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Research Article

Mapping of Malt Barley, Malt and Beer Production Value Chains in Northern Ethiopia

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Abstract

Background and Objective: Ethiopia has suitable diverse agro-ecologies for malt barley production. Different primary actors and support service providers are engaging in the entire value chain starting from input supply to malt barley production and final beer production and marketing. The study focused on mapping of value chain actors under malt barley production, malt and beer production in North Gondar Zone of Amhara Region by identifying the existing challenges and opportunities. **Materials and Methods:** The data were collected from 4 focus groups, 4 key informants and 10 factory workers. The collected data was qualitative and analyzed through qualitative techniques. **Results:** Malt barley is the main raw material for beer production. Results revealed that malt and brewery factories are the main driving forces of increasing farmers' income through malt barley production. Malt barley is the main cash crop for farmers particularly in the highland parts of the country. Malt barley, Gondar malt and Dashen beer production value chain maps well sketched and the role of each primary and supportive actor was indicated. Price fluctuation and lack of improved varieties for farmers, shortage of malt barley and vehicle for malt factory and political interference, negative competitors and lack of inputs including foreign inputs for brewery factory were the main challenges along the entire value chains. **Conclusion:** Strengthening of interlinkages of the value chains with appropriate support of enablers enhances the efficiency of all actors and this can ensure equitable benefits in the whole value chain.

Key words: Beer, gondar town, debark, malt, malt barley, brewing, value chain

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Barley (*Hordeum vulgare*) is one of the main essential grain cereals worldwide and ranked 4th next to wheat, corn and rice among cereals regarding the global quantity produced and area cultivated¹. The findings of this study suggest that barley could be a food source for millions of people although today mainly used for animal feed and brewing. Beer is the most popular alcoholic drink in the world and significant changes observed regarding beer consumption². The market shares of barley in Africa are concentrated in Morocco, Ethiopia and Algeria. These three countries accounting 87% of the total barley production of the continent³. This finding suggests that Ethiopia experienced the fastest beer consumption increase recently and this creates great opportunities for malt barley producers and malt factories. Barley is one of the major cereal crops produced in the highland parts of Ethiopia⁴. Yearly barley production in Ethiopia was 1,767,518,447 tons by cultivating 811,782.08 hectares of land in 2018/19 cropping season⁵. Ethiopia uses barley commonly for food and malting purposes. Malt barley is the major input for beer production and nearly 90% of the material cost for beer production is malt barley⁶. South eastern parts of Ethiopia are the main potential areas for malt barley production. The market demand for malt barley is in line with the market growth of the beer. Much of the requests of Ethiopia's larger as of now are being met by domestic brands. BGI castel has a rough estimation production of 2 million hectolitres per year and it is the larger operator in the market.

Ethiopia's malt and beer industry have been increasing with the increasing demand for beer with directly related to the rise of population growth, urbanization and increase in income. The demand for malt barley is increasing rapidly due to the construction of several new malt factories. Malt barley is the main cash crop regarding increasing farmers' income in the highland areas of Ethiopia⁷. Malt barley varieties that give high grain yield and fulfill the quality parameters of malt production are highly recommended for production by the malt factories⁸. This finding revealed that seed selection is an important factor in the process of malt barley production to get the expected return from the product and to ensure quality malt production. Twelve brewery factories are being existed in Ethiopia that is owned by six companies⁹. According to the findings of this study, the estimated capacity of annual beer production in Ethiopia is about 12 million hectolitres. BGI Ethiopia PLC, Dashen Brewery factory, Diageo Meta Abo Brewery Share Company, Habesha and Heineken are the brewery factories of the country. The quantity of beer production is directly related to the number of inputs used

and the capacity of residues to be produced. Malt grain is profoundly cultivating in North Gondar since the zone is known for its malt barley potential⁵. However, the findings of this study suggested that farmers are sowing their malt barley through the broadcast method and use a local variety that is why the productivity is below its potential. Lack of suitable malt barley varieties, good malting quality and stable performance are the major influencing factors among many constraints of malt barley production in North Gondar zone¹⁰. Poor institutional linkage and market imperfection mechanisms constraint malt barley production in the study area¹¹.

The value chains of agricultural commodities for developing countries are not competitive and farmers are exploited along the value chain¹². Strengthening the malt barley value chain fosters the proper functioning of the malt production value chain. Similarly, the well-functioning of the malt production value chain ensures the proper performance of beer production. Hence, all value chains have been performed very well to ensure the well-functioning of the entire value chain. Input providers, malt barley producers, unions, cooperatives, collectors, grain whole-sellers, processors and beer whole-sellers are the major malt barley value chain operators in malt barley production¹³. Support service providers of the value include all chain specific actors providing regular supports to the value chain operators regarding their common interests⁶. Most literature in the past focused on production constraints of malt barley production in the study area. Few studies investigated value chain actors (primary and supportive) and their functions at different stages of the value chain. However, the primary and support service providers are not sketched with a map in the area. The interdependence of different value chains are not adequately investigated. This study tried to investigate how the problem of one value chain function interrupts the entire (malt barley, malt and beer) production value chains.

The main purpose of this study was to identify the main value chain actors, challenges and opportunities under malt barley, malt and beer production value chains with clear map sketching of each value chain in the study area.

MATERIALS AND METHODS

Description of the study area: The study was conducted in the North Gondar zone of the Amhara region focusing on Debark district malt barley production, Gondar malt and Dashen beer production. The study was carried out in 2019 focusing on the 2018/19 production season. North Gondar zone constitutes 16 districts and Debark district was selected

purposely due to its malt barley potential and existence of many malt barley producers. Gondar malt factory and Dashen brewery factory are found in Gondar town and they are the drivers of malt barley production particularly in Amhara National Regional State. Gondar town is located at the latitude of 12°36' N and 37°28' longitude with an altitude of 2133 m.a.s.l.¹⁴. Gondar town was built about 400 years ago and many tourists come to the city due to the attractiveness of several Royal castles. Debarke district is located 830 km away from Addis Ababa and has a total population of 169,835 of which 85,594 males and 84,242 are females¹⁵. The district constitutes 30 kebeles and receives annual rainfall ranging from 900-1400 mm. Its altitude ranges from 2712-3122 m.a.s.l and has an average minimum and maximum temperature of 6.2 and 20.7°C, respectively.

Sampling techniques and procedures: Debarke district and Gondar town were selected purposely due to the existence of many malt barley producers in Debarke and Dashen brewery factory and Gondar malt factory in Gondar town. Four focus groups with members of six per group were organized with the help of development agents and experts of Debarke district. The focus groups and four key informants were selected from two kebeles based on their experience and knowledge regarding malt barley production and marketing. Four workers from the Gondar malt factory and six workers from the Dashen brewery factory were selected and interviewed accordingly. Data regarding malt and beer production and marketing were collected from these selected workers.

A sample size of the study: The study was conducted by collecting data from 4 focus group discussions with members of six per group and 4 key informants interviews from Debarke district. Two primary basic cooperative representatives and Mukara farmers' cooperative union manager were interviewed regarding malt barley production and marketing. About 28 farmers under 4 FGDs and 4 key informants participated in the discussion. FGDs participant farmers were selected by taking into account their experience and knowledge regarding malt barley production and marketing as well as their willingness to participate in the discussion. Development agents and experts also interviewed on malt barley production and marketing linkages starting from input supply to selling of the produce malt barley to Gondar malt factory. Four factory workers from the Gondar malt factory and six workers from the Dashen brewery factory were interviewed and data were collected accordingly.

Methods of data collection and analysis: Both primary and secondary data were used. In-depth information was collected regarding the entire value chain of malt barley production, malt and beer production. The data were collected from focus groups, key informants and factory workers focusing on qualitative data. The data collected particularly from key informants were used to triangulate the information collected from FGDs. The data was collected through interview schedule protocol and analyzed through qualitative techniques.

RESULTS AND DISCUSSION

Main value chain actors and supporters in malt barley production: Primary and supportive actors were involved and performed their functions accordingly in the value chain. Primary actors have performed the primary functions starting from input supply to production and final consumption. Input suppliers, producers, cooperatives, unions, Gondar malt factory, Gondar agricultural research centre and consumers were the primary actors under the malt barley value chain. The finding previously¹⁶ also found that input suppliers, collectors, retailers, local and national whole-sellers, processors and exporters were the main value chain actors with the support of enablers. Development Agents, the Bureau of Agriculture, University of Gondar and Debarke University were support service providers in the value chain and enable the proper functioning of the malt barley value chain.

Input suppliers: This segment of the value chain consists of the actors that provide the starting materials for the proper functioning of the subsequent malt barley value chain. The actors include in this segment were seed suppliers, fertilizer suppliers, extension service providers and other technical and financial supporters. Cooperatives, Mukara farmers' cooperative union and Gondar Agricultural Research Center were the main input suppliers in the study area. Cooperatives were the major suppliers of fertilizer and seeds. Cooperatives also collected malt barley and other products from cooperative members and delivered them to the Mukara farmers' cooperative union. Mukara farmers' cooperative union distributes fertilizer, improved seeds, agrochemicals, oil, sugar and other sanitary goods to basic primary cooperatives. The union received the collected malt barley produce from basic cooperatives and delivered the bulk to the Gondar malt factory. Gondar agricultural research centre and Mukara farmers' cooperative union provide improved seeds and technical training with full packages to producers, DAs, experts and other stakeholders in the overall processes of production and marketing.

Producers: Malt barley producers are the major value chain actors following input suppliers along the value chain. The result is similar to Weldeyohannis *et al.*¹³ who suggested that farmers are the main value chain actors in the malt barley production value chain and perform most of the primary functions by receiving inputs from input suppliers. Contracting of farmers with buyers has its own positive and significant implication on intensification, malt barley production, quality improvement and commercialization regarding increasing producers' income¹⁷. All malt barley producers in the study area were smallholder farmers having different land sizes. Malt barley producers of the district were delivered their products to the basic cooperatives and Mukara farmers' cooperative union. Mukara farmers' cooperative union and cooperatives received malt barley from farmers by considering the specification given by the Gondar malt factory. Malt barley products that are not accepted by cooperatives and the union due to under specification sold to farmers as a grain for consumption with the low price. The production process of malt barley undergoes the following basic farming operations from land preparation to final post-harvest handling. As the data got from FGDs, seed preparation, land preparation, ploughing, sowing, weeding, harvesting, damping, threshing and storing are the farming operations performed by farmers. Cleaning, packaging, transportation, storing and by very few farmers sorting were the post-harvest handling tasks performed by farmers along the malt barley value chain. Finally, producers provided their produce malt barley to cooperatives, Mukara farmers' cooperative union and farmers and directly to Gondar malt factory. Straw is the main byproducts for malt barley producing farmers and easily palatable by cattle and highly used for their dairy production and fattening.

Mukara farmers' cooperative union: Provides inputs (DAP and UREA fertilizer, improved malt barley seeds and sacks) to farmers through credit. The union also provides awareness creation training to farmers and primary basic cooperatives regarding the repayment system of the credit, quality malt barley production and marketing in collaboration with other stakeholders.

Gondar Agricultural Research Center: Provides initially improved malt barley seeds and technical training with other full recommended packages to farmers, development agents and other stakeholders. Newly released improved malt barley varieties have been promoted to the local communities to address the wide geographical areas. The research centre also facilitates the marketing linkage among actors with concerned bodies.

Gondar malt factory: The factory purchased the produce malt barley from farmers, cooperatives and Mukara farmers' cooperative union by considering the required specification for malt production. The factory has been provided money to the Mukara farmers' cooperative union for malt barley production through a contractual agreement. It also gives technical training to producers regarding quality malt barley production.

Consumers: Rural and urban dwellers and the Gondar malt factory are the main consumers for the produce malt barley. Rural dwellers and to some extent urban dwellers purchased the malted barley for consumption purposes that cannot proceed to the Gondar malt factory for malt production due to quality problems. Gondar malt factory purchased the quality malt barley for malt production from farmers, cooperatives and Mukara farmers' cooperative union.

Support service providers and their functions

Development agents/DAs: Development agents have been provided with both theoretical and practical training to farmers regarding different farming operations. Provide different advisory services to farmers to ensure the benefit of farmers as expected. Development agents play a central role starting from site selection up to the produce malt barley has been delivered to the malt factory. They conducted monitoring and evaluation with other evaluators to take corrective measures.

Bureau of agriculture and rural development: Bureau of agriculture provides training to development agents and farmers regarding production and marketing aspects. It also provides different advisory services and field supervision. Cooperatives and unions receive different technical supports from the bureau of agriculture and rural development. The sector fosters the overall marketing linkage and takes correcting measures regarding production and marketing while the problems are faced with the close collaboration of other stakeholders.

University of Gondar and Debark University: These institutes delivered different technical and capacity building training with full recommended packages to farmers, development agents, experts, cooperatives, unions and others to ensure a viable malt barley value chain.

Gondar Agricultural Research Center: Provides initial basic and pre-basic malt barley seeds to producers, seed enterprises, cooperatives and unions. Generates new and improved malt barley varieties based on the suitability of the

Table 1: Primary actors and their functions in Gondar malt production

Stages of the value chain	Actors	Functions
Input supply	Farmers Unions Ambasel	Input supply (malt barley, cleaning substance, chemical and fuel)
Production	Gondar malt factory	Malt production and providing of money to unions for malt barley production through a contractual agreement
Marketing	Malt factory	Sells the produce malt to Dashen brewery factory, Debre Birhan brewery factory and BGI Ethiopia and also other brewery factories
	Dashen and Debre Birhan Brewery factories	Purchase malt from Gondar malt factory for beer production
Transportation	Transporters	Transporting the malt production to Dashen and Debre Birhan brewery factories via vehicles from Tikur Abay transport service
Consumption	Gondar Debre Birhan Dashen and others	Beer production and selling to consumers

Source: Own survey data, 2019

agroecology. The research centre promotes the newly released malt barley varieties to a large segment of the community through pre-scaling up. Technical training has been provided to experts, farmers, cooperatives, unions and others with full recommended packages.

Major inputs used for malt barley production: Producers have to use the major production inputs to get the expected yield per hectare as well as net return from their produce. Improved malt barley seeds, fertilizer and pesticides are the major agricultural inputs that are commonly used by malt barley producers¹⁷.

Fertilizer: DAP and UREA fertilizers are the major inputs used by farmers next to seed for malt barley production to increase their production and productivity. Farmers are advised to apply fertilizers for their malt barley production as well as other crops based on research recommendations to get the expected return from their production. However, as the data collected from focus group discussions, all producers are not applying fertilizer and seed as the recommendations and that is why they are not benefited equally from their product.

Improved seeds: Seed is one of the major inputs for farmers in the overall process of the agricultural production system. The improved seed has a lion share to increase farmers' productivity. The finding of the previous studies¹⁸ showed that the availability of improved malt barley seeds significantly increased productivity. Many farmers are engaging in malt barley production in Debark district and provide their products to unions and cooperatives. Holker and IBON-174 were the improved malt barley varieties that are used by farmers in the area. These varieties were obtained from Gondar agricultural research centre and provided to farmers through Mukara farmers' cooperative union. A similar result was observed from Abebe and Abebe,⁷ who confirmed that malt barley producers, particularly in the highland parts of

Ethiopia, recommended using IBON 174/03 malt barley variety to increase malt barley production and generate more income for their livelihood. IBON 174/03, EH 1847 and Bahati improved malt barley varieties were also recommended for production due to their high grain yield and good quality parameters for malt production⁸.

Value chain mapping is a systematic way of sketching primary and supportive actors in the value chain with a clear indication of their functions. Figure 1, the linkage of primary and supportive actors in the malt barley production value chain was indicated. The figure also indicates the roles of each actor at different stages of the value chain. The pathway of production flow starts from input supply to final consumption destination.

Gondar malt factory: Malt barley productivity and extraction are the main criteria for variety selection. Holker and IBON-174 varieties are the selected and used varieties for the factory. For this malt production, the malted barley has to contain a protein content of 9-10.5. The use of recommended nitrogen fertilizer coupled with improved varieties significantly increased the malt quality¹⁹. Findings of this study revealed that application of 46 kg ha⁻¹ nitrogen fertilizer and IBON variety brought optimum grain yield which is economically feasible with acceptable quality standards to produce malt. As indicated in Table 1, malt barley, fuel, water, sacks, electricity, cleaning substance and fumigation chemicals to prevent weevil are the major inputs used by the factory. Farmers, Unions, Ambasel, Bahir Dar University, government and seed companies are the main sources of inputs. Malt barley has been supplied through farmers and unions. Ambasel commercial works corporation supplies foreign inputs. Bahir Dar University provides machines and operating training to factory workers. Input suppliers (Farmers, Unions, Ambasel and Bahir Dar University), Dashen brewery factory, BGI Ethiopia, seed companies and transporters are the primary value chain actors in Gondar malt production and marketing.

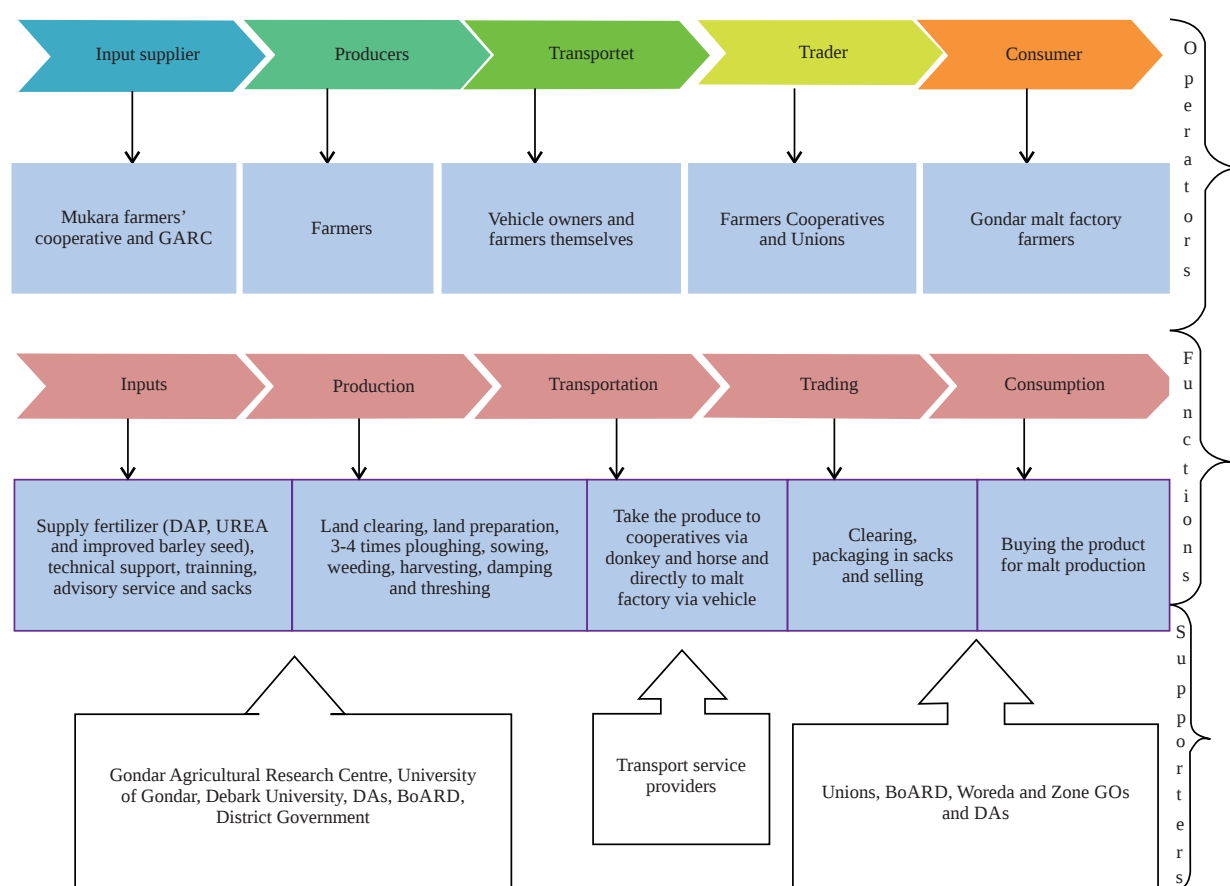


Fig. 1: Malt barley production value chain map of the study area

Table 2: Supportive actors and their functions in Gondar malt production

Supportive actors	Functions
ANRS government	Supporting and facilitating the process of contractual farming for malt barley production
BoARD	Provision of training to agricultural experts as well as farmers Facilitating the overall malt barley production and marketing process Facilitating the way to obtain improved malt barley varieties Provision of advisory service to seed companies
Belessa logistics	Provision of port service for some inputs which can be bought from abroad
TIRET corporation and other NGOs	Provision of financial support
Bahir Dar University	Technical support to factory workers Provision of machines for loading and unloading purposes
ISO, 2000	Technical support for quality assurance Provision certification for the qualification
AARC and GARC	Provision of training to experts and farmers in the overall malt barley production process Improved malt barley variety development and provision of initial seed to seed companies as well as producers

Source: Own survey data, 2019

Table 2 presents the main enablers of the Gondar malt production factory in the overall processes of malt production and marketing. Amhara National Regional State Government, Bureau of Agriculture, Belessa Logistics, TIRET corporation and NGOs, Bahir Dar University, ISO, 2000, Adet and Gondar Agricultural Research Centers are supportive actors in Gondar malt production.

Four main steps of malt processing: The study results indicated in Fig. 2 showed that malt production undergoes the following four main processes accordingly.

Cleaning: The collected malt barley across different producing parts of the country has been cleaned to avoid impurities for grading.

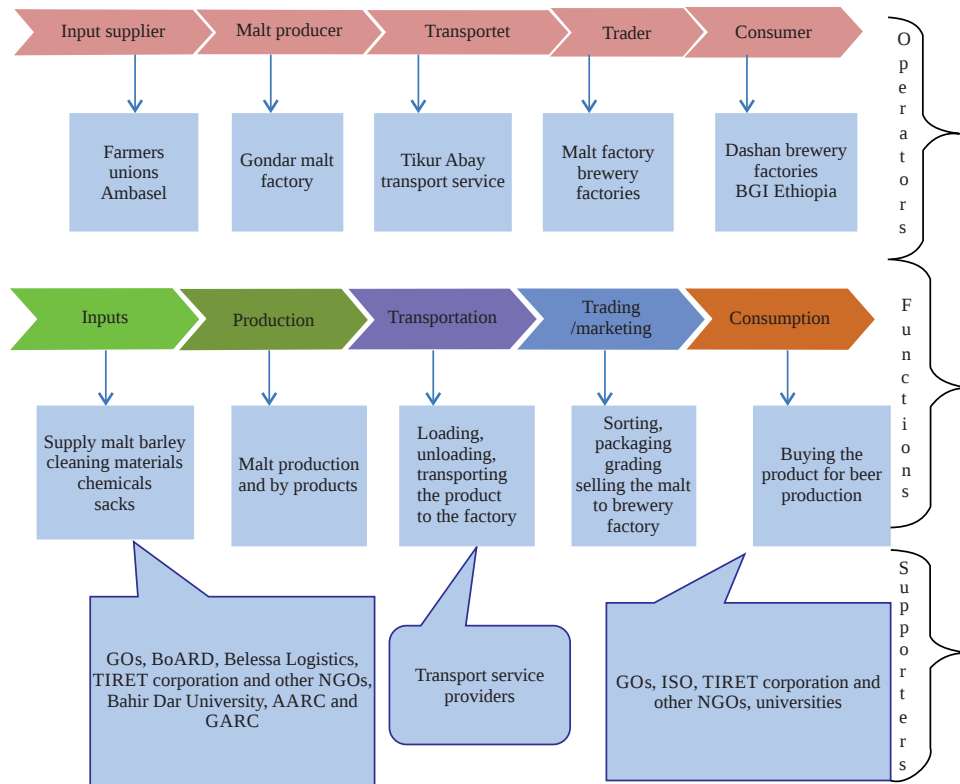


Fig. 2: Value chain map of Gondar malt production

Table 3: Major inputs used for Dashen brewery factory

Direct materials	Indirect materials	Packaging materials
Malt	Acid/HCl	Cork
Hop/gesho	Base/caustic soda	Level
Water	Additives	Glue
Yeast	Salt	Lubricant
4 types of enzymes		Anti-scale
		Depex

Source: Own survey data, 2019

Moisting/mezefzef: The cleaned malt barley stayed under the cold room for about 48 hrs by adding some water on it accordingly.

Germinating: The germination process has been conducted under the germination plant. It is the process of producing yeasts or enzymes that are used to accelerate the fermentation process. After the cleaned malt barley stayed for about 48 hrs under the cold room, it transfers to the germination plant and stayed about six days on it.

Drying plant: Finally, the germinated malt barley has been transferred to the drying plant/room after 6 days stayed in the germination plant to stop the germination process. The germination process stopped when the germination stage reached the required level. The byproducts/impurities of malt

were sold to legal traders through formal bid competition and then the traders sold to farmers for fattening and dairy production.

Dashen brewery factory: Dashen brewery factory has been used direct, indirect and packaging materials which can be available both domestically and abroad for beer production. Table 3, Gondar malt factory, Jigira PLC, Ambasel and NEVO enzymes are the main sources of inputs for the Dashen brewery factory. Gondar malt factory is supplying domestically produced malt and Jigira PLC supplying different necessary chemicals to the factory. Foreign malt and hop/Gesho have been supplied to the brewery factory through Ambasel commercial works corporation. Yeasts have been supplied to the factory through NEVO enzymes from South Africa.

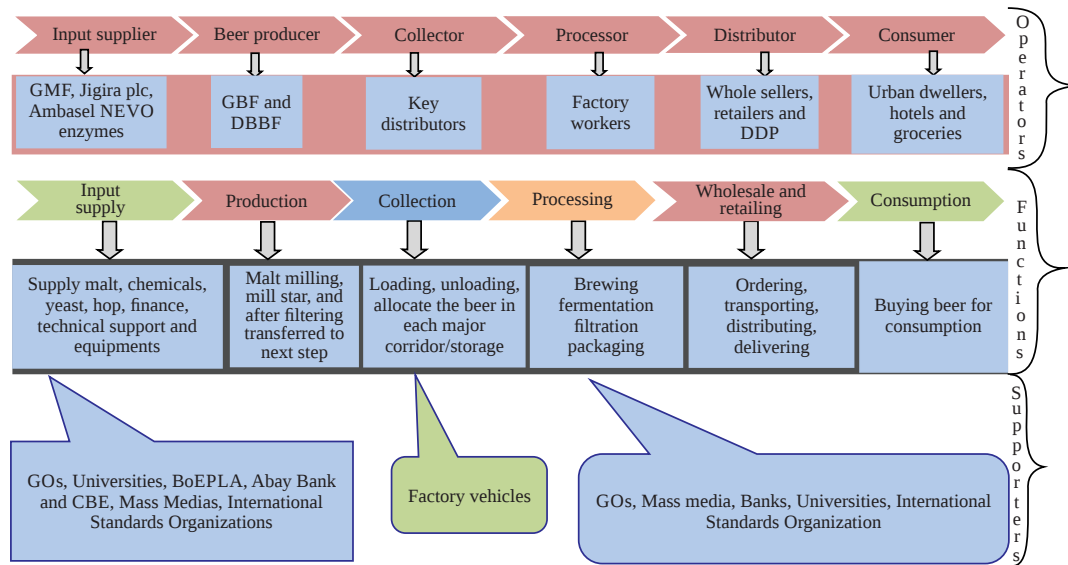


Fig. 3: Value chain map of Dashen beer production

Abay bank and commercial bank of Ethiopia are the main financial sources for Dashen brewery factory in the overall processes of Dashen beer production and marketing. Brewing, fermentation, filtration and packaging are the four main processing stages under beer production.

Product marketing: The beer products have been marketed along with different marketing actors. The packed products of beer are directly distributed to key distributors/whole sellers. The whole sellers distribute the beer to retailers and hotels based on their rank with fixed price including transportation cost. Finally, retailers and hotels provide the beer to consumers by fixing their selling price. According to the data collected from the factory, retailers and hotels received better profit as compared to the factory since they were selling the beer by fixing their price.

Primary value chain actors under Dashen beer production:

Primary actors are directly engaging in supplying inputs, beer production and marketing of the beer products along the value chain. Table 4 showed Dashen brewery factory, key distributors/whole-sellers, retailers, NEVO enzymes, Gondar malt factory, Ambasel, DDP (distribution development partnership), FSR (field sales representatives) and consumers are the primary value chain actors in Dashen beer production and marketing. These actors are directly involved in the value chain with the support of enablers.

Byproducts of Dashen beer production i.e., Furishka and others have been sold to farmers for fattening and dairy production purposes at an affordable price. These factory

byproducts significantly increase farmers' income through fattening and dairy production.

Supportive actors in beer production: Support service providers play an indispensable role in the proper functioning of the entire value chain. Accordingly, the University of Gondar, International Standards Organization/ISO, Tikur Abay transport service, government, Abay bank and commercial bank of Ethiopia, bureau of environmental protection and land association were enablers under Dashen beer production and marketing as indicated in Table 5.

Input suppliers, beer producers, collectors, processors, distributors and consumers were the main value chain operators along with Dashen beer production. As depicted in Fig. 3, the main functions of primary value chain actors and enablers are sketched. Mass media, GOs, international standards organizations, Universities and banks were the main supporters in the Dashen beer production value chain. Brewing, fermentation, filtration and packing are the main beer production procedures undertaken in the overall processes of beer production and marketing. Starting from input supply to beer production and final consumption destination, the primary actors and enablers are well connected and smoothen the overall processes of the value chain.

Challenges and opportunities of malt barley producers:

Price fluctuation of malt barley is a great challenge for farmers regarding production and marketing. The findings of previous studies¹⁸ also confirmed that farmers were price takers since

Table 4: Dashen brewery factory value chain actors and their functions

Stages of the value chain	Actors	Functions
Input supply	Gondar malt factory	Domestic malt supply
	Jigira PLC	Supplies different chemicals
	Ambasel	Foreign malt and hop supply
	NEVO enzymes	Yeast supply from South Africa
Production	Gondar Dashen brewery factory	Four main production processes of beer
	Debre Birhan Dashen brewery factory	• Brewing • Fermentation • Filtration • Packaging
Marketing	Whole sellers	Key distributors arrange and store the produced beer in each major distributing corridor and then distributing the beer to retailers properly
	DDP	Gives the order to key distributors to distribute the beer to retailers and hotels
	Retailors	Delivering beer to consumers obtained from key distributors
	Hotels	Gets beer from key distributors based on their rank and delivering to consumers
	FSR	Checks beer on the store
		Controls each retailer
Transportation	Factory vehicles	Conducting product promotion
		Collects feedback from consumers
Consumption	Urban dwellers	The produced beer has been transported from the factory to key distributing corridors and then to retailers and hotels through factory vehicles
	Rural dwellers	Consumption
	Hotels	

Source: Own survey data, 2019, DDP: Distribution development partnership and FSR: Field sales representative

Table 5: Summary of support service providers and their functions in Dashen beer production

Supportive actors	Functions
University of Gondar	Gives technical training regarding beer production
ISO, 2000	Evaluate the quality of the beer at least once a year
Government	Gives security service and others
Abay bank and commercial bank of Ethiopia	Provision of financial support and facilitates for foreign exchange
Bureau of environmental protection and land administration	Gives technical support for environmental beauty management and pollution control

Source: Own data, 2020

malt factories alone determine the selling price. IBON-174 malt barley variety is an early matured variety and not productive for the long rainy season. Lack of improved malt barley varieties that fitted the agro-ecologies and good malting quality were the major challenges for producers¹⁰. Farmers need alternative malt barley varieties to overcome the problem of their production at the time of the long rainy season. Additionally, the shortage of cultivated land particularly for malt barley is a challenge for farmers.

Availability of suitable agro-ecologies, malt and brewery factories, price increment over time, the existence of different institutes (research, centres, seed enterprises, universities and unions) including agricultural experts at different levels are great opportunities for malt barley producers. These opportunities are the power for farmers regarding increasing their level of production and productivity. The finding by previous research²⁰ also indicated that favourable agro-ecologies of Ethiopia and availability of improved malt barley seeds with the required quantity and quality significantly increase the production and productivity of farmers.

Challenges and opportunities of Gondar malt factory:

Shortage of raw materials i.e., malt barley and other inputs limit the quantity of malt production. Inadequate availability of these inputs restricted the factory to produce malt in its full capacity. The quality problem particularly malt barley also a challenge besides inadequate quantity. Lack of vehicles for malt barley transportation from their point of production to the factory is a great challenge for the factory. Due to vehicle constraints, the factory cannot produce the malt accordingly and is forced to pay more costs regarding vehicle rent. Time constraints are also a challenge for the factory to provide the malt to the brewery factory on time and it causes to lose some value and profit. In the overall processes of malt production, stakeholders' support is not as expected and this is a problem for the entire value chain.

The existence of many malt barley producers across different parts of the country is a great opportunity for the malt factory to get raw (malt barley) materials. The University of Gondar and Bahir Dar University provide technical training and machine supply and maintenance services which is an

opportunity to run malt production accordingly. ISO, 2000 is providing quality assurance for the produce malt as the specification. Belessa logistics also has delivered port services. TIRET Corporation and different NGOs facilitate financial services for the smooth functions of malt production and marketing processes. Finally, Dashen and Debire Birhan brewery factories purchased the produced malt accordingly. All the opportunities mentioned above ensure sustainable malt production.

Challenges and opportunities of Dashen brewery factory:

There is political interference in Dashen beer production and it is a challenge for the factory as the data collected from factory workers. The existence of negative competitors affects beer production and marketing. Some competitors negatively affect the Dashen beer products and discourage the factory. Water shortage and lack of inputs including malt and other foreign inputs are a great problem of the factory for beer production. Lack of external support for technical training regarding beer production and marketing has its own negative implication for beer production as well as marketing. Even the government couldn't support the factory as expected and the expected return might not be received. Additionally, the lack of foreign currency is a challenge to buy foreign inputs accordingly.

Gondar malt factory provides the raw materials (malt) for Dashen beer production which is a great opportunity for the factory. The existence of many Dashen beer consumers (Hotels, restaurants and individuals) enforce the factory to produce beer adequately. Commercial bank of Ethiopia and Abay bank facilitate the financial services to foster the overall processes of beer production and marketing. ISO, 2000 and Tikur Abay Transport service provides a quality evaluation of the beer and input and beer product transportation respectively. The University of Gondar supports the factory with technical and capacity building training. Bureau of Environmental Protection and Land Administration helps to keep the beauty of the environment through systematic avoidance of the factory wastes and all these things are opportunities to run sustainable beer production.

The regional and the federal government have to give more emphasis regarding supporting different value chains accordingly to ensure their contribution to the overall economic growth. The respective districts and zones of agriculture bureaus shall support the malt barley production value chain very well to increase farmers' income and ensure the sustainable supply of malt barley to the malt factories. Inter linkages among the value chains have to be strengthened for sustaining the proper functioning of the entire value chain.

CONCLUSION

This study was focusing on the three main value chains (malt barley, malt and beer) in the North Gondar zone of Northern Ethiopia. The study results found that malt barley production is one of the main cash crops of farmers in the study area. The findings also suggest that the existence of Gondar malt and Dashen brewery factories are the main driving forces for malt barley producers particularly in the high land areas of the Amhara region. Different primary actors are directly engaging in the three value chains with the facilitation and support of many enablers at different stages of the value chain. Well-functioning of the malt barley value chain smoothens the proper functioning of the subsequent malt and beer production value chains.

SIGNIFICANCE STATEMENT

This study investigated the roles of primary and supportive actors along the three (malt barley, malt and beer) value chains in the study area and this can help researchers, development practitioners and other concerned bodies to clearly understand the interactions of actors at different stages of the value chains. This study will also contribute to identifying the intervention areas of concerned bodies further to improve the performance of the value chains for the benefit of all primary value chain actors.

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