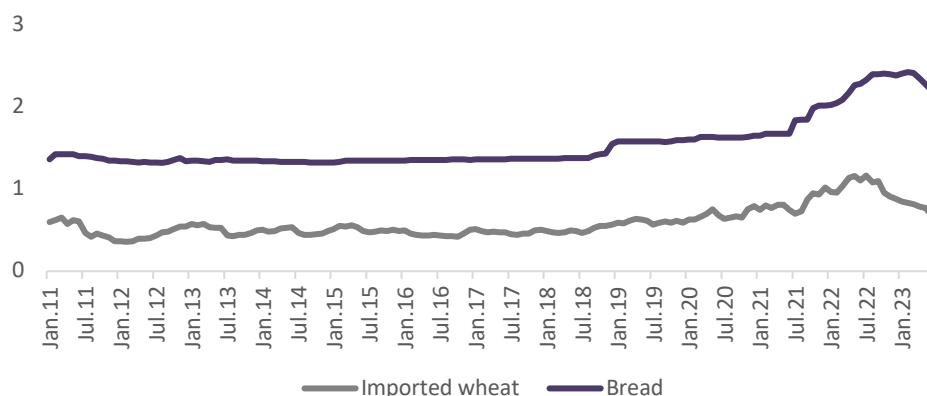


Source: Statistics Office of Georgia

A significant majority, exceeding 90% of the harvested wheat, is allocated for food consumption. The remaining portions are distributed for various purposes: seed usage accounts for 2.3%, forage feed takes up 3.3%, alcohol processing claims 0.6%, and a portion amounting to 2.2% is inevitably wasted, some due to quality issues, while others due to inability to be sold. Intriguingly, a relatively minor proportion of wheat products, constituting 0.8%, is designated for export. Although these exports accounted for 6% of the overall wheat balance sheet 10 years ago, the share has since diminished. Notably, the primary destination for these exports has been Armenia, with a noticeable surge from USD 6.2 million in 2011 to a substantial USD 38.7 million in the subsequent year. This abrupt increase can be partially attributed to tariff reductions established between the two countries. However, falling prices of wheat on the international market and the competitive advantage of cheaper Russian wheat swiftly displaced the Georgian alternative in the Armenian market, leading to a near cessation of wheat exports in 2016. Back then, the main advantage of alternative wheat exporters was price, indicating that the quality of Georgian wheat was on par with the international alternatives.

In the typical Georgian household, the most significant portion of spending is allocated to food. Within the inflation basket index, food and non-alcoholic beverages constitute approximately one-third of the total. Among these, bread is considered the utmost essential product. During the first half of the 2010s, the price of bread remained relatively steady, experiencing a slight decrease in the early years of the previous decade. However, a significant price surge was observed in 2018, primarily attributed to a deficient wheat harvest in Russia. This occurrence underscores the considerable impact of the Russian wheat industry on Georgia's own wheat sector.

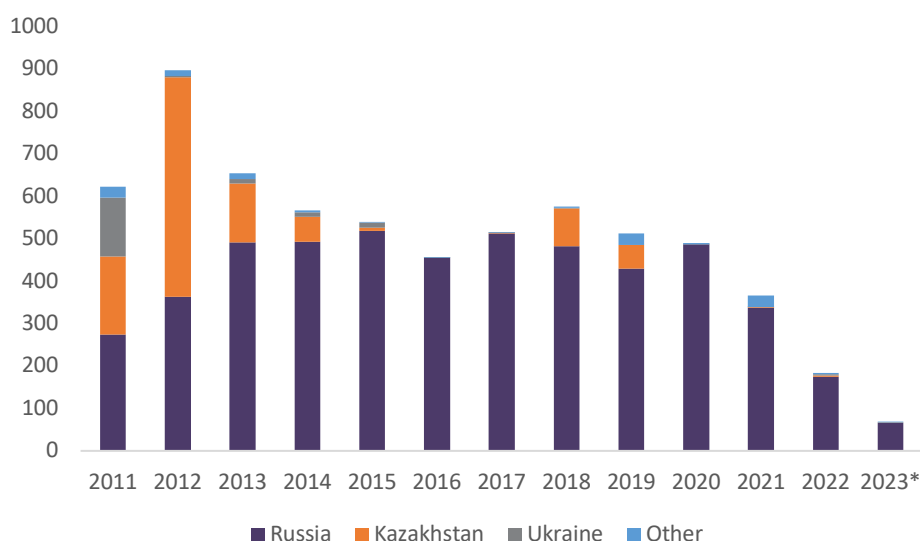
Graph 3: Price of 1 kg imported wheat and bread in Georgia in GEL²



Source: Statistics Office of Georgia

Historically, the importation of wheat in Georgia displayed a notable diversity, with three primary source countries contributing significantly: Russia, Kazakhstan, and Ukraine. However, the share of these latter two nations in the total wheat imports had markedly declined by the year 2015. Occasional wheat imports from countries other than Russia do occur, but these quantities remain negligible. The predominant factors driving the preference for Russian wheat are its competitive pricing, often coupled with superior quality compared to domestic alternatives, and the advantageous cost-effectiveness facilitated by the close proximity of Russian wheat production areas in the North Caucasus, as well as the presence of wheat processing facilities. Additionally, the increased demand for wheat in Central Asia and increasing competition on wheat from Kazakhstan further solidifies the financial rationale for the majority of wheat importers in Georgia to opt for Russian wheat.

Graph 4: Imports of wheat by country (thousand tons)³



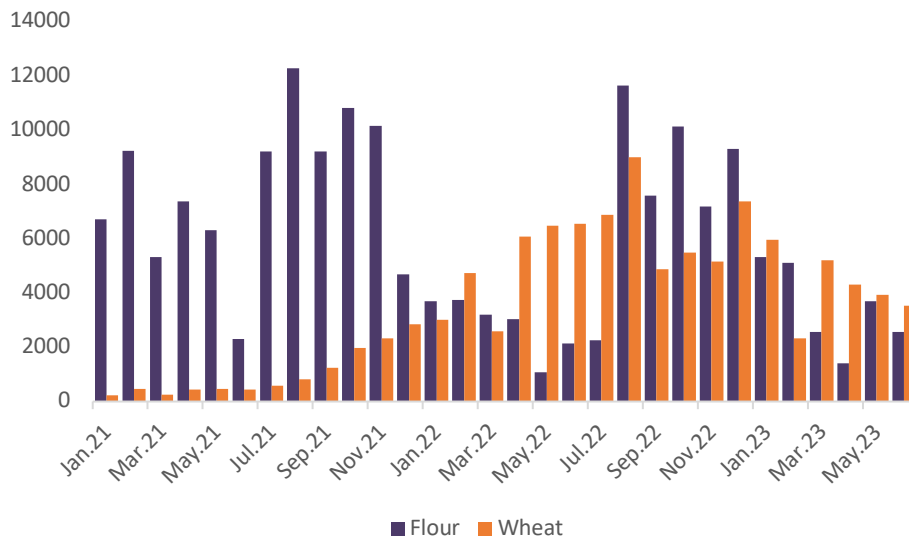
² Average price for 1 kg of white bread was assumed to be GEL 2.2 as of August 2023.

³ Only the first 7 months of 2023 are displayed.

Source: Statistics Office of Georgia

It's worth noting that the overall volume of imported wheat has experienced a significant reduction since 2020, declining from nearly 500 thousand tons in that year to 175 thousand tons in 2022. However, it is essential to clarify that characterizing this as a reduction in Russian wheat imports would be an inaccurate portrayal, as reality paints a divergent picture.

Graph 5: Imports of wheat and flour in thousand USD⁴



Source: Statistics Office of Georgia

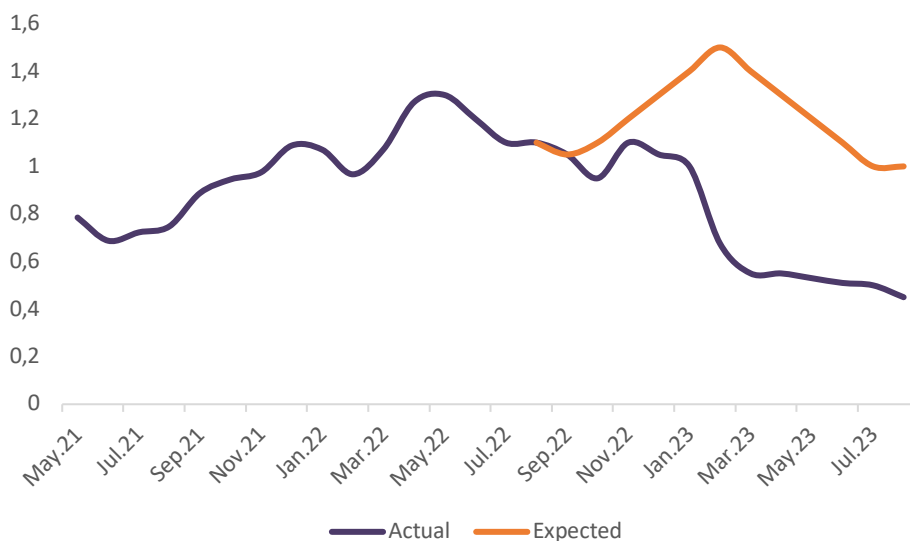
In February 2021, against the backdrop of already escalating food prices, Russia implemented export taxes on wheat, initially set at 25 euros per ton but subsequently doubled within a few months. For importers in Georgia, this policy shift translated to an approximate 5% increase in prices. **Simultaneously, the fluctuating nature of the subsidy program generated uncertainties among wheat importers, prompting some to opt for the substitution of wheat with flour.** This substitution strategy, however, introduces additional concerns, posing potential risks to national food safety. Importing flour is generally associated with lower quality, and it tends to have a shorter shelf life, thereby diminishing the stockpile capacity.

While the import of wheat did resume during the harvesting period in August 2022, the existence of stockpiled flour and Russian wheat exerted a negative influence on prices. To mitigate the impact of the oversupply of Russian wheat and flour within the Georgian market, the Government of Georgia took measures. Starting from June 2023, a GEL 200 tax was imposed on imported flour for a duration of five months, accompanied by a comprehensive prohibition on kibbled wheat. However, it is important to note that the influx of large amounts of flour had been going on for more than a year by that point. With the flour mill industry unsure of what to expect, either a ban on flour imports or a subsidy on wheat purchases, they had completely halted their operations during the first four months of 2023. The latest initiative to ban flour imports was also considered to be an abrupt decision by some in the wheat and flour industry.

⁴ Thousand USD was chosen instead of weight, as the utility of 1 kg of flour is far greater than 1 kg of wheat

Another noteworthy determinant influencing the decisions of Georgian wheat farmers is the factor of expectations. For an extended period, the prevalent practice among these farmers has been to amass a considerable portion of their harvest and subsequently release it into the market during the winter season. This strategy has been a long-standing tradition. Notably, the Russian invasion of Ukraine and the subsequent surge in international wheat prices exaggerated expectations of pronounced wheat shortages during the winter of 2023. Predictions indicated that prices could soar to as high as GEL 1.5 per kilogram of wheat.

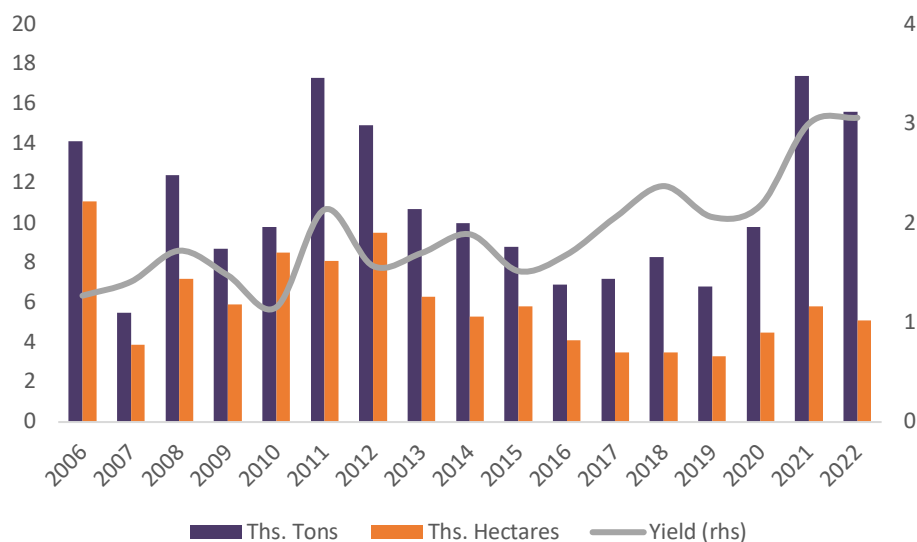
Graph 6: Wheat prices in Georgia (GEL per kg)



Source: Statistics Office of Georgia, SQIL MPIS, interviewed farmers in target municipalities

Curiously, many farmers responded to these expectations by adopting a cautious approach, leading them to store significantly larger quantities of wheat in preparation for the winter period. However, the actual outcomes diverged significantly from these anticipations. Surprisingly, not only did the price of international wheat not rise as predicted, but it also experienced a substantial decrease, both on the international market and domestically within Georgia. This unanticipated price trajectory contrasts sharply with the actions taken by the farmers, leading to an unexpected misalignment between expectations and actual market dynamics.

Graph 7: Wheat production in Kvemo Kartli



Source: Statistics Office of Georgia

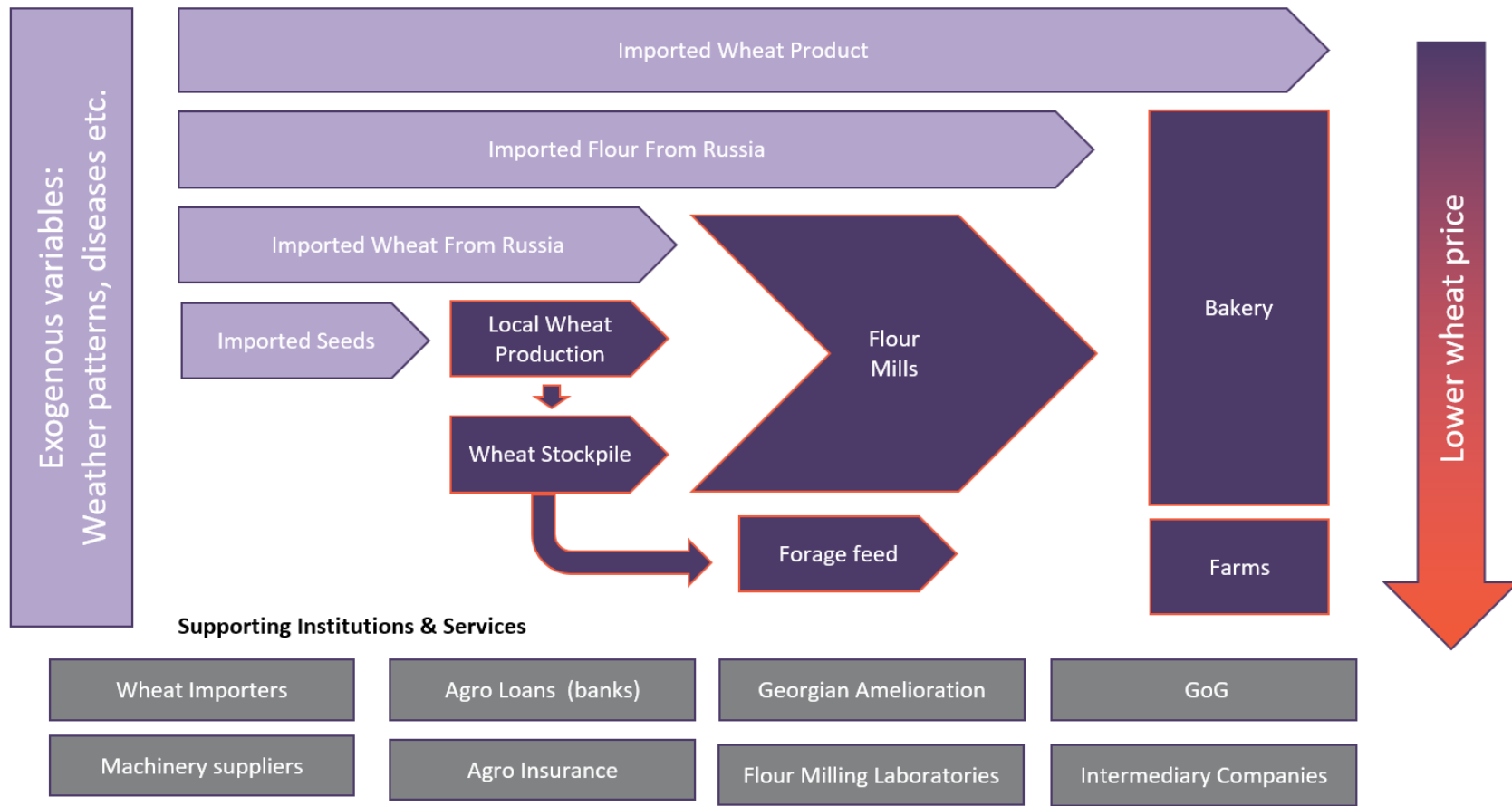
The Kvemo Kartli region holds the distinction of being the second largest wheat-producing area in Georgia, with 15.6 thousand tons of wheat produced in 2022, trailing only the Kakheti region in this regard, which produced 120.7 thousand tons in the same period. Other notable regions, such as Shida Kartli and Samtskhe-Javakheti, produced 11.7 and 6.2 thousand tons, respectively. Wheat cultivation has undergone significant changes over the past 15 years. During this period, wheat farming enjoyed greater popularity, evidenced by the utilization of approximately 11.1 thousand hectares of land in Kvemo Kartli, a figure more than double the present land area dedicated to wheat cultivation. Overall, the target municipalities of Marneuli, Gardabani, Bolnisi, Tsalka, and Dmanisi account for more than 85% of the wheat production and land usage in Kvemo Kartli⁵, with Marneuli municipality being the largest producer out of the selected 5 municipalities, amounting to 40% of the production in the region. The latter boasts such a high production capacity due to larger land availability and better irrigation infrastructure, in conjunction with a more suitable climate and soil type for wheat farming. In addition to Marneuli, Bolnisi can also be regarded as a significant hub for wheat farming. This assertion is supported by the fact that a majority of farmers who own lands exceeding 100 hectares have holdings in both Marneuli and Bolnisi, while avoiding other municipalities. This phenomenon can be attributed to the relatively close geographical proximity of these two regions, as well as the comprehensive range of agricultural services available in Bolnisi, mirroring the offerings of Marneuli's market. Farms situated within the municipalities of Gardabani, Dmanisi, and Tsalka are predominantly characterized by smaller-scale operations. These farms primarily rely on the neighboring regions of Bolnisi and Marneuli for various resources and support.

While the land area devoted to wheat has not experienced substantial growth in recent years, noteworthy advancements in farming management, the adoption of modernized machinery, and the availability of improved seed quality have contributed to a remarkable transformation in wheat harvest yields. From 2019, the yield per hectare has increased by more than 50%, in conjunction with the larger area of land utilized for wheat, the total production has increased from 6.8 tons to an impressive 15.6 tons in 2022. Remarkably, the wheat harvest yields in the Kvemo Kartli region, which equaled 3 tons per hectare in 2022, slightly surpass those observed in Kakheti, where it amounted to 2.9 tons per hectare.

⁵ Quantitative assessment from interviews made with farmers who hold farms both in Tetrtskaro and target municipalities.

Due to high costs associated with wheat farming and falling prices observed on the international markets from 2008 to 2017, significant proportion of those lands have been converted for other uses. One of such uses is for corn, but the main alternative for farmers who wanted to leave the wheat production behind was to reorient the land for livestock feed use, like planting silage or renting the land for foraging. Given the high yields achieved, the Kvemo Kartli region possesses the capacity to more than double its wheat production by employing the same size of land that was utilized in 2006. This emphasizes the significant potential for increased wheat production within the region based on the current yield levels.

Graph 8: Value Chain Map of Wheat and Flour sector



4. Value Chain Actors

4.1. Primary Factors

Rainfall is a crucial factor in determining the growth and development of wheat throughout its various stages, and it can be considered as the first and the most vital part of the value chain. With climate change effects already felt in Georgia, especially the southern and eastern parts susceptible to desertification, in conjunction with erratic rainfall patterns, meaning longer draughts and heavier rainfall, the weather plays a significantly more important role in the success of wheat harvest than it did before.

Wheat development can be divided into 6 parts, with each stage requiring a certain amount of rainfall:

Table 1: Planting stages of wheat with the most optimal rainfall

| Stages | Period | Rainfall Needed |
|---------------------|-----------------------|-------------------------------|
| Planting stage | September to November | Adequate rainfall |
| Tillering stage | December to March | High rainfall |
| Jointing stage | March to April | Adequate rainfall |
| Flowering stage | May to June | Limited rainfall ⁶ |
| Grain filling stage | June to July | Adequate rainfall |
| Ripening stage | July to August | Low rainfall ⁷ |

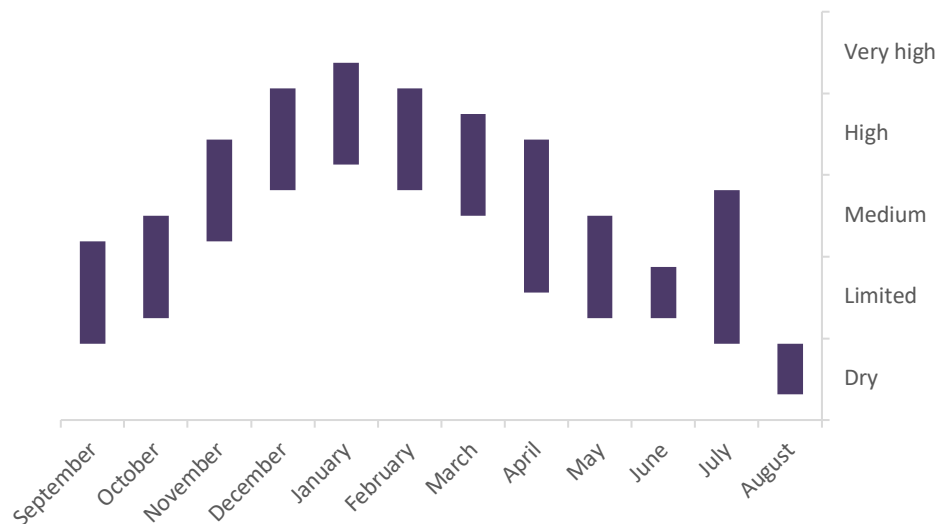
Source: Interviews in target municipalities

If all of the conditions of rainfall are met, both yields and quality can substantially benefit. Especially important are flowering stage and ripening stage, where increased rainfall and humidity damages the grain. **The negative effects of the rainfall anomalies can be mitigated by preemptive measures, such as drainage systems, sloped farms, irrigation etc.**

⁶ Drought causes poor pollination and decreased wheat yields, whereas too much rainfall causes reduced grain set.

⁷ Low rainfall needed to decrease moisture, excess of which can lead to pre-harvest sprouting and reduce grain quality. In such conditions, wheat contains its “crystallized” form and can be sold for GEL 0.2 more per kilogram.

Graph 9: Months with the most optimal rainfall for wheat common in Kvemo Kartli

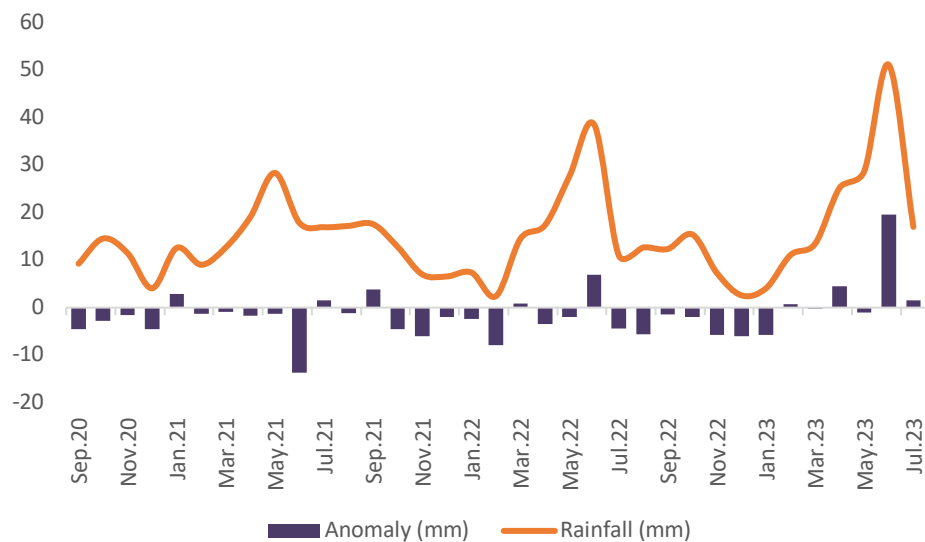


Source: Interviews in target municipalities

Surveyed farmers reported varying amounts of rainfall in the past three crop seasons. In fact, only a quarter of farmers stated that the rainfall during the above-mentioned time frame was adequate or normal. The majority of interviewees (60%) stated that the 2020-2021 season had high rainfall (with emphasis on hail) compared to the following 2021-2022 season, for which the same amount of farmers reported low rainfall. The current season seems to be much wetter than the previous two seasons. A farmer from Dmanisi municipality put it in the following way: “We had a hailstorm in 2021, drought in 2022, and floods in 2023”.

The anomalies can be seen in rainfall data. **With increasing global temperature, weather anomalies have become more noticeable in the last 3 years.** A similar trend can be seen in the rainfall data of Kvemo Kartli region. Though the average rainfall of the region does not exactly coincide with ideal weather pattern for wheat, locals have adapted with different types of wheat and varying harvesting dates. 2023 has been especially damaging for some of the farmers, as the excess rainfall anomaly coincided with flowering stage, decreasing yields.

Graph 10: Observed rainfall and anomaly in Kvemo Kartli



Source: WFP, food security analysis

The diverse array of wheat seeds encompasses various types, each distinguished by unique characteristics and intended applications. Among the pivotal factors guiding the selection of the most appropriate wheat variety for cultivation, gluten concentration assumes paramount importance. Gluten, an essential protein with remarkable viscoelastic properties, plays a transformative role in bestowing bread with its characteristic structure, texture, and elasticity. Consequently, wheat seeds are broadly classified into three main types based on their gluten content: hard wheat, soft wheat, and forage wheat, also referred to as green wheat.

Hard wheat, renowned for its elevated protein concentration and robust gluten development, emerges as the principal choice for bread production. Its formidable gluten network ensures the formation of well-risen and chewy loaves, rendering it ideal for crafting hearty bread and other substantial baked goods. On the other end of the gluten spectrum, soft wheat boasts a lower protein content, resulting in a more tender and delicate texture in the baked products it engenders.

Beyond the realm of human sustenance, wheat also serves as a crucial source of nourishment for livestock. Here, the significance of forage wheat comes to the fore. Forage wheat, specially cultivated to cater to the dietary preferences of livestock, is characterized by its reduced gluten content. The lower gluten concentration in forage wheat renders it easily digestible for animals, making it a favored feed option. To optimize its nutritional benefits for livestock, forage wheat is strategically harvested before the grains reach full maturity and proteins attain their maximum development.

Alongside the protein levels, maturity date and season, disease resistance, yield potential, baking quality, and region of adaptation also play important roles. Almost all of the farmers had winter wheat, which is sown in the fall, lives through the winter, and is then harvested in the summer. As winter wheat has significantly more time to accumulate proteins and gluten, it is usually preferred over spring wheat. In addition, winter wheat requires a mild winter not to freeze in the most vital stages of its development, and such weather is usually a characteristic of the target municipalities.

During the interviews, it was quite hard to identify which type of wheat the farmers had planted, as some of them used mixed farming, modified crops, or had no information about the type of wheat they had planted in the first place.

Out of the farmers who could identify the type of wheat they had planted, the most common were the following: Amicus, Gallus, Grom, and Koper. All of them are high-quality wheat seeds with good yields and baking quality. However, there are some key differences.

Table 2: Planting stages of wheat with the most optimal rainfall

| | Amicus | Gallus | Grom | Koper |
|----------------------|-----------------------------|-----------------------|----------------|----------------|
| Bread or forage | Bread | Bread | Bread | Bread |
| Hard or soft wheat | Hard | Hard | Soft | Mixed variants |
| Maturity date | Early | extremely early | Medium | Medium |
| Disease resistance | Good | Good | Good | Good |
| Yield potential | High | High | High | High |
| Baking quality | Excellent | Excellent | Good | Excellent |
| Region of adaptation | Europe, Asia, South America | North America, Canada | North Caucasus | Georgia |

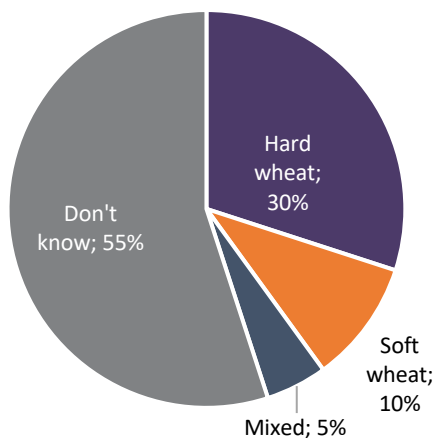
Source: Interviews in target municipalities

- **Amicus** is an early maturing wheat variety, which means that it can be harvested earlier in the season than Gallus or Grom. This can be an advantage for farmers in areas with short growing seasons. Amicus is also a hard wheat variety, which means that it has a higher gluten content than soft wheat varieties.
- **Gallus** is a medium-maturing wheat variety, which means that it has a longer growing season than Amicus but shorter than Grom. Gallus is also a hard wheat variety with a high gluten content. It is well-suited for making bread and other baked goods.
- **Grom** is a soft wheat variety with a lower gluten content than Amicus or Gallus. This makes it less well-suited for making bread, but it is still suitable for making pasta and other baked goods. Grom is also a good choice for farmers who are looking for a wheat variety that is resistant to diseases.
- **Koper** is a soft wheat variety that is native to Georgia. It is known for its high yields and good baking quality. Koper wheat is a popular choice for making bread in Georgia. It is also used to make pasta, noodles, and other baked goods.

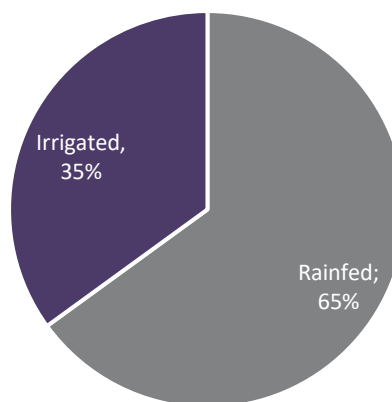
A substantial number of farmers, predominantly situated in the southern expanse of the Marneuli municipality, have attested to procuring wheat seeds from sources of unofficial or non-formal nature. Among these instances, one particular type of seed has recurrently emerged, purportedly originating from Ukrainian origins. However, the precise taxonomic classification of this seed variety as either hard or soft wheat remains a subject of ambiguity. Nevertheless, it is noteworthy that the farmers have conveyed that their prior acquisitions of wheat from these identical sources underwent a diverse array of testing procedures aimed at gauging their applicability for bread production. If this specific wheat variant were to indeed demonstrate its aptness for bread-making, according to farmers, market valuation of the wheat could increase by 10%.

Almost a third of the farmers (30%) reported producing hard wheat, with 10% having soft wheat and only 5% having mixed types. **The rest, which is 55%, had no information not only about the type of wheat (hard / soft), but also about other characteristics.**

Graph 11: Distribution of planted wheat by type



Graph 12: Farms by irrigation types



Source: Interviews in target municipalities

Types of irrigation can significantly affect crop yields. Two of the most common methods of wheat production are rain-fed and irrigated wheat production. Rain-fed wheat production relies on the natural rainfall in the area to provide water for the crop. This type of production is more common in areas with a moderate climate and a reliable rainfall pattern. Rain-fed wheat production is less expensive than irrigated wheat production, but it is also more risky. If there is not enough rainfall, the crop may fail. Irrigated wheat production uses artificial irrigation to provide water for the crop. This type of production is more common in areas with a dry climate or a variable rainfall pattern. Irrigated wheat production typically has higher yields than rain-fed wheat production, but it is also more expensive. Irrigation infrastructure, such as canals and pumps, needs to be installed and maintained, and water must be purchased.

The main differences between rainfed and irrigated wheat production can be summed up in the following chart:

Table 3: Features of rain-fed and irrigated wheat production

| Feature | Rain-fed wheat | Irrigated wheat |
|----------------------|-----------------------------|------------------------|
| Water availability | Depends on natural rainfall | Artificially irrigated |
| Yield | Lower | Higher |
| Cost | Less expensive | More expensive |
| Risk | Higher | Lower |
| Environmental impact | Lower | Higher |

Source: Interviews in target municipalities

The majority of the farmers surveyed, comprising 65% of the sample, predominantly depended on natural rainfall as the primary water source for their agricultural endeavors. Nearly all of these respondents expressed their concern regarding excessive precipitation experienced in recent months. This surplus rainfall adversely affected crop quality and caused diminished yields. However, a farmer from Bolnisi municipality shared insights

regarding a distinctive topographical feature. He underscored that certain wheat farms, characterized by a discernible inclination, exhibited resilience against the repercussions of heavy rainfall. In such instances, the torrential downpours effectively washed away excessive water, leaving behind a higher moisture content, increasing the yields and quality. In stark contrast, fields with flatter terrain endured the inundating impact of flooding, leading to pronounced agricultural setbacks. Significantly, none of the rainfed agricultural plots featured the presence of requisite infrastructure, notably including drainage ditches or diversion channels.

The situation regarding irrigation practices among farmers brings forth various complexities. Only around a third (about 35%) of the participants mentioned they were actively using irrigation methods, with most of them in the municipality of Marneuli. The common methods were surface irrigation and sprinkler systems, and a few respondents mentioned combining these two approaches manually. Because water is abundant, methods that save water, like drip irrigation and subsurface irrigation, are not as commonly used. Interestingly, despite Marneuli being the only municipality from the targeted areas that is implementing irrigation on a mass scale, in the last season, farms in Tsalka boasted higher yields, mainly because of more moderate rainfall in the latter.

Addressing the substantial water availability, it is noteworthy that the entire water provisioning is facilitated by the Georgian Amelioration services. The network of water canals extensively covers the vast expanse of the designated municipalities, including Marneuli, Dmanisi, Bolnisi, Gardabani, and Tsalka. The cost associated with supplying a hectare of land with water amounts to GEL 70 per month, encompassing the provision of water throughout the Spring, Summer, and Autumn seasons. On initial inspection, the prospect of encountering water scarcity issues may appear negligible. However, it is apparent that farmers continue to grapple with challenges concerning irrigation. Beyond the reluctance to enhance crop yields through more efficient and complex farming methods, the predicament extends to financial constraints and logistical impediments. These multifaceted factors contribute to the predominance of rainfed farming practices among the majority of agricultural practitioners.

When assessing the quality of service provided by the Georgian Amelioration, two primary factors come into play: the proximity of the water canal and the proximity of the service provider's office. The former plays a pivotal role in determining the feasibility and potential economic viability of irrigating the agricultural field. For instance, if a water canal is situated just a few hundred meters away from the farm but lacks accessible open ditches and furrows, its utility diminishes substantially. This scenario becomes even more complex when the terrain features a noticeable incline, rendering gravitational force insufficient to channel water effectively from the canal to the field.

In situations where the distance between the farm and the canal is relatively short, and there is a manageable incline, farmers often resort to the utilization of water pumps. Such occurrences are quite widespread in the southern parts of the Marneuli municipality, where the canals physically do exist, but there is no adequate infrastructure to connect the water to the farms without the pumps. These pumps offer considerable efficiency and ease of control, although, in contrast to rainfall, they entail significant financial outlay. The precise cost outlay varies due to multiple factors, including fuel prices, initial pump acquisition costs, pump efficiency, the span between the canal and the farm, the degree of incline, and others. According to the local farmers from the above-mentioned regions, common pump models are priced around GEL 2000, accompanied by an additional monthly expenditure for fuel, commencing at approximately GEL 300 when irrigation becomes necessary.

The secondary factor, of comparatively lesser influence, is about the vicinity and the caliber of services offered by the Georgian Amelioration to the farmers from the target municipalities. According to the farmers stationed in the outskirts of Marneuli, the maintenance of the canals is a recurring necessity due to potential clogging issues. The consequences of obstructed canals encompass a decline in water supply, which poses an evident concern. Additionally, a distinct challenge arises from the escalating pressure within these canals, potentially leading to water surges and consequent field inundation. This predicament is absent in areas where comprehensive services are extended, safeguarding against such occurrences. However, certain farmers from the eastern parts of the Marneuli municipality have voiced grievances, underscoring that the operational distances of the Georgian Amelioration offices are notably more substantial compared to neighboring villages. This geographic disparity

leads to service delays, compelling farmers to undertake remedial actions themselves, often involving the engagement of costly vehicles.

Table 4: Distance – Service amelioration matrix

| | | Distance to canals | |
|-----------------|------|--|--|
| | | Close | Far |
| Service quality | High | <i>Cheap water and accessible services</i> | <i>Expensive water and accessible services</i> |
| | Low | <i>Cheap water and inaccessible services</i> | <i>Expensive water and inaccessible services</i> |

Source: Interviews in target municipalities

Taking into account the two variables of proximity, one with the canals and the other with the service providers, we are left with the four possible outcomes:

- **Cheap water and accessible services:** with canals being in the vicinity of the farm and the maintenance being done periodically, the majority of the farmers who use irrigation have such conditions.
- **Expensive water and accessible services:** Farmers encountering such circumstances typically find themselves situated at a distance of a few hundred meters from the aforementioned group. The cost of water transportation is almost never economically feasible when it comes to wheat. However, water pumps are occasionally employed, predominantly when farmers need to irrigate other crops.
- **Cheap water and inaccessible services:** In the absence of support from the Georgian Amelioration, the overall expense linked to irrigation significantly surpasses the costs incurred by those who bear the monthly fee of GEL 70. Nonetheless, there are instances where farmers view this trade-off as justifiable.
- **Expensive water and inaccessible services:** In conditions like this, it is impossible for household farmers to grow any kind of produce, they even neglect to pay the Georgian Amelioration fee of GEL 70, citing that they should not pay for services which they are not provided with. Only large-scale farmers, who can afford to dig separate ditches and pump the water, take part in farming activities.

4.2. Production Cycle

Wheat production encompasses two distinct cycles: the first type is winter wheat, initiated in late summer or early autumn and extending through the early to middle stages of summer. In contrast, spring wheat is sown during the early spring period and undergoes harvesting several months subsequent to the summer wheat. Given that the majority of the farmers from target municipalities subjected to interviews concentrated on cultivating summer wheat, with only a small minority having experience in cultivating both wheat types, their responses were primarily solicited exclusively for the summer wheat variant.

The procurement of agricultural inputs in the region typically occurs during the late July to early August timeframe, with primary focus placed on the acquisition of wheat seeds, which stands as the principal and often sole input procured within this period. Local farmers face three primary alternatives when it comes to sourcing these seeds: they may opt to purchase them from local fellow farmers, obtain them from nearby agricultural markets, or place custom orders with suppliers based in Europe or the United States.

Table 5: Cycle of each production stage in target municipalities

| | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug |
|----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Buying inputs | 30% | 15% | 5% | | | | | | | 10% | 25% | 15% |
| Tilling | 25% | 20% | 15% | | | | | | | | 10% | 30% |
| Planting | 40% | 25% | 15% | 5% | | | | | | | | 15% |
| Weeding | 32% | 16% | 11% | 5% | 5% | 11% | 16% | 5% | | | | |
| Applying Pesticides | | | | | | 12% | 29% | 29% | 18% | 12% | | |
| Applyin Fertilizers | 5% | 5% | 5% | 11% | 16% | 21% | 26% | 11% | | | | |
| Irrigation | | | | | | 6% | 22% | 28% | 22% | 17% | 6% | |
| Labor Hiring | 21% | | | | | | | | | | 16% | 63% |
| Harvesting | 5% | | | | | | | | | 10% | 15% | 70% |
| Selling | 20% | 15% | 5% | | | | | | | | | 60% |

Source: Interviews in target municipalities

It's noteworthy to emphasize the economic implications of these choices, as the cost of the seeds directly affects subsequent crop outcomes. The most economical seed variants available in Kvemo Kartli, priced at approximately GEL 1.5 per kilogram, although budget-friendly, are typically associated with inherent trade-offs leading to diminished yields and substandard quality. Notably, a substantial proportion of farmers, especially farmers with Georgian rather than Azerbaijan or Armenian ethnicities, choose to invest in wheat seed varieties such as "Amicus" and "Gallus," which come at a slightly higher cost of approximately GEL 2.5 per kilogram. These particular seed types have gained favor due to their ability to strike a balance between cost and yield quality, presenting a practical compromise between affordability and productivity.

Conversely, the market in Marneuli offers premium seed variants at a significantly elevated price point, reaching up to GEL 4.5 per kilogram. While these more expensive options may offer potential advantages in terms of yield potential and crop performance, they demand a more substantial initial investment from farmers, both as the initial input and further maintenance, which most of the farmers in the rural areas of Kvemo Kartli do not find to be a worthy trade-off.

It is essential to highlight that a significant proportion of farmers, particularly those who invest in medium-quality seeds with price ranges spanning from GEL 2 to 3 per kilogram, consistently underscore the criticality of selecting appropriate seeds. While this emphasis on seed quality is not unfounded, it's noteworthy that many farmers tend to disproportionately prioritize this aspect while allocating relatively less attention to the subsequent procedural aspects that unfold after the wheat has been planted.

4.3. Machinery

The preparation and tilling of land in the target municipalities predominantly occur during the late August to early September timeframe. Historically, this process relied heavily on cheap manual labor provided mostly by ethnic

minorities, but over the years, mechanization has gradually replaced human workers. This transformation has been facilitated by a combination of factors, including government-subsidized machinery programs covering 35% of the costs, the establishment of subsidized service centers to support the use of machinery, and a notable escalation in labor costs—increasing from GEL 20 per day prior to the COVID-19 pandemic to the current rate of GEL 50.

The adoption of machinery for land preparation has become nearly ubiquitous due to these factors. **However, a significant proportion of farmers in Kvemo Kartli have voiced concerns regarding the escalating expense of renting agricultural machinery.** This emerging financial burden has garnered substantial attention within the farming community.

The high expense associated with machinery rental was previously alleviated by government subsidies facilitated through the Agricultural Logistics and Services Company, which provided machinery at affordable rates. Notably, this company operated two centers situated in the Marneuli and Bolnisi regions. Regrettably, during the period spanning 2019-2020, due to instances of negligence and inadequate maintenance, these services were discontinued. A significant portion of the machinery was subsequently auctioned off to the farmers in Marneuli and Bolnisi municipalities, but feedback from farmers who acquired tractors, harvesters, and related equipment painted a disheartening picture of their condition, with some items deemed irreparable.

Presently, the option of renting machinery from farmers in either Marneuli or Bolnisi has become considerably more expensive in the long run than outright purchase. However, for the majority of farmers, the financial feasibility of acquiring such equipment remains elusive. For instance, to cater to the needs of a wheat farm spanning 100 hectares, at the very least, the possession of a single tractor is necessary, with prices for such machinery potentially reaching GEL 400 thousand.

Physical accessibility is not a prevailing issue, as these machines are readily available for sale both through online channels and local vendors. Notably, one of the prominent establishments, Noblex, is affiliated with Agrosphere, located in Marneuli, offering a variety of machinery options.

It's important to mention that households who own tractors and lease them to fellow farmers have not been immune to these changes. The cost of servicing and maintaining machinery has surged considerably, largely attributed to the shift from once-public service centers in Bolnisi and Marneuli to private entities. This transition to a privatized model has contributed to the increased costs and has generated apprehension among those relying on rented agricultural machinery.

4.4. Financial Analysis

In 2015, the Ministry of Agriculture conducted an assessment that indicated the cultivation of wheat on a one-hectare land would incur costs amounting to GEL 1926. The total value of the harvested wheat sold was GEL 3000, resulting in a final profit of GEL 1074. Subsequently, the dynamics of wheat farming have undergone significant changes. As reported by farmers, the expenses include GEL 300 for tilling, GEL 120 for planting, a minimum expenditure of GEL 150 per hectare for fertilizers, and approximately GEL 450 for the required quantity of wheat seed (180 kg per hectare). These initial costs alone exceed GEL 1000.

The latter half of expenses, spanning from September to August over a period of 10-11 months, adds another GEL 1500 to the total cost. This amount is allocated to cover labor, harvesting, additional fertilizers, pesticides, fuel for water pumps, and other related expenses. **A preliminary estimation places the cost of cultivating wheat on a hectare of land at approximately GEL 2500, signifying a notable 40% increase when compared to the previous two seasons.**

Revenue is contingent on two primary factors: quantity and price. Unlike the uniformity in pricing, there exists considerable variation in the reported wheat harvest quantities among the majority of farmers, varying more by the methods they use rather than by municipalities. Some farmers experienced a reduction in yields from 5 tonnes per

hectare to 3 tonnes, while others observed the opposite trend. Taking an average yield of 4 tonnes per hectare, accounting for the typical loss of 15-20% during the harvesting process, and with a price of GEL 0.5 per kilogram, the farmer's approximate revenue amounts to GEL 2000. This translates to a net loss of GEL 500 per hectare.

The realization of losses becomes a tangible concern only if the decision is made to sell the wheat at the present moment. Farmers, however, have long acclimated themselves to the challenging landscape of volatile prices. It is customary for a significant portion of the harvested wheat to be conserved and sold during the winter months—a time-honored approach that has been embraced by farmers for decades.

Historically, about half of the harvest in Kvemo Kartli was typically sold immediately, while the remainder was reserved for sale during the winter season. However, the current year presents a noteworthy departure from this pattern, as an overwhelming majority of the harvested wheat is being retained. This shift is attributed to the fact that a substantial number of farmers have not yet managed to sell the harvest from the preceding season.

Compounding the issue is the inadequate storage infrastructure, especially acute outside of the municipal center of Marneuli. Some farmers have been compelled to resort to paying their neighbors to store the wheat until winter arrives, while others have been forced to expand their existing storage facilities. Those contemplating such expansions have calculated that a storage unit capable of holding 20 tonnes of wheat could entail costs reaching up to GEL 100,000. This figure far surpasses any anticipated profit or revenue.

The practice of preserving harvested wheat and subsequently selling it during the winter months has been a fundamental strategy within the wheat farming landscape in the selected municipalities, primarily because of the dominance of the winter seeds in the region. This approach was further accentuated by the anticipations surrounding the potential prohibition of Russian wheat imports in the latter part of 2022. In response to the projected price surge, a significant majority of farmers made the strategic decision to predominantly sell their wheat during the winter season, projecting a price increase of 20-40% even without the changed geopolitical conditions, and up to 60% in case of decreasing Russian imports.

Regrettably, contrary to these optimistic projections, the prices, particularly within the local market in Marneuli, experienced a substantial decline, plummeting from GEL 1.00 to GEL 0.60, reflecting a stark 40% decrease. This unexpected turn of events dealt a severe blow to the farmers who had placed their bets on the prospect of higher prices. **The resultant surplus of wheat due to the high number of stockpiles exacerbated the situation, leading to a pronounced price slump that significantly impacted both forage and bread wheat prices, causing a substantial price disparity.**

4.5. Milling Industry

A clear distinction exists in Georgia between high-quality wheat intended for bread production and lower-quality wheat utilized for forage purposes. Mill owners in the selected municipalities region have voiced the prevalent trend of importing the majority of high-quality wheat from Russia, priced at GEL 0.7 per kilogram, while domestic alternatives command a lower price of GEL 0.55 per kilogram. This regional mill industry encompasses five mills in Kvemo Kartli, with two located in Marneuli, two in Bolnisi, and one in Rustavi. The largest among them, "Agrosystems" in Marneuli, boasts a daily processing capacity of up to 600 tons of wheat.

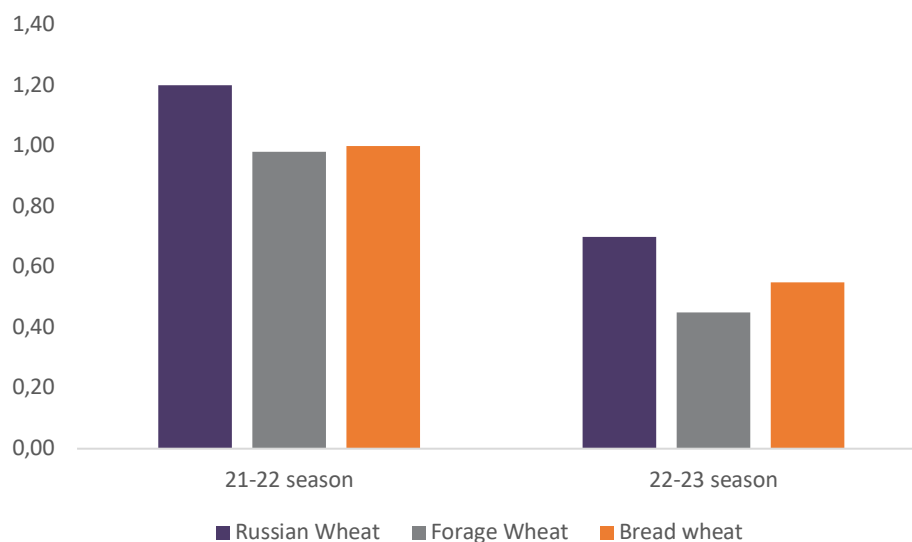
Interviews with the milling industry representatives have revealed their concerns regarding the quality of Georgian wheat, leading them to implement rigorous examination procedures in laboratories. Various methods are employed by the mills to assess wheat quality, often involving combinations of the following tests:

- **Ash Content:** Wheat samples undergo high-temperature combustion to eliminate organic material, leaving behind only the mineral ash.

- **Protein Content:** Near-infrared spectroscopy is used to measure protein levels, involving the illumination of wheat samples and measurement of reflected light.
- **Moisture Test:** Techniques based on resistance or capacitance are utilized to determine wheat moisture levels, with excessive moisture deemed undesirable.
- **Falling Number:** A test where wheat flour is mixed with water and heated, followed by the tracking of viscosity changes. Inadequate viscosity levels can have adverse effects on the baking process.

The increase in the supply of forage wheat has triggered a noticeable expansion in the price gap between Georgian forage wheat and bread wheat. In the previous season, the cost difference between bread wheat and forage wheat was minimal, ranging from 1% to 3%. However, the current situation represents a significant shift, with the price disparity now soaring to 20%, with prices at GEL 0.45 compared to GEL 0.55.

Graph 13: Price of Russian, Georgian Forage, and Georgian bread wheat (GEL per kilogram) 2021-2023



Source: Interviews in target municipalities

This stark contrast in pricing has prompted a considerable number of farmers to opt for selling their wheat to mills for the production of bread flour rather than utilizing it as forage feed. **Nonetheless, an interesting complication arises due to the prolonged period of relatively low distinction between low-quality and high-quality wheat prices, due to which farmers have shifted their production towards lower-quality wheat throughout the years.** This scenario has led to a substantial portion of wheat being rejected by mills, as the modest 2% increase in revenue did not sufficiently incentivize farmers to adopt more advanced and modern farming methods throughout the years.

Within the Kvemo Kartli region, there are five mills, four of which are strategically located within the target municipalities. These mills operate continuously throughout the entire year. Wheat is systematically stockpiled in silos, with replenishment primarily occurring during the late months of August and the winter season. The combined milling capacity of Kvemo Kartli's mills is estimated to hover around the range of 1200-1500 tons per day.⁸ However, these mills function at approximately half of this capacity to ensure a year-round supply of the product to the market.

⁸ Assuming that the largest flour mill has a daily capacity of 600 tons, while the other four have around 200 each.

Flour mills rely on three primary inputs: wheat, electricity, and labor, with wheat being the most crucial determinant of the final product's quality and price. As previously discussed, flour mills typically have two options for sourcing wheat: domestically from Georgia or from Russia. While Russian wheat is notably more expensive, it offers superior quality. Quality assessment occurs at multiple stages of the production process. Some farmers send their wheat to laboratories in Marneuli, Tbilisi, or nearby flour mills, where it undergoes various tests such as ash content, protein content, moisture level, and falling number. Flour mills also conduct quality checks on both the wheat and the flour they produce. If the results prove unsatisfactory, the wheat is returned to the farmers, who may either stockpile it or sell it for GEL 0.43 per kilogram as animal feed.

The most critical quality assessment occurs at bakeries and shops, where the final product, namely flour, is scrutinized. In the event of subpar quality, bakeries often demand refunds, highlighting the importance of ensuring high-quality flour. **To achieve such quality, flour mills primarily rely on imported Russian wheat, but they also blend it with higher-quality Georgian wheat, which is somewhat less expensive.** On average, Russian wheat, including VAT, costs GEL 0.7 per kilogram, while Georgian wheat of somewhat high-quality costs GEL 0.53 per kilogram, excluding VAT. Flour mills typically blend 80% Russian wheat with 20% Georgian wheat, resulting in an average wheat price of GEL 0.65 per kilogram.

Maintaining competitive prices is crucial due to intense competition within the flour milling industry. Bakeries and shops can easily switch suppliers, prompting flour mills to go the extra mile. Many flour mills in selected municipalities even offer free delivery directly to their customers. A representative from a Bolnisi flour mill shared that for clients making substantial flour purchases, they would deliver the product to any location in Georgia at no additional cost. As an example, they mentioned delivering flour to Kobuleti without shipping charges to compete with flour sellers in Batumi.

Flour is typically packaged in 25 and 50-kilogram sacks, which are procured at a reasonable cost in Tbilisi. Given the business-to-business (B2B) nature of this industry, elaborate packaging with marketing details is unnecessary, as the key determinants are the final product's price and quality. Some mills have attempted to use 1 and 2-kilogram sacks for shops that require smaller quantities of higher-quality wheat. However, logistical challenges rendered this approach financially impractical.

The primary challenge faced by the milling industry, especially smaller-scale mills in Bolnisi and Marneuli, is the practice of bakeries paying only upon selling their final goods (mainly bread). This system severely limits the mills' cash flow, especially when expanding their services to new customers. Instances of bakeries abusing this system by not paying the mills have been reported. In total, the rate of bakeries returning flour due to unsatisfactory quality or refusing to pay constitutes approximately 5% of total sales. With the decreasing supply of high-quality wheat from Georgian farmers and increasing costs of labor, the price of flour has increased by 20% compared to the previous year, ranging from GEL 0.9 to 1, though it must be mentioned that the level of their production across the year, therefore almost no seasonal price variation can be observed.

4.6. Funding and External Stakeholders

4.6.1. Government Agencies

Rural Development Agency (RDA)

The Rural Development Agency (RDA) is a non-profit entity responsible for implementing projects and programs initiated by Georgia's Ministry of Environment and Agriculture. Its primary objective is to foster sustainable and inclusive rural development and support rural communities. The agency takes on the task of planning and managing state programs and conducts research and analysis to identify priority areas and develop action plans accordingly.

Within the target municipalities, the RDA offers support for grain processing (with the exception of wheat flour). Here are some of the programs that are relevant to the value chain:

- **Preferential Agrocredit for Fixed Assets – subcomponent for financing the food and energy efficient industries** is relevant for this value chain. In particular, the **production of bread and bread products** from wheat (target B (k)) is one of the target directions, though the production of wheat itself is not covered by the program. In this framework, the RDA co-finances loans to create new agricultural enterprises or modernize old ones. Specific value-chain-relevant purposes include the production of organic fertilizer, an establishment of infrastructural enterprises such as grain dryers and storage warehouses. The total amount of the loan (s) issued to one beneficiary under the subcomponent shall not be less than 1,500,000 (one million five hundred thousand) GEL and shall not exceed 10,000,000 (ten million) GEL.
- **Preferential Agrocredit Project for Current Assets -** within the framework of **subcomponent of Annual Crop Financing** loans are issued to finance the costs of one operational year of annual crops and Lucerne for the following purposes: funding sowing and planting materials, expenses for pesticides and fertilizers, hiring labor and agricultural machinery, and covering fuel and lubricant costs for machinery used in agricultural activities. The loan amount issued per beneficiary on the season is set at GEL 10,000 to GEL 100,000. The maximum annual interest rate of the loan issued by a financial institution under the present sub-component to a beneficiary should not exceed 18%. The Rural Development Agency co-finances a 12-month interest rate loan under the subcomponent in amount of 9% per annum, no more than 14 months after the loan was issued, and after the beneficiary confirms the purposeful use of the loan.
- **Agroinsurance** – under the program, the agency offers co-financing insurance coverage for risks associated with hail, flood, and storm. Beneficiaries can insure land plots up to 10 hectares in size, except for wheat crops, which can be insured for land up to 50 hectares. Each beneficiary receives 70% of the necessary funding from the RDA.

Enterprise Georgia

Enterprise Georgia is a government agency functioning under the Ministry of Economy and Sustainable Development of Georgia. Its primary aim is to promote local production and encourage entrepreneurship. Through the "Micro and Small Business Support Program," the agency provides potential beneficiaries with the opportunity to receive grants of up to 30,000 GEL. The beneficiaries must contribute 20% of the total grant. Notably, the program does not finance the primary production of grains. Instead, it focuses on financing processing activities, specifically the production of wheat flour and bread.

4.6.2. Donor Organizations

Donor organizations play a crucial role in the grain and flour value chain. Since 2013, The European Union has provided support to rural development and agriculture in Georgia through ENPARD, the European Neighbourhood Programme for Agriculture and Rural Development. One of the main goals of the program was to introduce and improve the process of certification of seed and planting material in Georgia. Within the program, 7 nurseries were established throughout the country, and in 2022, the use of certified seeds for wheat production increased by 150%, compared to 2019. Through ENPARD, the Food and Agriculture Organization of the United Nations (FAO) conducts grant competitions to help farmers acquire necessary machinery and equipment. Additionally, ENPARD and FAO agronomists extend their support to interested farmers by introducing them to innovative no-till farming technology for wheat cultivation. This technology significantly reduces production costs.

4.6.3. Financial Institutions

7 out of 14 banks operating in Georgia cover the region of Kvemo Kartli. All the accessible banks in the region are presented in Marneuli, whereas only 4 banks operate in Bolnisi, Gardabani, and Tsalka. Dmanisi has the least number of banks in the region.

Table 6: Banking entities in Kvemo Kartli and selected municipalities

| Region/Municipality | Branches and Service Centers | ATMs | Number of Banks |
|---------------------|------------------------------|------|-----------------|
| Kvemo Kartli | 77 | 140 | 7 |
| Bolnisi | 8 | 9 | 4 |
| Gardabani | 8 | 21 | 4 |
| Marneuli | 16 | 23 | 7 |
| Tsalka | 5 | 6 | 4 |
| Dmanisi | 7 | 6 | 3 |

Source: National Bank of Georgia

With a total of 77 branches and service centers, Kvemo Kartli exhibits a strong presence in the banking sector. However, Rustavi alone accounts for 35% of total number of branches. The municipality with the most branches and centers is Marneuli (16), and the municipality with the fewest is Tsalka (5).

In addition, there are 140 ATMs in Kvemo Kartli. However, the distribution of ATMs differs significantly throughout municipalities. The bulk of ATMs are centered in Marneuli (23) and Gardabani (21). ATMs are less accessible in other areas.

Regarding non-bank financial institutions, there are 17 branches of lending entities in Kvemo Kartli, making up 5% of Georgia's total lending entity branches. Currency exchange bureaus, on the other hand, are fewer, with 46 branches, comprising 7% of the total branches. However, the region has a higher number of microfinance organizations, hosting 32 branches, which represent 8% of the total number of microfinance organizations in Georgia.

Table7: Number of branches of Non-Bank Financial Institutions in Kvemo Kartli and their share in total branches in Georgia

| Non-Bank Financial Institutions | Number of Branches | Share in Total Branches |
|---------------------------------|--------------------|-------------------------|
| Lending Entities | 17 | 5% |
| Currency Exchange Bureaus | 46 | 7% |

| | | |
|----------------------------|----|----|
| Microfinance Organizations | 32 | 8% |
|----------------------------|----|----|

Source: National Bank of Georgia

The conducted interviews reveal that the majority of wheat producers depend on loans for carrying the production. A significant part of respondents are users of Agro Loans (mostly business loans). Many farmers expressed difficulties in paying back the loans. Some farmers suggested a preference for longer-term loans for primary production of grain. Currently, they are required to repay the loan after harvest, which leaves farmers without substantial resources for reinvesting the gained profits into producing. Thus, the farmers believe that having more time to repay their loans would allow them to reinvest the profits and build stronger production in the long run.

4.6.4. Sectoral Associations

Grain producers in Georgia have the option to become members of two major associations: the Georgian Farmers' Association (GFA) and the Biological Farming Association Elkana. The latter, Elkana, has been dedicated to agricultural biodiversity conservation since 1996. Its primary objectives involve restoring Georgian seeds and planting materials. Notably, the organization began to breed, promote, and distribute endangered endemic species of Georgian wheat. Moreover, Elkana plays an active role in delivering training and consultations, sharing informative publications and news, and facilitating favorable conditions for organic production among Georgian farmers. A predominant proportion of farmers, particularly those belonging to ethnic minority groups, demonstrated limited or negligible knowledge of either of the aforementioned agricultural associations. Nevertheless, it is noteworthy that the GFA has garnered significantly greater recognition within this demographic part, primarily attributable to its active involvement in price data collection, land surveillance endeavors, and diversified financial initiatives. It is important to highlight that a minority of large-scale farmers from the Marneuli region have had experience of engagement with the Elkana organization in the context of Georgian wheat cultivation. However, majority of them chose to discontinue their endeavor with Elkana in favor of alternative crops, notably those from Europe and the United States, owing to the superior crop yield offered by the latter sources. The Wheat Producers Association stands out as the most proactive organization in terms of market analysis within the wheat industry. Their role involves providing valuable insights into the current trends within the global and local wheat markets. Furthermore, they actively protect the interests of Georgian farmers in the face of a competitive global business environment. The organization often provides feedback about government regulations of the wheat industry and trade, assessing the challenges related to food security in the country, as well as the stability of supply and prices of wheat, flour, and bread. While a substantial segment of the agricultural community does not maintain direct membership in the association, it is important to recognize that frequent interactions occur between affiliated members and their non-affiliated counterparts within the farming environment on a daily basis.

At the national level, another notable sectoral association is the Georgian Wheat Growers' Association. Their primary goals encompass the protection and revival of rare and endangered Georgian wheat species and varieties, along with the revitalization of bread-baking traditions in the country. In Kvemo Kartli region, the association took the initiative to restore unique endemic species – Dika and Shavphka. The project received funding from both the United Nations Development Programme (UNDP) and the Global Environment Fund (GEF). Within the framework of the project, local producers in Asureti planted high-quality certified seed material across a 50-hectare area. Additionally, the association conducted training and consultation sessions for local farmers.

4.6.5. Vocational Educational Institutions

In the target municipalities, there are three educational institutions providing Vocational Education and Training (VET) programs. Among them, two are situated in Marneuli, and one is in Dmanisi. It's worth noting that the

program related to farming is only offered at the institution in Dmanisi. However, there are no educational institutions offering VET programs in Tsalka, Bolnisi, and Gardabani.

Table8: Vocational educational institutions

| Municipality | Educational institutions with VET programs | Program name |
|--------------|--|---|
| Marneuli | Marneuli Community College | Do not have program relevant to the value chain |
| Marneuli | College of Marneuli | Do not have program relevant to the value chain |
| Dmanisi | Swiss Agricultural School Caucasus | Farming |

Source: vet.ge

In the Dmanisi municipality, the Swiss Agricultural School Caucasus offers a comprehensive Vocational Education and Training (VET) program with a primary focus on farming, particularly stockbreeding. However, the program also encompasses essential topics of agricultural management and operations. In partnership with USAID, the school also offers short-term practical training programs in crop production and agricultural mechanization, which can be relevant to grain producers. Notably, the school plans to introduce a new training program focused specifically on grain production, which is set to launch in the upcoming year.

A solid understanding of various aspects of wheat farming is essential for achieving high crop yields, as evidenced by successful projects. During interviews, some farmers mentioned their participation in training programs conducted by Agrosphere approximately four years ago. These programs were relatively short in duration and featured the involvement of experts from Austria. The training sessions involved visits and consultations, with some Austrian experts visiting farms in Marneuli and Bolnisi, while Georgian farmers had the opportunity to visit and observe farms in Austria.

Farmers expressed the significant difference between the knowledge they acquired through these training programs and their traditional farming practices. These disparities encompassed various areas, including planting techniques. Most Georgian farmers traditionally employed a dense planting method (approximately 300 kg per hectare), whereas it was found to be more efficient to use two separate batches of 150 kg of wheat, each sown on opposite sides. Additionally, the timing of planting, pesticide application, and harvesting were emphasized as critical factors. Importantly, many of these techniques did not lead to increased costs and, in some cases, even resulted in cost savings. For instance, the practice of minimum soil tillage was highlighted, as annual tilling was deemed unnecessary and potentially detrimental. Farmers who underwent the aforementioned training and actively implemented these practices in their daily farming routines reported substantial yield increases, often exceeding 50%. On average, they achieved wheat yields of 7 to 8 tons per hectare.

5. SWOT Analysis

| SWOT Analysis | |
|---|---|
| Strengths | Weaknesses |
| <ul style="list-style-type: none"> □ Weather Pattern and Location: Kvemo Kartli benefits from a favorable location, boasting an average annual rainfall of 500mm and fertile soil, which contributes to its agricultural suitability. □ Local Demand: The presence of five medium to large-sized mills within the region offers a distinct advantage, significantly reducing transportation costs due to the proximity of the product's destination. □ Strong Community Networks: The tightly-knit communities in the area hold the potential to nurture cooperation and collective endeavors among various participants in the value chain. □ High Yields: The Kvemo Kartli region demonstrates some of the highest wheat production yields in all of Georgia, underscoring its agricultural prowess. □ Diverse Wheat Seed Planting: Among the 27 renowned wheat seeds in Georgia, a noteworthy 14 are currently cultivated. Five of these varieties are endemic, specifically tailored to the local conditions, reinforcing their adaptability and potential for enhancing wheat cultivation in the region. | <ul style="list-style-type: none"> □ Rainfed farms: Disproportionally high number of rainfed farms, causing lower yields and lower quality, especially in draughts. □ Unknown seeds: Insufficient information concerning the specific seed varieties planted by farmers, encompassing their origins, ideal planting-harvesting windows, and requisite irrigation practices, presents a notable challenge. This knowledge gap diminishes the ability to make informed decisions regarding crop management, thereby potentially compromising agricultural productivity. The absence of comprehensive seed-related data underscores the necessity for enhanced information dissemination and exchange mechanisms to better support effective cultivation practices. □ Storage: The absence of essential storage infrastructure for winter and subsequent seasons poses a significant challenge, particularly in cases where the retail price falls below the production cost. This deficiency in storage facilities hampers the ability to effectively manage wheat supplies for the longer term, impacting the sustainability of the agricultural system. □ Additional cost of irrigation: A predominant issue arises from the geographical separation of the majority of farms from nearby melioration canals, necessitating the use of expensive water pumps or leading to the abandonment of irrigation practices altogether. This situation engenders increased operational costs for farmers or, in some cases, a complete inability to access adequate irrigation, highlighting the pressing need for more accessible and cost-effective water distribution mechanisms. □ Forage Wheat Predominance: Over the years, a prevailing trend toward forage wheat cultivation has emerged. This choice by farmers is driven by the minimal price disparity between forage wheat and bread wheat, leading them to prioritize cost-saving measures and consequently produce lower-quality wheat. The persistence of such practices has led to the erosion of knowledge and techniques associated with planting high-quality wheat, posing a significant challenge to the preservation and enhancement of wheat cultivation standards. □ Import Dynamics: Numerous representatives from flour mills have conveyed that the majority of high-quality wheat is currently imported from Russia. |

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| | <p>Georgian wheat faces difficulties in competing with imported wheat in terms of both price and quality. This trend in imports underscores the challenges faced by domestically produced wheat in the context of market competition.</p> |
| <p>Opportunities</p> | <p>Threats</p> |
| <ul style="list-style-type: none"> □ Enhanced Production Potential: Over the past two decades, there has been a remarkable increase in wheat yields, with the production tripling. This upward trend in yields presents a noteworthy opportunity to augment the overall wheat production. If the total area sown for wheat remains equivalent to that of the year 2006, there is the potential to achieve a 200% increase in total wheat production. □ Enhanced Quality: Through the application of diverse agricultural methodologies, encompassing techniques such as both supplementary and full irrigation, vigilant weeding, judicious crop rotation, effective water harvesting practices, and the utilization of organic manure, the resultant wheat will exhibit heightened quality. This improved quality renders the wheat more suitable for bakeries, positioning it as a superior choice for bakery-related applications rather than merely serving as animal feed. □ Enhanced Coordination and Planning: The strategic timing of wheat sales can have a transformative impact on the financial performance of farms, potentially shifting them from a state of financial loss to one of profitability. Farmers must prioritize better planning for the sale of wheat, moving beyond a focus solely on winter seasons. This emphasizes the necessity for improved coordination in aligning the timing of wheat sales with market conditions that maximize profits. Proactive planning and synchronization with market demand are essential for optimizing the financial outcomes of wheat cultivation. | <ul style="list-style-type: none"> □ Impact of Climate Change: The escalating temperatures and the heightened occurrence of extreme weather events, particularly irregularities in rainfall patterns, pose significant challenges to wheat production. These changing climatic conditions have the potential to make wheat cultivation an even more arduous endeavor. □ Influx of Inexpensive Wheat into the Market: Irrespective of the outcome of the Russia-Ukraine grain deal, Georgia serves as a cost-efficient avenue for selling North-Caucasian wheat. Additionally, the reduction in potential buyers has created a situation where wheat is being offered to Georgian mills at a substantial "discount." This phenomenon contributes to a market flooded with economically priced wheat. □ Ambiguous Regulatory Environment: Despite multiple endeavors by the Government of Georgia to curtail the influx of low-cost wheat and flour, the precise timeline for the enforcement of these regulations remains uncertain. Consequently, a noteworthy proportion of farmers and mills find themselves unable to undertake long-term investments given the absence of a clearly defined regulatory framework. This ambiguity surrounding the regulatory environment creates a level of risk that dissuades entities from committing to substantial and lasting investments, which, in turn, affects the strategic planning and decision-making within the wheat sector. □ Declining Interest in Wheat Production: A substantial majority of farmers have voiced their apprehensions regarding the absence of profitability within the wheat production sector. The presence of extensive stockpiles of both Russian wheat and Georgian forage wheat has led to the anticipation that prices will not stabilize in the immediate foreseeable future. As farmers struggle to sell wheat at a profitable rate, the likelihood of them discontinuing wheat production is a looming concern. |

6. Recommendations

After conducting an investigation into the wheat and flour value chain within the municipalities of Bolnisi, Marneuli, Gardabani, Dmanisi, and Tsalka, a series of suggestions have been formulated to promote the advancement of this value chain. These recommendations center around key aspects such as fostering economic growth, enhancing the role of seed providers, improving both wheat yields and quality, implementing more effective irrigation systems, providing financial support, ensuring affordability, and promoting the development of essential skills.

6.1. Recommendations for Farmers

Enhanced Seed Selection: As elucidated previously, a significant proportion of small-scale farmers lack crucial information regarding the specific seed varieties they are employing in their agricultural endeavors. By incurring a modest incremental cost, the adoption of considerably higher quality seeds becomes a viable option. This strategic shift in seed selection has the potential to yield multifaceted benefits, resulting in increased both crop yields and overall produce quality.

Enhanced Production Practices: A subset of farmers predominantly depends on high-quality seeds to drive substantial improvements in their agricultural outcomes, often neglecting to optimize essential production elements such as irrigation, pesticide application, and fertilization. It's imperative to recognize that allocating a fraction of the total budget solely to the initial seed cost may lead to unsatisfactory results in seed quality unless accompanied by adequate post-planting care and maintenance. Achieving satisfactory results hinges upon a comprehensive approach, where both the initial investment in quality seeds and the subsequent aftercare are synergistically addressed to optimize the overall production process.

Water Harvesting: Rainwater harvesting constitutes a practice encompassing the collection and storage of rainwater for agricultural purposes. This method proves particularly advantageous in regions with restricted water supplies, serving as a sustainable approach to crop irrigation. In areas facing water scarcity, such as regions with limited water resources, the adoption of rainwater harvesting can yield substantial benefits, especially in terms of enhancing wheat yields. The utilization of this method not only augments crop productivity but also contributes to the conservation of irrigation water, leading to cost savings for farmers. This approach aligns with sustainable agricultural practices, emphasizing the importance of maximizing the efficient utilization of available water resources.

Crop Rotation: Crop rotation involves the deliberate cultivation of various crops in a predetermined sequence within the same field over multiple growing seasons, a practice that is not commonly adhered to by a significant number of farmers. This approach offers several advantageous outcomes, including the enhancement of soil health, mitigation of pest and disease pressures, effective weed management, and the augmentation of overall crop yields. In the context of wheat farming, crop rotation plays a pivotal role due to its multifaceted benefits. It aids in disrupting the disease cycle specific to wheat, contributes to the improvement of soil health, facilitates weed control, and ultimately leads to an increase in wheat crop yields. Recognizing the significance of crop rotation in wheat farming underscores the necessity of its widespread adoption, promoting sustainability, and optimizing agricultural outcomes.

Minimum Soil Tillage: Minimum tillage represents a sustainable agricultural approach characterized by the deliberate minimization of soil disturbance. Regrettably, this practice remains relatively unfamiliar among small and medium-scale farmers. Nonetheless, its adoption holds several potential advantages, encompassing the enhancement of soil health, erosion reduction, decreased fuel consumption, emissions reduction, and, in certain instances, the augmentation of crop yields. The significance of minimum tillage within wheat farming is particularly noteworthy, as it contributes to the improvement of soil quality, subsequently fostering healthier crop growth and potentially higher yields. Moreover, this practice aligns with environmental sustainability by curbing the production

of fuel-related emissions, which holds paramount importance in contemporary agricultural practices. Recognizing the manifold benefits, adopting minimum tillage practices in wheat cultivation not only safeguards soil health and crop productivity but also contributes to a more environmentally responsible farming approach.

Composting: Composting serves as an effective strategy to enhance soil health by introducing organic matter into the soil. This process positively impacts soil structure, water retention, and nutrient cycling. Moreover, it has the potential to reduce reliance on chemical fertilizers by supplying essential nutrients to plants. Additionally, composting fosters the attraction of beneficial organisms, including earthworms and bacteria, which contribute to the overall improvement of soil health and play a role in pest and disease control. Importantly, composting offers the advantage of reducing greenhouse gas emissions, achieved by diminishing the necessity for chemical fertilizers while concurrently enhancing soil health. Embracing composting practices underscores their multifaceted benefits, benefiting both agricultural productivity and environmental sustainability.

6.2. Recommendations for public entities and international partners

Language Training Initiatives: Providing targeted language training programs specifically tailored to the Azerbaijani minority communities in the southern regions of Kvemo Kartli. These efforts aim to bridge the linguistic gap between the designated municipalities and the broader Georgia, facilitating effective communication and integration.

Enhancing Labor Skills: Engaging in partnerships with vocational training establishments to provide specialized courses in areas such as wheat and flour processing, quality control, and farm management. Conducting workshops and training sessions for technicians and focusing on the enhancement of machinery services.

Enhanced Co-Financing Strategy: Grants and funding should be directed towards encouraging farmers to boost the productivity of their agricultural operations by focusing on initiatives such as enhancing irrigation systems and adopting diverse farming techniques. This approach is preferable to primarily allocating resources for the purchase of machinery and seeds, which may result in cost reduction but does not necessarily contribute significantly to overall productivity improvement.

Incorporating International Expertise: Given the scarcity of expertise within the specified municipalities (and throughout the nation), it is advisable to invite foreign specialists to assist the local communities in adopting contemporary knowledge and techniques for wheat and flour production.

Enhanced Irrigation Accessibility: It is imperative to facilitate more convenient access to irrigation, establishing direct canal connections to obviate the expense of water pumping. Furthermore, it's essential to extend improved services, reaching even the remote regions.

Stable and Strategic Regulatory Framework: The regulatory structure should be characterized by stability, avoiding ad hoc alterations, and instead, being meticulously designed with a clear outlook on the operating conditions for Georgian wheat farmers.

Common wheat storage facilities: Some of the farmers have expressed their desire to see large storage facilities in municipalities. They even showed willingness to pay for the storage services. Small-scale wheat and cereal storages are not cost-efficient, while significantly larger ones could use the economies of scale advantage.

Through the application of these comprehensive suggestions, notable progress can be achieved in the wheat and flour value chain within the municipalities of Bolnisi, Gardabani, Marneuli, Tsalka, and Dmanisi. This

encompassing approach holds the potential for substantial improvements in economic expansion, enhanced wheat production, and more effective governmental backing. These concerted endeavors would substantially contribute to the overarching development and enduring viability of the wheat and flour industry within the designated municipalities.