SNV IMPACT THAT MATTERS

Veggies 4 Planet & People

Value Chain Study on Traditional African Vegetable in Ethiopia

Welmera, Ejere, and Woliso woredas of Oromia

In partnership with

WorldVeg

With the support of

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Value Chain Study on Traditional African Vegetable in Ethiopia: Welmera, Ejere, and Woliso woredas of Oromia

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ACRONYMS AND ABBREVIATIONS

CBO	Community Based Organization
DA	Development agent
EC	Ethiopian Calendar
FGD	Focus Group Discussion
IKEA	Ingvar Kamprad, Elmtaryd
IPM	Integrated Pest Management
ISD	Institute for Sustainable Development
KII	Key Informant Interview
NGO	Non-Governmental Organization
SNV	Netherlands Development Organisation
TAVs	Traditional African Vegetables
ToR	Terms of reference
V4P&P	Veggies for Planet and People
VBN	Vegetable Business Nnetwork
VC	Value Chain

EXECUTIVE SUMMARY

The Veggies for Planet & People (V4P&P), a five-year project is being implemented by the Netherlands Development Organisation (SNV) and World Vegetable Centre (WorldVeg) with the support of the IKEA Foundation. The project is implemented in Ethiopia and Kenya having the overall objective to create jobs and income, particularly for youth and women, in the vegetable sector; and to improve environmental and human health through the safe production of vegetables.

The selection of viable Traditional African Vegetables (TAVs) with high production potential, irrigation capabilities, market accessibility, and continuously increasing demand, supported by good extension, input availability, and a good enabling environment that can produce excellent business opportunities, was the overall focus of this value chain study.

120 sample households (HHs) were interviewed as part of the study, which was carried out in three woredas, six kebeles, and eight vegetable business networks (VBNs). A total of 16 focus group discussions (FGDs) were organized, with two taking place in each VBN including up to 200 participants. Methodologies applied included focus group discussions (FGDs), key informant interviews (KIIs), HH surveys, visual observations and document reviews. Numerous organizations in the field of agriculture, cooperative promotion, market development, trade, finance and economic development, including branch offices of the former Oromia Saving and Credit SC now known as Sinqe Bank, the Holeta Research Center/Horticulture Research Section, and cooperative unions) were visited and consulted. Representatives from authorities, professionals, local experts, and market actors (such as producers, wholesalers, retailers, and supermarkets) too were contacted. Vegetable farms, regional retail markets, and regional collection centres were also visited and critically examined.

Four types of vegetables were selected in each woreda for the value chain analysis. The selections were done in line with the criteria and procedures set and consensus reached during inception phase of the study. The selection done using both *top-down and bottom-up* approaches. The prospective vegetables signifying woreda's potential with their respective growing kebeles/areas were identified at Woreda top-level discussion session. The consultants then proceeded to selected kebeles to make area specific discussion with the VBNs members at the bottom level and prepared initially the long list of vegetables and then step by step come up to selection of specific potential commodities. Finally, the prioritized vegetables were brought up to woreda level discussion for verification and ultimate consensus on selected VCs in each kebele and woreda. This step-wise approaches and discussion involved many woreda level offices, such as the heads of Woreda Agriculture Offices, multi-disciplinary experts – vegetable, input, extension, marketing, etc. – and SNV representatives, while the kebele and VBN level discussion involved FGDs and HH/ survey respondents held with the members of the VBNs residing in specific kebeles of each woreda. Accordingly, the vegetable value chains (VCs) selected in each woreda were:

(i) Onion, kale, tomato and green pepper in Woliso Woreda;

(ii) Kale, spinach, lettuce, and leek in Wolmera Woreda; and

(iii) Onion, pepper, garlic and kale in Ejere Woreda.

Due to a lack of improved inputs, farmers in the study areas are practically less skilled in using TAVs and regenerative technologies now than they were in the past. Instead, producers and facilitators encouraged the the use chemical inputs and high yielding vegetable seeds. The assessment's findings showed that

local aggregators (collectors) and brokers dominate the market and have a weak connection to VBNs and other vegetable farmers. The informal actors, due to a lack of transparency, trust, and justice, dominate the value chain. Producers of vegetables are highly critical of the current input-output marketing structure. Farmers' issues with input and output marketing are real, according to support providers and enablers, and they require a diverse approach to resolve.

Cooperative unions play a very small part in helping its member vegetable farmers overcome obstacles in marketing and production. The main input that they provide to vegetable farmers is chemical fertilizers. The remaining essential inputs – such as seed, insecticides, and herbicides – are primarily purchased from private agro-dealers in Addis Ababa and its vicinity. Therefore, the major goal of this vegetable value chain analysis might be achieved by the V4P&P Project focusing on enhancing vegetable production and marketing by strengthening the existing VBNs and connecting them to the market entry points.

The main vegetable varieties unique to each woreda were chosen systematically, taking into account their high potential to boost vegetable producers' incomes by enhancing their productivity, in addition to their crucial role in generating employment opportunities and helping rural women and youth generate income.

The study recommends taking into account the following crucial areas for improvement in order to enhance vegetable production and commercialization in the project areas of the VBNs:

(i) link producers directly to wholesalers, agro-processors and institutional buyers through VBNs/ farmers organization

(ii) introduce and strengthen the existing use of mobile and ICT application for market information and key extension advice in collaboration with relevant public sector organizations, NGOs, donors, and telecommunication providers;

(iii) support research and development efforts on design and efficiency of harvesting tools, and equipment through collaboration with universities, research centres, TVET centers, and private sectors;

(iv) develop training manual/guides on vegetable production and provide capacity building training on irrigation enabled production;

(v) train VBN member farmers and stakeholders on sorting, grading and packing protocols to improve the quality and marketability of the vegetable;

(vi) provide awareness on appropriate transport and quality management system of products and

(vii) enhance post-harvest management by utilizing various technologies that aid in efficient handling, storage, and transportation;

(viii) strengthen VBNs and enable them to be a product collection/marketing centre;

(ix) concentrate on and address vegetable farmers' issues relating to market inputs;

(x) support and promote use of regenerative technologies and TAVs;

(xi) provide basic business skills to the key market actors – input suppliers, local collectors and wholesalers – that have possible linkage to VBNs;

(xii) provide a platform that can sustainably connect producers, major players, and brokers in order to collaborate toward a common objective and

(xiii) work to standardize and regulate the vegetable marketing system, which is largely informal.

1 INTRODUCTION

Traditional African Vegetables (TAVs) are vegetables that are indigenous to the continent of Africa. TAVs include Ethiopian kale, pumpkin, amaranth, African nightshade, spider plant, blackjack, cowpea, African eggplant, jute mallow, sweet potato leaves, cassava leaves, hare lettuce, green pigeon pea and okra.

Many TAVs are rich in nutrients and have the potential to significantly reduce malnutrition. They can also provide farming communities in rural, urban, and peri-urban regions with dependable sources of income, according to Mwadzingeni et al. (2021). TAVs offer numerous health advantages in addition to opening up economic and employment opportunities. The majority of TAVs may be cultivated naturally or with few inputs. Additionally, they are simple to cultivate using conventional methods and regenerative technology. Across the vegetable value chain, TAVs are understudied and underutilized despite their advantages and potential.

In line with this, Veggies 4 Planet & People (V4P&P), a five-year project being implemented by the Netherlands Development Organisation (SNV) and World Vegetable Centre (WorldVeg) with the financial support from IKEA[1] Foundation, aims to create jobs and income, particularly for youth and women, in the vegetable sector and improve environmental and human health through safe production of vegetables. Given the increasing demand for TAVs by urban consumers, the project and its implementation partners (SNV and WorldVeg) have placed a special emphasis on the development of the TAV value chain.

The Veggies 4 Planet & People (V4P&P) project has four main outcome areas:

1. Identification, assessment and strengthening of Vegetable Business Networks (VBNs)
2. Promotion of use of regenerative and circular technologies in vegetable production
3. Building of strong commercial vegetable seed systems
4. Awareness and demand creation for sustainable technologies, business services, seeds, other inputs, and safe vegetables and vegetable products.

The project will connect the producers and/or VBNs to the urban consumers within a maximum radius of 120 km, with a focus on marketplaces for urban consumers in Finfinnee, Addis Ababa around the Special Zone, and peri-urban areas of three woredas—Wolmera, Ejere, and Woliso.

1 IKEA is named after the initials of founder Ingvar Kamprad, Elmtaryd, the farm on which he grew up, and Agunnaryd, the nearby village.

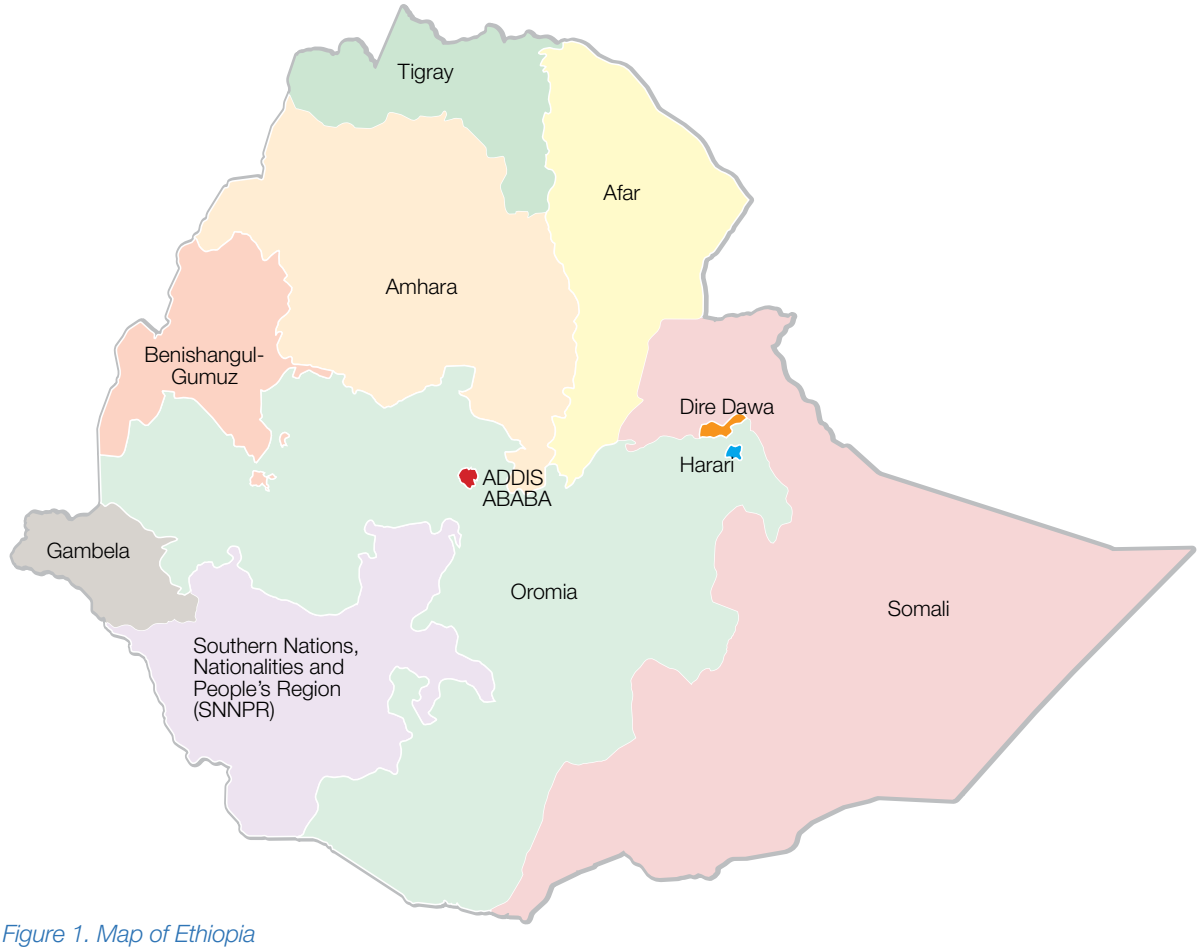


Figure 1. Map of Ethiopia

Objective of the study

The primary goal of the vegetable value chain study was to conduct a thorough value chain analysis and direct project implementation activities in accordance with the required standards of the value chain approach. The specific objectives of the study were:

1. To identify vegetable value chains in the areas of focus and analyze their potential in terms of production, irrigation facilities, availability of market and demand from consumers;
2. To assess the areas of support and/or propose strategy to strengthen existing VBNs and link them to the market (entry points) to play their role sustainably;
3. To identify and assess the availability and accessibility of key inputs for regenerative agricultural technologies which are going to be adopted and practised by producers and have potential to be promoted; and
4. To evaluate the enabling environment surrounding the vegetable value chain, including but not limited to extension service providers, government initiatives, development partners and their projects, rules and regulations, informal rules and norms, etc.

2 METHODOLOGY AND APPROACHES

Methods of data collection

Both quantitative and qualitative data were collected, analyzed, and used as input to prepare this report. The data collection methods and tools applied for the studies are highlighted as follows:

Review of secondary sources of data

Various literatures on value chain studies conducted by SNV including researching various websites, related documents and reports, provided preliminary characterization of potential VBNs and market actors in each target area.

Participatory household interview

Participatory HH interview involved interactive interviews between household respondents and producers. It was used to gather quantitative data that allow answering individual and specific research questions. Data was collected between the months of July and August 2021 by visiting each of the sample respondents by enumerators and facilitators capable of speaking the local language (Afan Oromo) and familiar with culture and social context of the communities.

Key informant interviews (KII)

An in-depth interview was carried out with key individuals and organizations – value chain actors, supporters, influencers, relevant public and private institutions – using an approved semi-structured questionnaire.

The staff, experts and management heads of institutions/organizations and key stakeholder groups were consulted and interviewed.

Focus groups discussion and group interviews

With an average of 10–12 people in each group, the focus group discussion (FGD) included all community representatives, producers of vegetables, women and youth, kebele leaders, agriculture and health extension workers, local leaders, farmers, traders, and other participants in the vegetable value chain. In order to learn more about sources of livelihood, current employment opportunities, and income sources, as well as the contribution of vegetable production to household economies, discussions were held with members of the VBN for women and youth as well as other producers and market actors. These discussions served to triangulate or substantiate the data from the HH survey.

Data analysis

Data encoders checked, cleaned, and organized the surveys for coding and entry as part of the quantitative data analysis process. A computer-based data input process was carried out using data organizers and encoders. Using CSPro software and SPSS, the data input system was created for the household HH survey questionnaires. Data was then tabulated and summarized using descriptive statistics to determine frequencies, means, indices, scores, and proportions or percentages, and results were then presented in the report using cross tabulations, graphs, charts, and other pertinent visual aids. As part of the data analysis process, outputs from various methodologies and techniques were triangulated, allowing for comparison and validation of results. Triangulation was also used to analyze and ensure the validity and reliability of study methodologies and data collection and analysis tools and techniques.

Selection of kebeles, VBNs, and sampling of HH respondents

Given the sampling frame of 16 kebeles and 31 VBNs provided by the project, high potential vegetable producing kebeles and VBNs with possible irrigation facilities, closeness to market and main road, and linkage to markets, were specifically chosen from each of the three districts. Using the highest response proportion rates of 35% and 25%, respectively, to estimate the number of kebeles and VBNs to be included, the optimal sample size/number of kebeles and VBNs was statistically established. Once the ultimate number of 6 kebeles and 8 VBNs was established, the kebeles and VBNs were strategically selected with the help of relevant woreda experts and project officers.

A systematic random sampling procedure to choose VBN members from the provided list of member names in order to select HH respondents for each kebele was used. In this procedure, 120 sample HHs were chosen from eight VBNs using a statistically acceptable response rate of 12%. Based on probability proportional to size (PPS), these HHs were distributed across the three woredas, with around 15 HHs from each Kebele/VBN being interviewed. Table 1 displays the survey's sampling units and their distribution among kebeles and VBNs.

Table 1. Total number of kebeles, VBNs and VBN members per each woreda

Woreda/ Cluster	Number in V4P&P project[1]			Number sampled for survey[2]		
	Kebele	VBN	HHs/VBN members to date	Kebele	VBN	HHs/VBN members
Woliso	6	14	430	3	3	45
Wolmara	6	11	365	2	3	45
Ejere	4	6	189	1	2	30
Total	16	31	984	6	8	120

Source: [1]Project document; [2]Own computation

Priority vegetables per woreda

The study of HHs' survey responses on their preference and actual decision to cultivate or plant Ethiopian kale is shown in Table 2 below (Yehabesha Gomen). Kale was prioritized over other vegetables by approximately 98% of VBN member HHs from Woliso and Wolmera and 57% from Ejere woredas.

Table 2. Summary of selected vegetables by ranking order in each woreda

Woreda	Vegetables selected for the value chain study			
	1st	2nd	3rd	4th
Woliso	Onion	Kale	Tomato	Green pepper
Wolmera	Kale	Spinach	Lettuce	Leak
Ejere	Onion	Green pepper	Garlic	Kale

3 RESULTS AND DISCUSSION

Assessment of support services and the enabling environment to VBNs and key actors in vegetable value chains

Food Systems

Food systems are extremely complex, with all of the activities of food systems from production to consumption affecting global health and nutrition, environmental sustainability, and livelihoods and employment. Globally, agri-food work is the largest economic sector, employing over a quarter of the world's workers. The scale alone of global food systems makes achieving change complicated and slow. Fear of the unknown, combined with vested interests of powerful food systems players, can bring resistance to innovation and change. This results in a lack of effective responses to already pressing issues. The challenge Is compounded by the difficulties of creating sufficient collective understanding and commitment among the highly diverse groups involved in food systems.

However, while change often seems slow and difficult, stuck or even regressing, there are endless positive examples of individuals, communities, groups and organisations working for more sustainable and equitable food systems. Especially when the life force of food is involved, people are deeply capable of innovation, creativity, social organisation and activism.

While foresight and scenario analysis is no panacea to the complex and overlapping issues within our food systems, it offers two critical contributions:

Motivation and clarity for change by offering stakeholders a window into the future, through which they can see how their longer-term interests and aspirations would be affected by different future scenarios.

Helping break down the barriers of vested interests by facilitating stakeholders to collectively explore options and pathways for change that can balance individual and common interests.

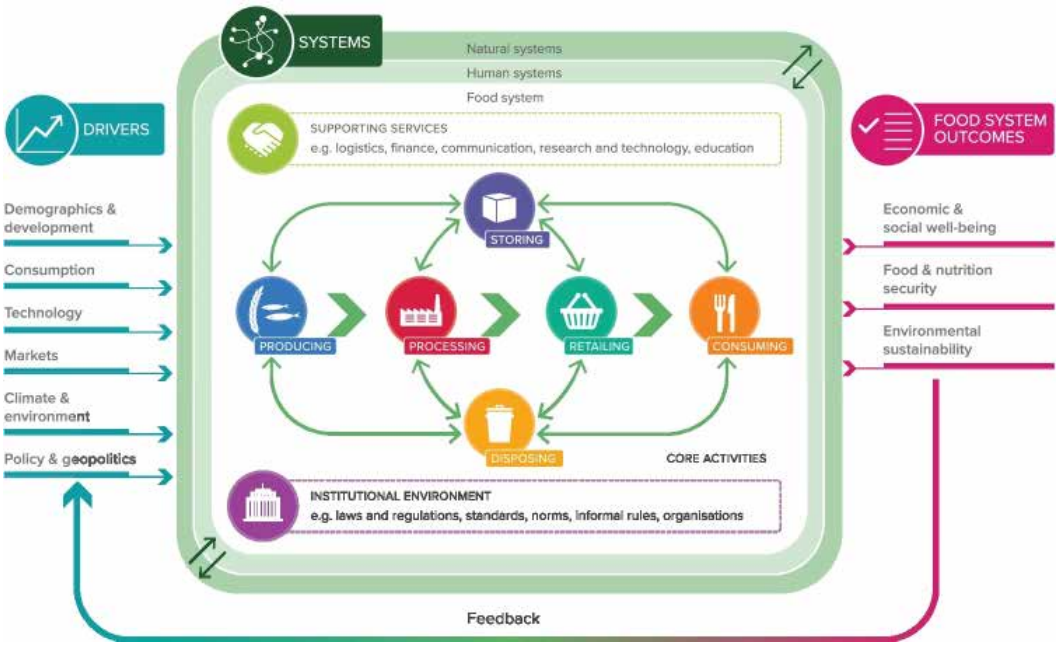


Figure 2. Food systems linkages

Source: Foresight4food

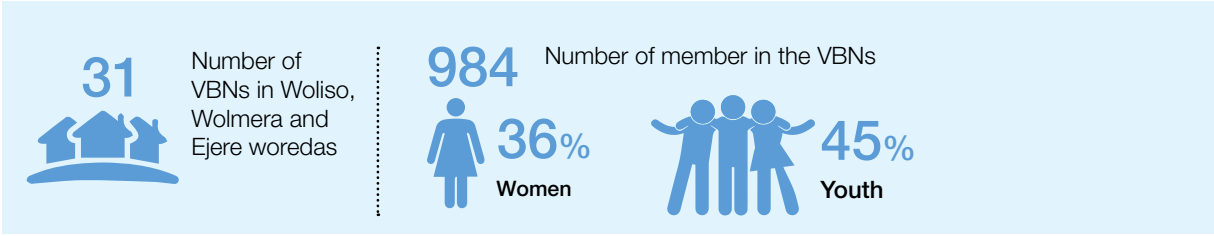
Overview of VBNs and socio-demographic characteristics of HHs member

The three study areas already have 31 VBNs with 984 members (36% women and 45% youth), and some preliminary work has been done with the groups. The detail about these groups is summarized in Table 3.

Table 3. Summary information and basic data on VBNs by woreda

Woreda	No of Kebele	No of VBNs	Members			Female (%)	No youth members	Youth (%)
			Men	Women	Total			
Woliso	6	14	281	149	430	35	214	49.77
Wolmera	6	11	227	138	365	38	123	33.70
Ejere	4	6	124	65	189	34	107	56.61
Total	16	31	632	352	984	36	444	45

Source: V4P&P project document, August 2021



Sex

A total of 120 HHs from VBN members (vegetable producers and suppliers) were randomly selected from the three woredas involved in the HH survey. Figure 2 shows total number of respondents by woreda and sex. Out of the total interviewed HHs about 91 (75.8%) were men, while 29 (24.2%) were women.

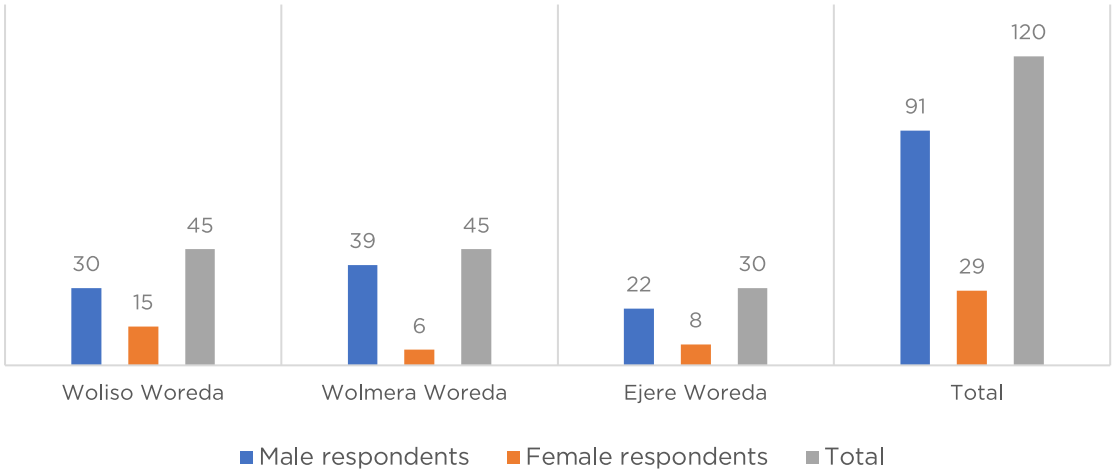
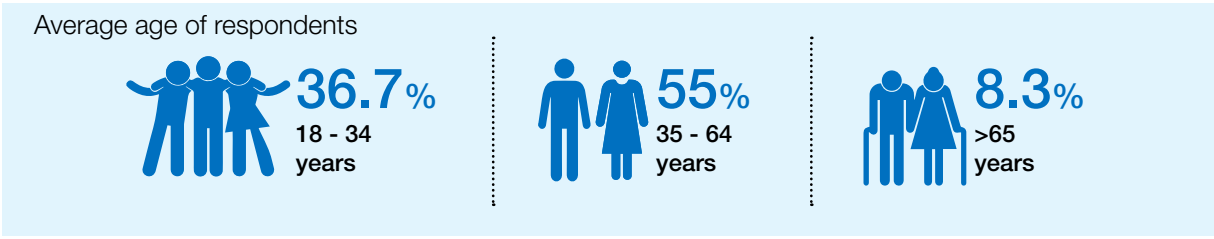


Figure 3. Number of household survey respondents of VBNs members by sex

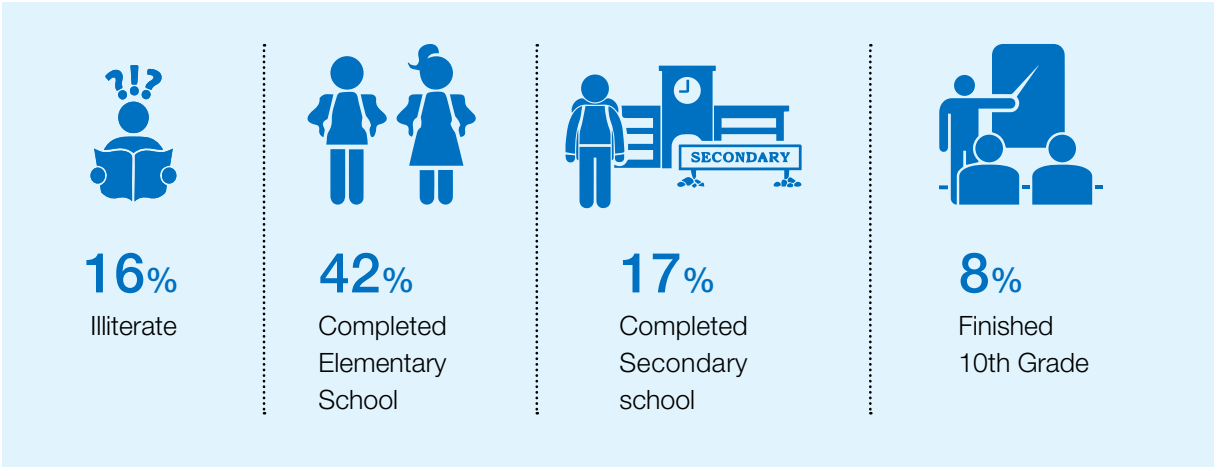
Age

According to survey analysis results, 36.7% of respondents were youth between the ages of 18 and 34. While 55% of all HHs were between the ages of 35 and 64. 8.3% of respondents were above 65. This shows that 91.7% of all respondents were in the working age group.



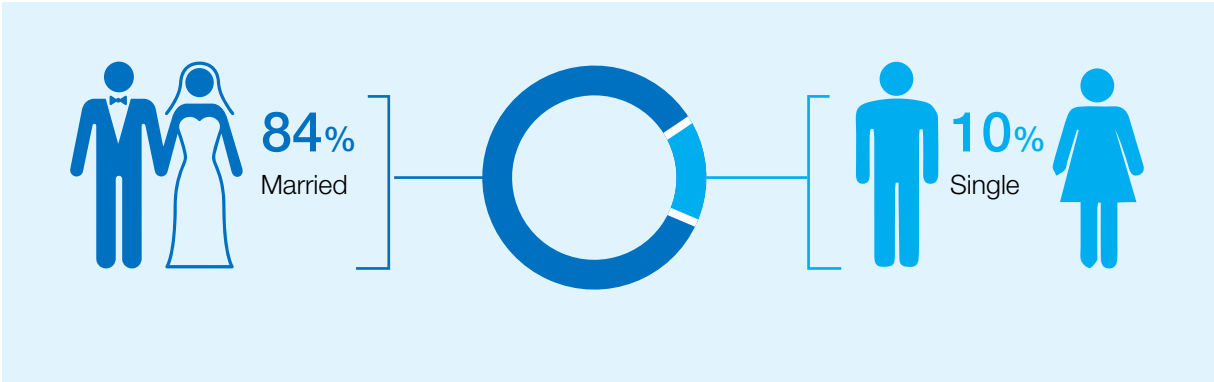
Education

An interesting finding from the assessment of respondents' educational status was that a large portion of the HHs had better educational status, with only 16% of HHs being illiterate. In addition to this, almost 17% of all respondents attended basic education, while 42% and 17% of respondents completed elementary and secondary education, respectively. Additionally, 8% of responders had finished the 10th grade.



Marital status

The survey's findings revealed that 84% of the men and women are married and only 10% are single.



Assessment of the existing enabling environment

In the woredas, linkage of value chain actors to markets, enabling environment and support services is vital for the success of vegetable production and marketing as illustrated in Figure 3.

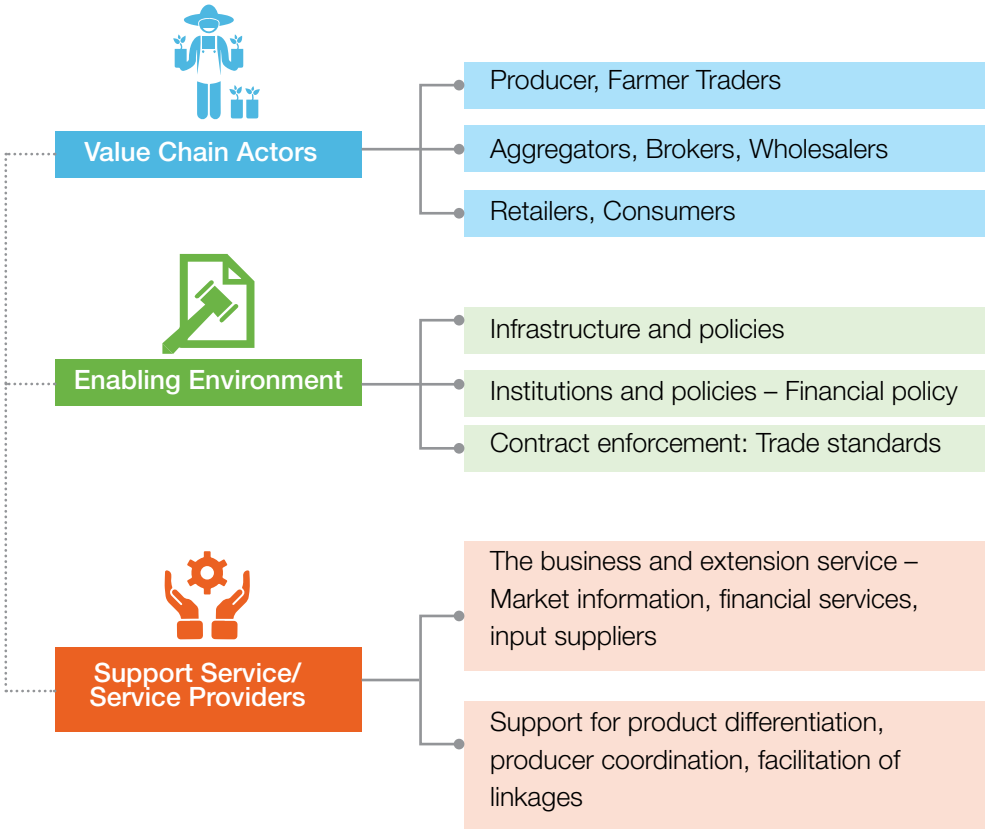


Figure 3. List and linkage of VC actors, enabling environment and support services. Note: Dotted line indicates a weak linkage.

Source: Adapted from Portia Ndou et al, 021

The value chain actors need close relationships to and support from the enabling environment and support service providers. Coordinated efforts to approach and support vegetable producers and traders are either very weak or nonexistent in the project areas. The current levels of assistance given to VBNs and the environment that enables the vegetable VCs to operate are disorganized and ineffective to properly assist producers in general and the VBN members in particular.

The rules and regulatory system governing the quality and safety of various inputs and vegetable production supplied to markets, as well as market regulations, are at an early stage. These enabling environments also include extension services and other interventions by the government and development partners.

To significantly improve the current support services provided for vegetable production and commercialization, all major players must put up extensive efforts. Furthermore, by ensuring that vegetables meet quality and safety standards in a coordinated manner, the support services should also enable employment creation and income generation for women and youth.

Major actors involved in vegetables value chains

Vegetable value chain consists of input suppliers, commodity producers, market actors and transporters, processors and consumers. Additionally, it includes the movement of inputs, goods (outputs), information and expertise, finance, and the social capital required to unite and connect producers and consumers. As opposed to the simpler types of supply chains, where producers and buyers only exchange price information – often in an antagonistic manner – the value chain functions best when the actors cooperate to produce higher quality products and generate more income for all participants along the chain fairly.

The vegetable value chains of the V4P&P Project woredas are weak and traditional, falling into the category of modest value chains—in which the linkage between chain actors, functions supporters, and influencers operate in an unorganized and weak manner coupled with a weak governance system where market rules and regulations systems are not safe, fair, and equitable among actors and, ultimately, the consumers.

There are various actors of the vegetable market chain that support the chain actors in performing their roles. Below is a brief overview.

Input suppliers

The major suppliers identified in the input supplying function of the VCs are: agro-dealers; private input suppliers; cooperatives unions; government agencies; and NGOs. The major inputs required are seed and seedlings, organic fertilizers and plant extracts. These inputs come from a variety of sources:

Agro-dealers: These provide nearby farmers with a variety of agricultural inputs. Three private dealers operate in Woliso, while one is located in Ejere. Although the merchants offer a variety of improved vegetable seeds, insecticides, herbicides, and organic fertilizers, none of them offered seeds for TAVs and regenerative technologies. Most inputs, such as seeds, herbicides, and insecticides, are more reasonably priced when purchased from private dealers as opposed to cooperatives, whose administrative overhead result in higher prices.

Vegetable farmers face difficulties relating to the quality of inputs, such as seed viability and effectiveness, sub-standard and adulterated chemicals, insecticides, and pesticides. Raising concerns on the safety of the farmers, dealers, and consumers.

Agro-dealer shops: The agro-dealers buy inputs from the suppliers in Addis Ababa (Ateklit Tera). Their vegetable inputs originate from various countries such as the Netherlands, India, China, Turkey, Germany, and Kenya.

Table 4. Information on sample agro-dealers visited

Woreda	Trade name	Year started	Inputs supplied	Sources
Woliso	Woliso Pesticide Store	2002 EC	Onion, Tomato, Red beet, cabbage, herbicide, Eco-green fertilizer, pesticide (Diazoline), herbicide (2-4D, Palace), farm implements, etc.	Purchased from Importers in Addis Ababa
Wolmera	Wanofi Pesticide and Herbicides Dealer	2011 EC	Carrot, red beet, Lettuce, Leek, Head cabbage, Eco-green fertilizer/fluid, herbicides, pesticides, etc.	Purchased from Importers in Addis Ababa
Ejere	Ejere Pesticide dealer	2010 EC	Onion, cabbage, Eco-green fertilizer/fluid, herbicides, pesticides, etc.	Purchased from Importers in Addis Ababa

Source: Organized from KI Interviews with private agro-dealers

Some of the issues faced by agro-dealers and farmers include:

- Poor product quality—expensive, substandard goods are sold;
- High shortage of supply of inputs. in Holeta/Wolmera, for example, a dealer expressed that there is serious problem in getting quality pepper seed and as a result stopped supplying pepper seed—this is a good opportunity for VBNs to engage in production of quality vegetable seeds of different varieties and alleviate the problem vegetable farmers face in getting quality seed;
- Rapid increase in input costs: this results in forcing farmers to pay more;
- No compensation is offered for losses brought on by poor input quality—farmers buy inputs at their own risk; and
- No or insufficient quality and safety control in their respective woredas

Cooperative Unions: The unions are multipurpose cooperatives and are not commodity-specific. They offer a range of services through their member cooperatives. Improved seed for cereal crops, chemical fertilizer, herbicides, insecticides, and farm equipment are just a few of the services they offered by the unions. Additionally, the unions purchase from farmers agricultural produce. The unions have a very limited role in providing the inputs that their members' vegetable farmers need, and they are not involved in providing TAV seeds or other regenerative technologies. Two of the main unions in the woredas are Liben in Woliso and Robi Berga in Wolmera for Wolmera and Ejere woredas.

Some of the constraints faced by the unions are:

- Lack of planning by member basic cooperatives—they do not notify the union in advance of any products they require a market for;
- lacks of knowledge in technologies, particularly cold storage, needed to extend the shelf-life of vegetables;
- Inability to diversify product lines by farmers within the same production period leading to oversupply and a lack of demand;
- lack of coordination among assistance organizations in serving farmers; and
- competition from brokers and big traders.

Brokers and big traders: Brokers played unfair roles, such as withholding information, disparaging cooperatives, and influencing large traders or consumers to avoid purchasing from cooperatives. The brokers who form close relationships with large dealers are a major contributor to the distortion of the vegetable market. Similar complaints were also voiced by private vegetable growers. The problem is not with price fluctuations but rather with market disruptions that undermine market participants' credibility and reduce transparency. Cooperatives have a very difficult time competing with big traders and their related

brokers. Brokers undoubtedly play a key role in providing participants with market information and related services, but their function must be transparent and subject to appropriate regulations.

Government organizations: Government institutions active in agriculture and research are actively involved in the farmers' supply of agricultural inputs, including vegetables. For instance, some of the local vegetable farmers receive Ethiopian kale and lettuce seeds from the Holeta Agricultural Research Center's Horticulture Research Section.

NGOs: By providing farmers with inputs such as vegetable seeds, seedlings, and other inputs, NGOs and other partners are also a part of the vegetable market value chain. In Wolmera Woreda, ISD began its intervention by teaching and educating the beneficiaries about the advantages of regenerative technologies while also offering free vegetable seeds to encourage vegetable growers in producing organic vegetables. ISD continues to assist farmers, by facilitating the market for selected vegetable growers in the Wolmera Woreda region so they can produce and supply conventionally organic vegetables to the specialized market in Addis Ababa where there is a high demand for safely grown vegetables. Despite the demand, there are stringent requirements such as organic product certification that need to be fulfilled.

Other key actors

Producers: Producers are vegetable farmers who grow a variety of vegetables in the target woredas, including lettuce, leek, garlic, Swiss chard or spinach, Ethiopian kale, onion, tomato, and pepper. The farmers use irrigation and rain to grow their crops. Various industrial chemicals, including fertilizers, are used by these producers in the growing of Improved tomato, pepper, onion, lettuce, leek, garlic seeds. There is minimal usage of regenerative technology on TAVs. The government and producers are concentrating on adopting high yielding varieties of quality seed and intense applications of related inputs to boost output rather than using regenerative technology.

One of the main obstacles to the widespread application of regenerative technologies is a lack of robust promotion and a lack of input supplies. In all three woredas, various initiatives are being made to promote and practice the usage of conventional compost, vermiworm, and manure.

The producers either take their goods to surrounding local marketplaces or sell them at the farm gate. When demand is at its highest and there are more sellers than buyers, the price is primarily established by the buyers. Producers then have the choice of selling or rejecting the offer. Only when producers are certain that there will soon be another opportunity to sell at a greater price without endangering the product's quality or shelf life do they reject the agreement.

Farmer traders: These farmer traders are few and intermittently pick and distribute produce to the local market. Due to the significant danger of perishability, farmer traders are hesitant to deal in vegetables such as Ethiopian kale, spinach, lettuce, leek, and pepper.

Aggregators These are actors buy the goods from the farmers at the farm gate or at the local markets. They buy the produce, pack, transport, and then sell to the retailers or wholesaler. Local aggregators are primarily women incur risks and are skilled in handling perishable leafy crops.

Collectors These are actors buy the goods from the farmers at the farm gate or at the local markets. They buy the produce, pack, transport, and then sell to the retailers or wholesaler.

Farmers processing lettuce in Wolmera

There are about 30 collectors in Kolobo town. Leafy vegetables such as Ethiopian kale, lettuce and leek were the only vegetables at the vegetable collection center in Kolobo. The town's municipality built the collection shade to accommodate collectors that are easily accessible and act as a source of supplies for VBN farmers. The collectors separate the discarded items, organize and bundle the vegetables in "jambi," and then transport them directly to Addis Ababa's retailers and consumers. Transferring such leafy vegetables to wholesalers lengthens the supply chain and reduces the product's shelf life.

Brokers: These are middlemen who primarily disseminate knowledge and serve as a conduit between buyers and sellers in conducting vegetable transactions. However, brokers are claimed to be primary market "distorters" since they prevent producers from getting access to accurate information, always side with or favor financially wealthy traders, taking advantage of producers. Some of the wholesalers assisted by brokers in transactions are located in Woliso, Wolmera, and Ejere. Most of them are in Addis Ababa and neighboring locations.

Wholesalers: Wholesalers in each woreda town buy vegetables in bulk then sell them to shops in various locations. There are only six wholesalers operating in the Woliso, Wolmera, and Ejere woredas, and they primarily deal in potatoes, onions, and tomatoes. In leafy vegetables where the shelf life is short, the involvement of wholesalers is relatively minimal. The commodity is sometimes delivered directly to the merchants.

Onion and Tomato wholesaler store and packing wooden boxes in Holeta town.

Retailers: Traders either buy produce directly from farmers, collectors, or wholesalers and then resell them to consumers in supermarkets, retail shops, open-air marketplaces, or on the sides of the road. Eight fruit and vegetable traders are registered in Holeta in Wolmera woreda, while 18 are in Ejere.

There are two types of retailers: those who run their businesses inside of stores or supermarkets, and those who operate outdoors in open spaces like outdoor markets and along the sides of open roads. Fruits are rarely sold at open-air markets. Supermarkets specialize in selling fruits and vegetables. In large towns like Addis Ababa, vegetable retail is conducted outside and is primarily handled by women and girls).

Kale retailers in Woliso

Consumers: These make up the final link in the supply chain for vegetables. These include individuals, and businesses like hotels and restaurants. Addis Ababa, has a large population, high-end hotels and other establishments.

Enabling environment: A key player in Ethiopia's vegetable industry is the Ministry of Agriculture. The national focus has recently been mostly on cereals, but it now appears to be turning to higher value items that create opportunities for off-farm employment. Other state actors are:

- The Agricultural Transformation Agency (ATA), a semi-autonomous government institution, developing strategies and system transition pathways.
- The national agricultural research system—this includes Ethiopian Universities, the Ethiopian Agricultural

Research Institute and its regional aliases, such as the Oromia Regional Research Institute

- The Ethiopian Investment Commission—responsible for attracting commercial investment to the sector – primarily focuses on commercial farms. Horticulture is a priority investment sector for Ethiopia.

Some of the policies, regulations and informal rules governing and affecting the vegetable sector in Ethiopia include:

- Switching from rain-fed agriculture to irrigation, increasing agricultural mechanization and input intensity, increasing private sector participation through direct investment, and implementing inclusive farming models like contract farming according to the ten years' Perspective Development Plan (2021-2030). By 2030, 7% of the population is expected to be living below the poverty level, the plan also aims to reduce the agricultural sector's share of GDP to 22% and create 14 million jobs annually.
- Emphasis on nutritional variety and the value of fruits and vegetables in the fight against stunting by the Ethiopian Public Health National Strategy.
- Acknowledgement of the agricultural sector as a significant contributor to achieving the country's nutrition goals. The second National Nutrition Policy (NNP II), a national nutrition policy document, outlined a number of goals and activities that were sensitive to nutrition and developed a comprehensive list of pertinent indicators to assess the strategy's success in promoting better nutrition.
- Setting up of food regulation management systems in the agri-food chain e.g. multiple Codex Alimentarius[2] guidelines and the National Codex[3]. Regarding fruits and vegetables, it's unclear how the process is progressing.

Vegetable Production and Farming Practices by Woredas

Production Estimate by Volume, Land Size, and Number of Producers

All the three woredas have good potential for vegetable production and marketing. More than 10 different types of vegetables are produced in each woreda. Farmers have irrigation land and produce vegetables primarily for sale at markets for income generation. The availability and size of farmlands that can used for growing vegetables as well as the number of farmers who are involved in this activity and easy access to markets, makes the areas suitable for vegetable production. Moreover, identified and prioritized vegetable crops were found to have various market outlets including Addis Ababa, Jimma, Bedele, Gambella, Wollega, and Asossa. Identified market outlets for each crop and woreda are indicated under the sub-sections of each commodity in this report. Potential and production performance of each woreda is summarized in Figure 4.

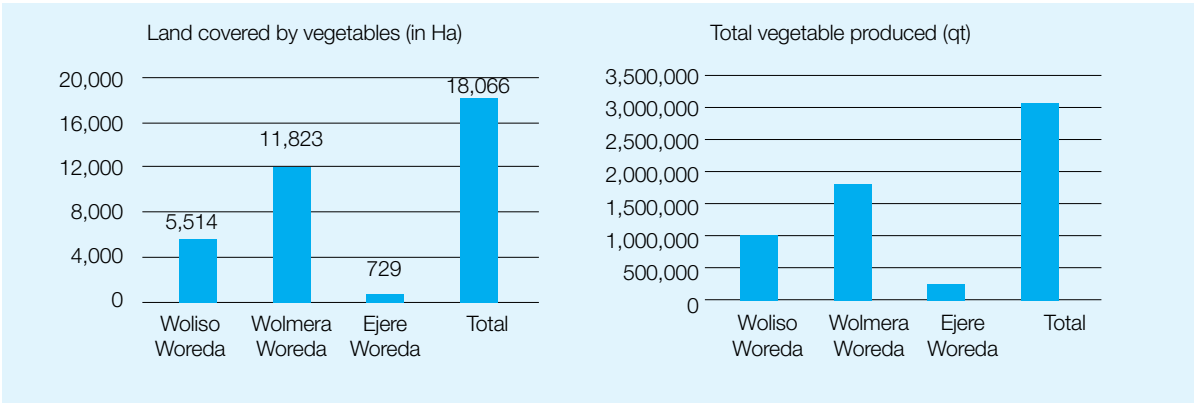


Figure 4. Total land covered by vegetables and vegetable production performance by woreda in 2020/21 (2013 EC).

Source: Woliso, Wolmera, and Ejere woreda Agriculture and Natural Resource (NR) offices, August 2021

2 https://www.fao.org/fao-who-codexalimentarius/about-codex/en/
3 https://www.ethiostandards.org/codex-ethiopia

Basic facts on woredas' potential for vegetables production

Woliso Woreda

22/35	Out of **35** kebeles in the woreda, **22** have irrigation potential
	There are **seven** big rivers in the woreda that the community uses for irrigation
	All the interviewed respondents have irrigated land and produce vegetables under irrigation for market purpose.
	There are **14,742** farmers (**12,803** men and **1,939** women) organized into **143** irrigation water user associations in the woreda.
	Woreda agriculture office has supported irrigation water use associations with **22** water pumps, and construction of **21** traditional ponds.
	In year 2020/21 (2013 EC), a total of **7007** ha in the woreda was under irrigation, and **5,514 ha (78.8%)** of the same area was used for vegetable production.
	Out of the total **1,030,971** qt produced from irrigated farming, **964,512 qt (93.6%)** were vegetables In similar production year, **6,788 ha** land was used for vegetable production using summer rain; and about **1,969.558 qt** of different types of vegetables were produced.

Wolmera Woreda

19/23	Out of **23** kebeles in the woreda, **19** have irrigation potential. Rivers and springs are the major water sources for this purpose.
	There are **33** irrigation water user associations having **3,124** members (**2,688** male and **436** female) in the woreda.
	Twelve (**12**) irrigation projects constructed by Agricultural Growth Program (AGP) is serving the community with production of different types of vegetables
	All the interviewed respondents have irrigation land and produce vegetables mainly to generate income
	In 2020/21 (2013 EC), fiscal year a total of **11,823 ha** was covered by vegetables using irrigation in two rounds, and about **1,713,267 qt** different types of vegetables were produced. Similarly, during the summer (kiremt) rainfall, a total of **1,211,210 qt** vegetables were produced on **4,731ha** land.

Ejere Woreda

13/26	Out of the total **26** rural kebeles, **13** have irrigation potential.
	There are four big rivers with high irrigation potential in the woreda
	There are **24** irrigation user associations in the woreda.
	All the interviewed respondents (**30**) have irrigated land and produce vegetables to generate income
	In 2020/21 (2013 EC), **729 ha** irrigation land was covered by different types of vegetables; and a total of **252,369.25qt** vegetables were produced

The use of irrigation facilities and seasonality of the production

Woliso Woreda

Of the 35 kebeles in the woreda, 22 can potentially be used for irrigation. The woreda has seven significant rivers that are used for irrigation. On these rivers, a few contemporary canals have been built, but the majority of the canals are traditional irrigation canals. With the help of 22 water pumps that were provided on a credit basis, Woliso Woreda Agriculture Office has supported irrigation user associations. There are also 21 traditional ponds. Woliso Woreda has 14,742 members across 143 irrigation water user associations (12,803 men and 1,939 women).

Wolmera Woreda

Of the woreda's 23 kebeles, 19 have the potential to be used for irrigation. The primary water sources for irrigation are rivers and springs. With 3,124 members (2,688 men and 436 women), 33 water user associations exist in Wolmera woreda, but only 13 of them are officially recognized. In two rounds of planting in 2020/21 (2013 EC), irrigation was applied to 11,823 acres of land, all of which was used to grow vegetables.

Ejere Woreda

Out of the four large rivers that run through the woreda, two are used for agriculture. Thirteen of the 26 rural kebeles have the potential for irrigation. The woreda has 24 irrigation user associations. Variety of vegetables were grown on 729 hectares of irrigated land in 2020–21 (2013 EC), yielding 252,369.25qt of produce in total.

Figure 5 shows the irrigation potential of the three woredas.

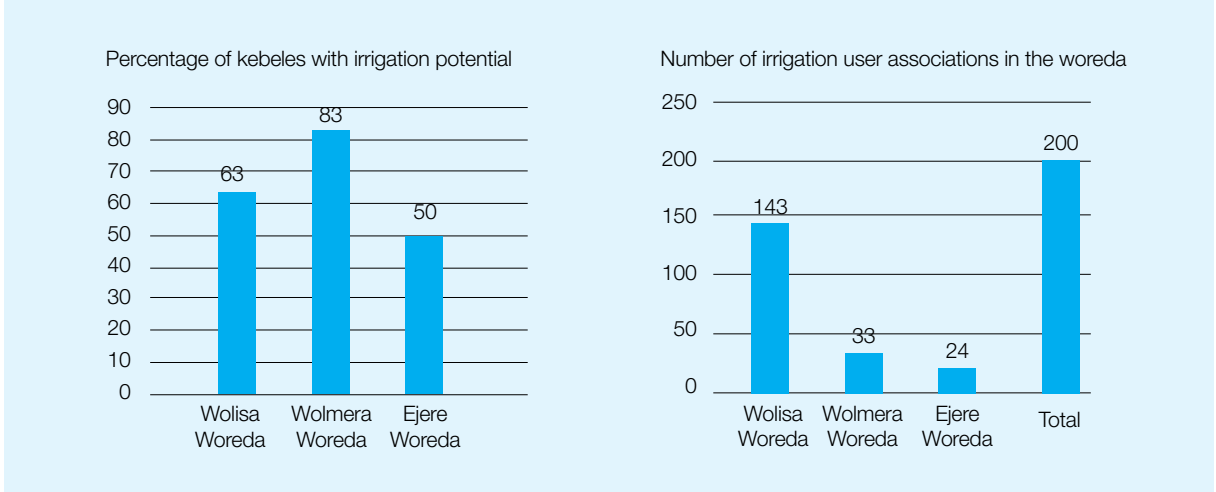


Figure 5. Percentage of kebeles with irrigation potential (left) and No of irrigation user associations (right)

Analysis of Gross Revenue for the selected vegetables

A cost and benefit analysis was done on selected vegetables in each of the three woredas—onion for the Woliso Woreda, lettuce for the Wolmera Woreda, and pepper for the Ejere Woreda—cost and benefit analyses was conducted. The profitability assessment was calculated using the average market price of the selected commodities based on production data. According to calculations done on the following vegetables, producers can get reasonable revenue and make a good profit margin. The following gross revenue analysis on the selected vegetables is indicated below, although it excludes a number of expenses such market levies, taxes, transportation costs, commission fees, and land prices.

Woliso Woreda

Four vegetables were selected for the value chain analysis in this woreda—tomato, Ethiopian kale, onion, and green pepper. An estimated Birr 225,000–255,000 in income can be generated for every 0.5 hectare cultivated with onions, with a cost of Birr 104,300. This is according to the gross revenue study done for onions.

The analysis illustrated below is for onion produced on 0.5ha (2 timad), and amounts and costs used for this analysis were taken from two onion producer FGD members (one best performing and one medium) identified by the FGD members. The discussion was made with these individuals and averages of the amounts and costs they mentioned were used for the analysis.

Table 5. Gross Revenue analysis of Onion in Woliso Woreda (0.5 ha of land)

Production Cost (in birr)	Gross Revenue (in birr)
• Seed = 2.5 tins (1,250gm) x 750 br = 1,875 birr • Fertilizer while on seed bed = 25 kg = 325 birr • Pesticide while on seed bed = 750 birr • Weeding while on seed bed = 1,000 birr • Transplanting = (labor cost) = 3,000 birr • Fertilizer after transplanting = 4 qt x 1,700 birr = 6,800 birr • Weeding = 20 laborers x 2 times x 180 birr =7,200 birr • Pesticide = 2,500 birr • Water pump = 8 dys x 12 hrs x 200 birr = 19,200 birr • Benzin = 5,000 birr • Harvesting = 20 laborers x 180 birr = 3,600 birr • Cleaning and packing = 150 qt x 35 birr = 5,250 birr • Bags = 150 x 15 birr = 2,250 birr • Transportation = 150 qt x 50 birr = 7,500 birr **Total cost =104,300 birr**	• Sale (at farm gate) = 150qt x 1500 birr = **225,000 birr** • Sale (if taken to the market) = 150qt x 1700 birr = **255,000 birr** **Gross Revenue at farm gate and local markets** • If sold at farm gate = 225,000 – 104,300 = **120,700 birr** • If sold at market = 255,000 – 63,325 = **150,700**

Source: Calculated by study team
Note: These gross return of onion production on 0.5 ha land do not consider various costs such as market levies, land taxes, market price, commission costs, land values etc.

Wolmera Woreda

In this woreda, Ethiopian kale, spinach, lettuce, and leeks were selected for the value chain study. In order to determine whether the lettuce business is financially sustainable, a profit analysis was conducted. The analysis was made for lettuce production on 0.25 ha land. The result shows that Birr 464,930 gross profit obtained at farm gate by incurring production costs of Birr 75,070 cost, without taking other expenses into account[4].

Table 6. Gross Revenue analysis of Lettuce in Wolmera Woreda (0.25 ha of land)

Production Cost	Gross Revenue at Farm Gate
Seed = 500 gm = 1,500 birr Fertilizer while on seed bed = 100 birr Land preparation: 10pd x 250 birr x 3 times = 7,500 birr Transplanting = 10 pd x 250 birr x 3 times = 7,500 birr Tinning & weeding = 8 pd x 180 birr x 3 times = 4,320 birr Fertilizer after transplant = 50 kg = 1,150 birr Fertilizer & labor (repeated 10x) = 26,000 birr Harvesting = 5 pd x 180 x 3 times/month x 10 months = 27,000 birr **Total Cost of Production = 75,070 birr**	30 rounds of harvest x 30 *Jambi x 600 birr = **540,000 birr** **Gross Revenue/Return** 540,000 br – 75,070birr = **464,930 birr** *Average Price/Jambi is 600 birr

Source: Calculated by study team, pd = persons per day

Note: This is gross return from Lettuce production on 0.25ha land at farm gate. The costs do not consider taxes, market price, packaging, transportation, land values etc.

Ejere Woreda

In Ejere Woreda, the vegetables selected for value chain analysis were onion, pepper, garlic, and Ethiopian kale. Among these vegetables the gross revenue analysis was done for green pepper to show whether or not the business is financially viable. Hence, the analysis is made for pepper production on 0.25 ha land as follows.

Table 7. Gross Revenue analysis of Green Pepper in Ejere Woreda (0.25 ha of land)

Production Cost (Birr)	Revenue (Birr)
Seedlings = 4,000 per 0.25ha x 7.21br = 28,840 birr Fertilizer = 5 qtx 1,800br = 9,000 birr Ago chemicals = 15,000 birr Land preparation: 10 pd x 180 birr x 3 times = 5,400 birr Transplanting = 15pd x 180 birr x 3 times = 8,100 birr Tinning & weeding = 8 pd x 180 birr x 5(x) = 7,200 birr Fertilizer & labor (repeated to 5x) = 20,000 birr Harvesting and preparation = 10 pd x 200 x 6(x) for 5 months = 12,000 birr Motor pump rental = 3,000 birr Fuel cost = 40 lt x 35 birr = 1,400 birr **Total = 91,940 birr**	Green Pepper can be harvested up to 6 rounds 1st round = 30 box 2nd round = 80 box 3rd round = 60 box 4th round = 40 box 5th round = 30 box 6th round = 15 box Total = 255 box x 65 kg = 16,575 kg = 16,575 kg x 35 birr = **580,125 birr** Gross Revenue at farm gate: 580,125 birr – 91,940 = **488,185 birr**

Source: Calculated by study team

Note: This gross return from Green Pepper production on 0.25ha land at farm gate do not consider the costs such as market levies, other taxes, market price, packaging, transportation, land values, commission costs etc.

Table 8. Production or cropping calendar of some vegetable crops produced by irrigation for all woredas

Type	First Round Irrigation			Second round irrigation		
	Sowing	Transplant	Harvest	Sowing	Transplant	Harvest
Onion	August	September	Nov/Dec	January	March	April/May
Pepper	August	Sep/Oct	January-June	-	-	-
Garlic	July	August	November	February	March	May/June
Kale	August	Sept	Oct-May			

Source: Horticulture Experts of the Woreda Agriculture Offices

4 Market levies, taxes, market price, packaging, transportation, land values etc.

Assessment on practices of regenerative technology, availability of key inputs and consumers preferences

Most of the vegetable farmers are well aware and have positive attitude towards regenerative technologies including the availability and accessibility of the required key input. There has been various efforts by the government and development partners in promoting good agronomic practices by means of some regenerative technology that create minimum environmental and health related risks. The farmers have also been encouraged to adapt and practice climate smart agriculture (CSA) and use regenerative technologies, though the communities have always used farming practices such as crop rotation, intercropping, mulching, and use of crop biomass. However, much work has not been done to support these practices and their actual application at scale.

Almost 99.2% of households used or practiced one or more regenerative technologies in the last cropping season of 2020. Major regenerative technologies used by most respondents are: compost preparation and application, use of integrated pest management (IPM), crop rotation, and use of disease resistant/tolerant varieties, mulching, and recycling of on farm biomasses. Figure 6 show the summary of proportion of vegetable producers who used some of regenerative technologies in each woreda.

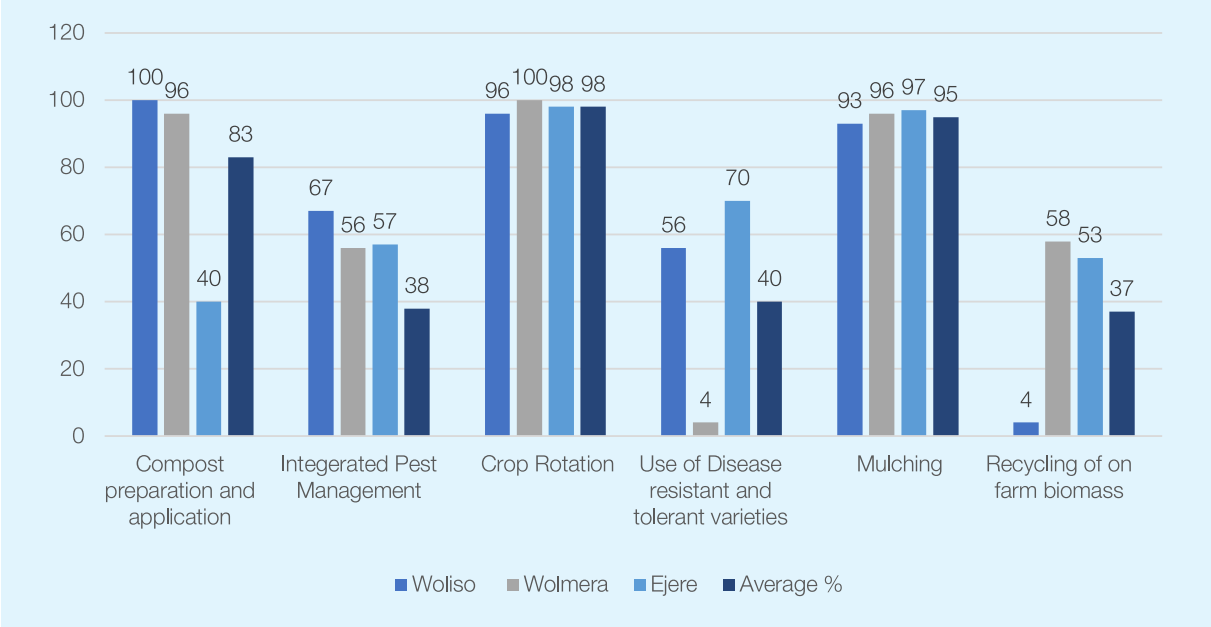


Figure 6. Use of regenerative technologies (percentage) by vegetable producers in each woreda

The existence of projects like Sustainable Land Management (SLM), Agriculture Growth Program (AGP), and Climate Action through Landscape Management (CALM) supported the better promotion of use of regenerative technologies according to Institute for Sustainable Development (ISD) an NGO that has been operating in Wolmera for the last eight years.

Key inputs for regenerative agricultural technologies, such as seeds, seedlings, bio-pesticides, irrigation equipment, and suppliers of vermi worms for vermicomposting, are some of the challenges that vegetable farmers face. These include a critical shortage of inputs, lack of timely access to the necessary and appropriate inputs, and lack of timely availability and affordability of other inputs like fertilizers.

The primary barrier to the supply of these inputs in these woredas is the market's dominance by informal dealers, who sell them at exorbitant prices despite their poor quality and expiration dates. According to VBN members, the seeds obtained from these unofficial providers are not pure, do not fully germinate, and are primarily contaminated with diseases. Regarding other inputs, cooperatives are the only source for fertilizer, while private traders occasionally offer supply. The main sources of agricultural chemicals are private agro-dealer shops in the woredas and Addis Ababa.

The majority of consumers are willing to pay more for high-quality, risk-free vegetables with a traceable source, especially those provided by organic producers and those made using regenerative technology. All customers voiced worry about the rising prices of vegetables, the seasonality of supply, as well as the quality and safety issues with the delivered vegetables, all of which are influenced by brokers and middlemen in local markets and across all production areas.

Processing, storage, post-harvest handling practices and transportation

Post-harvesting practices broadly comprise cleaning, packing, and processing, storage, transportation, and distribution. According to Chagomoka et al (2014), a number of critical bottlenecks hamper the growth of the traditional vegetable sector in Eastern and Southern Africa. The bottlenecks include: (i) lack of access to high quality seeds; (ii) high on-farm production losses; (iii) high perishability and post-harvest losses, particularly, for leafy traditional vegetables such as amaranth; (iv) lack of appropriate market infrastructure for handling perishable produce; (v) weak linkages between supply chain actors (i.e., input suppliers, producers and markets); (vi) lack of well-structured and organized markets leading to high transaction costs along the supply chain due lack of reliable market information and support systems; (vii) lack of mechanisms to set prices (i.e., traditional vegetables are usually sold by farmers mostly on the basis of "cost of living" rather than production costs or supply and demand conditions), resulting in low bargaining power of farmers; and (viii) ineffective institutional policies to enhance trade within and between regions and countries.

Leafy crops are particularly prone to post-harvest losses due to their high perishability. Farmers gather vegetables, sort them, bundle them, and either sell them to consumers right immediately or transport them to markets. The longer vegetables are stored after harvest, the more of their original quality they lose. Because of this, vegetable growers take all required precautions to deliver their harvests to markets as soon as possible. Additionally, farmers clean and cool-store vegetables like tomatoes and onions to extend their shelf lives before distributing them to local or village open markets or to roadside retailers. They also frequently add water to keep leafy vegetables fresh. It is vital to transport vegetables swiftly, preferably at night and before sunrise in order to preserve quality and lengthen shelf life.

An onion and tomato wholesale shop

Preparation (processing) of leafy and other vegetables for market

Vegetable farmers' post-harvest practices are broadly divided into two depending on the nature of the vegetables: (i) make quick preparations and taking to the market or supply to the buyer shortly after harvest, for example, leafy vegetables such as Ethiopian kale, lettuce and spinach and (ii) store briefly and supply to market or buyers, for example, non-leafy vegetables such as onion and tomato. The primary post-harvest activities carried out by vegetable producers include cleaning by washing, sorting, packing, storing, and transporting the produce before selling it to the buyer. Selling can be done at farm gate or by taking the product to the local and roadside markets as well as other big markets in nearby cities.

While processing or preparing vegetables after harvest, suppliers usually wash, remove the unwanted parts and make bulk pack which is locally called 'Jambi'. Water used to wash and clean the vegetables is usually unhygienic. The problem is more aggravated since the sources and quality of water used for washing and watering of these vegetables is sometimes exposed to pollution by various chemicals and waste matters causing huge problem on quality, sanitation, safety, and nutrition of the products. On the other hand, in most vegetable supplying areas, vegetables processing (washing and packing) is done in a rivers or available water bodies. Most of these water bodies are contaminated by upstream by big farms using harmful chemicals.

There is an urgent need to address these cross-cutting issues of consumers' safety, health, and nutrition. Furthermore, these critical challenges are further exacerbated by ever increasing demand and prices of vegetables.

Farmer processing lettuce (the upper two), Spinach (lower left) and Leek (lower right) for market in Wolmera

Transportation of vegetable

One of the most important factors in ensuring that a product is delivered on time and that its quality and shelf life are maintained until it reaches the local market and is sold to customers is transportation. As a result, vegetable producers should adopt the good practice of moving produce rapidly, especially at night and before sunset.

Produce is moved by farmers using a variety of methods, mostly carrying, loading, and moving animals, carts, and vehicles (where there is road accessibility).

Vegetables being transported using donkey (left), cart (middle) and minibus (right) in Kolobo/Menagesha town

The risk of perishability of vegetable depends on a number of variables, such as the type (nature) of the vegetable (for instance, leafy vegetables are highly susceptible to loss), the weather at the time of harvest (wet or dry as well as cold or hot), handling practices during and after harvest (transport), the distance from the market, and the mode and suitability of transport used to bring the product to the market. Vegetable post-harvest processing and transportation in the research areas is underdeveloped and need improvement. Enhancing post-harvest handling, especially proper handling during transport, is essential.

Assess potential markets and possibility for a niche markets

The project areas are strategically located close to Addis Ababa City where there is high population with better income. In 2021 the population of Addis Ababa estimated at 5, 5005,524 and projected to reach 8,938,683 by 2035[5].

On the other hand, the demand for vegetables especially for export is increasing (Hunde NF. 2017); in Ethiopia, vegetables are important for economic, nutrition, health, smallholder farming system sustainability and attract foreign direct investment (Amsalu Ayana et al, 2014). The following table shows Ethiopian three years export performance of vegetable.

Table 9. Selected vegetables Export from Ethiopia to all destinations in 1000euros

Type	2015	2016	2017
Tomatoes	8,518	8,086	7,972
Onion & shallots	2,161	2,371	2,577
Garlic	185	362	709
Cabbage Lettuce	1,455	1,570	1,593
Cabbages, kohlrabi, kale & similar editable brassicas	273	298	295
Leeks & other alliaceous vegetables (excel, onions, shallots & garlic)	123	178	141
Total	14,730	14,881	15,304

Source: ICI Business - Michel Peperkamp (December 2020)

5 World Population Review (2021) world population.com

The data provided above are good evidence that there is export market potential in addition to local markets for vegetables. Hence, to exploit the available market, gearing the production system towards markets, improving quality of the products and strengthening market promotion has of paramount importance.

Institute for Sustainable Development (ISD) is doing the market facilitation role and possible to adaptation in Wolmera Woreda. Some of the farmers around Holeta town in Wolmera Woreda have started to produce organic vegetables and there is high demand for their produce in Addis Ababa.

By transforming vegetable production and marketing, it is necessary to take advantage of the specialized market. The current system of production and marketing has a number of challenges, such as difficulty obtaining high-quality inputs and rapidly rising input costs. Affluent families in Addis Ababa have expressed a strong interest in purchasing and consuming organic vegetables grown by ISD-supported farmers. Although purchasers are willing to pay more, they need third-party assurance that the products are truly organic.

Therefore, it is imperative to produce vegetables using regenerative technologies – such as the use of manure, conventional compost, vermicompost, and crop rotation – that not only improving the soil quality but are also environmentally safe, consumer friendly and have a high niche market.

Vegetable production and marketing as source of income and employment

Vegetable production and marketing is quickly replacing other sources of income and creating jobs for women and youth. Some of the most significant obstacles facing young people who want to engage in vegetable production are access to land and funding for the lease of land and purchase of inputs.

Increased income, better health and nutrition, more rural jobs, high yield (output) per unit area, little land needed for cultivation, inexpensive start-up costs, and use as a source of food for the hosehold are just a few advantages of vegetable growing.

But in order to increase the participation of women in vegetable production and commercialization, adequate support in the delivery of extension services is needed. Women take part in every phase of the vegetable value chain, including harvesting, post-harvest handling, storage, as well as selling.

Women and youth encounter a number of obstacles when it comes to growing and marketing vegetables, such as inadequate access to suitable extension services, a lack of land, funding, and necessary inputs, and a lack of regular market information delivered to producers through appropriate media.

Creating sustainable market (entry point) and linkage to potential buyers of vegetables

Creating reliable market for the vegetable producers is of paramount importance. Currently, there are 31VBNs distributed in three woredas: 14 in Woliso, 11 in Wolmera and 6 in Ejere. Each VBN has member vegetable producers. The majority of VBNs members are vegetable farmers who live a long way from the market centres found in woreda towns. In addition to efforts made to make them vegetable production centers, which are complementary to one another, focus should be placed on making selected potential VBNs “market centers” where vegetables could be supplied, their transactions, and inputs could be carried out. This will help alleviate some of the market-related issues related to the vegetables identified during the value chain analysis.

Bulk production of vegetables

For VBNs members, bulk production of vegetables is advantageous as it attracts buyers and raises the price negotiation power of the vegetable producers. Large volume of quality products attracts buyers and enables producers to sell their products at the farm gate, which is preferable especially if price is attractive and competitive.

The establishment of market centers would draw large consumers and lay the groundwork for the development of a solid and long-lasting market connection. The larger collectors and prospective buyers would be able to get closer to the sources of supply, which would lower the involvement of chain players, increase the profit margin for the producers, and lower the final price for the consumers. Both producers and consumers would benefit from the creation of such a fair market. The prevailing vegetable market or value chain as stated above is contrary to this fair approach.

In addition to consideration of creating market centers at strategic VBNs in each Woreda, conducting assessment and creating market linkage with potential buyers within the woredas and outside of the woredas including buyers in Addis Ababa is vital. Ambo University Woliso Campus for Woliso Woreda; Habesha Cement Factory and military contres for Wolmera and Ejere are willing to support vegetable producers in buying their products and contributing all round support.

The proposed market linkage (Figure 7) for the VBNs market centers with potential buyers (local and in Addis Ababa) is presented as follows:

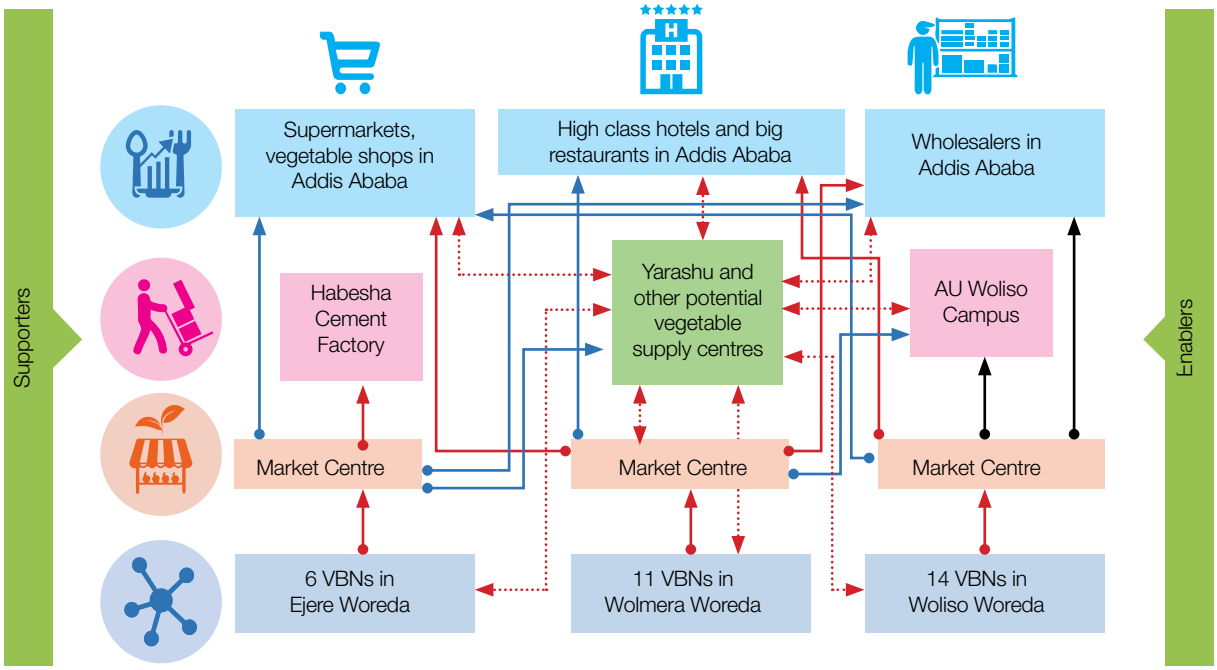


Figure 7: Potential Market linkage between the VBN Members, Institutional Consumers and Potential Vegetable buyers and Market Centers

The suggested product collection centers or market centers will improve the present state of marketing by enhancing producer solidarity, bargaining power, and market impact. Additionally, it would motivate them to increase production in response to market demand; enhance post-harvest crop management techniques; reward buyers by lowering some of their transaction costs; motivate producers and consumers due to the fair market; and establish advantageous long-term links with larger buyers (entry point) and promote the emergence of niche markets for particular vegetables.

Wolmera market, Wolmera Woreda, Ethiopia

4 CROSS-CUTTING ISSUES IN VEGETABLE VALUE CHAINS

Women and youth participation on production and marketing

Some of the major cross-cutting issues are women and youth participation, nutrition and health, quality and standards. Like men, women have an active participation in production of all identified vegetable commodities. They participate on seedbed preparation, sowing of seed or seedling planting, land preparation, transplanting, weeding, and harvesting. However, spraying of agrochemicals and irrigation are commonly done by men and youth.

Producers of (relatively) higher value commodities like onions, tomatoes, and peppers typically employ qualified and experienced laborers from the SNNPR and Meki area for all production-related tasks, from planting and growing to harvesting and packing, as the production practices of these crops require skill and experience. Laborers are brought in from other areas due to lack of skilled workers, experienced in vegetable production. Improving vegetable production skill of the surrounding farmers and alleviating the shortage of skilled labor is one of the areas that needs to be addressed. In these situations, the farmers cover all the costs of the skilled laborer until the crops mature. Producers, who are typically men, provide the essential inputs and manage the entire production process; women play a little role in the management of the process. In relation to how revenue is used, husbands and wives consult on how resources should be used fairly.

However, unless done large scale on a large piece of land, kale and other vegetables are cultivated in homesteads and are typically managed by women. The income generated is then used to cater for household expenditure.

The ability to sell is equal for men and women. However, men are more likely to sell produce than women because they can bargain with brokers, collectors, and purchasers and have greater access to market information (such as the current price and alternative markets). Men sell the majority of vegetables (apart from kale). The decision on how to use the proceeds from the sale of produce is made jointly, making it possible for men and women to access income.

Most input suppliers – seed and agro chemicals – men and youth. The collection and retailing of leafy vegetables is dominated by women, while males are mostly involved in these activities for other vegetables like onion, tomato, and pepper. This may be due to the latter set of crops' relatively high capital requirements, varied geographic distribution, and longer geographic flow.

With their families, the youth take part in all aspects of production, but have no power to take the produce to market by themselves unless the family permits. Alternatively, the youth can rent their own land and grow various vegetables, most commonly onions, tomatoes, peppers, and leeks. Although some hire both skilled and unskilled laborers, they participate in all production-related activities—these youth have full right on selling their produce and deciding on the use of income.

The role of women and girls in supporting the value chain with provision of skilled and unskilled labor is significant. Land preparation, seedlings transplanting, cultivating and fertilizer application are the key activities, and women and girls account for more than half of the daily laborers engaged on these activities. Along the value chain, the production and marketing of these commodities not only sustain the livelihoods of the actual producers but also generate employment opportunities for men, women, and youth.

Food safety, nutrition and health issues of consumers' concern

There are serious nutrition, health and safety concerns on the handling of the produce along the value chain. Most institutional and middle-class consumers in Addis Ababa are willing to pay more for vegetables that are safely grown and handled from farm to the market, with traceable production area, particularly, those organic produced with regenerative technology.

At the farm level, output depends on inorganic fertilizers and agrochemicals during planting; later, spraying is done on mature vegetables to ensure a better yield. Because of this, the chemicals residues have a negative impact on consumer health. The lack of protective equipment exposes the sprayers to potential chemical exposure.

The primary mode of transportation to markets is via donkey carts, and the method that crops are loaded, unloaded, and handled along the way exposes them to various contaminants and quality degradation.

In areas where green vegetables and leeks are produced, the practice of cleaning crops by simply submerging them in running water from various sources – including water waste from flower farms – is common.

Vegetable cleaning (left) and transportation (centre and right) to market (Wolmera Woreda)

Additionally, the various flower farms in the research area have an effect on water pollution, which may be evident in crops grown using irrigation.

To mitigate this, there is need to shift and strengthen organic farming, sensitize the community on safe production, and improving post-harvest handling mechanisms..

Quality and standards

There are no quality standards in the study areas that could be used to facilitate vegetable production and marketing. The standard for quality varies from actor to actor and depending on knowledge and experience producers have accumulated on vegetable production and marketing. Having quality standards would be beneficial for actors in enhancing efficiency and effectiveness of the market of selected vegetables. Hence, sensitizing all the actors along the value chains on good post-harvest handling of vegetables and maintaining quality as well as safety of the products are of paramount importance.

5 VALUE CHAIN ANALYSIS IN SELECTED VEGETABLES

Ethiopian Kale value chain

Kale (*Brassica carinata)* was selected for the value chain study in all the three project woredas. It is grown at higher altitudes. Kale is a nutritious vegetable, high in calcium and iron. Its leaves can be harvested from 35 days to 10 weeks, earlier being better for tenderness, re-growth, and re-harvesting. Kale is produced in these woredas for home consumption as well as for market at homestead and farm levels. Kale is harvested, packed, transported, and supplied to the market predominantly by women. Moreover, the sale of this product in all retail markets in Woliso, Holeta and Ejere undertaken by women.

Value chain Map of Kale

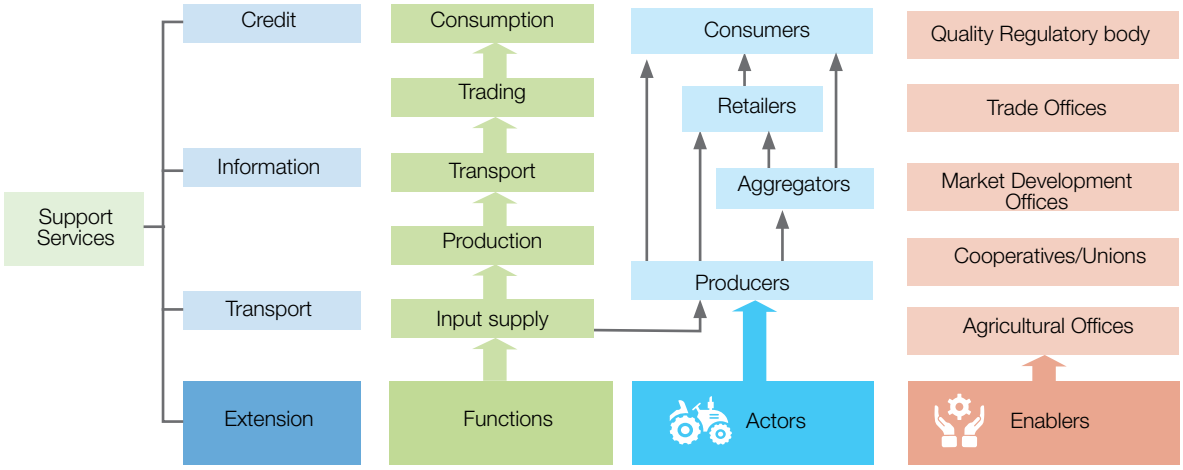


Figure 8. Kale value chain map

Value chain function and key actors

The key value chain key actors of kale are input suppliers, producers, collectors, retailers and consumers.

Kale needs to be handled carefully both during and after the harvest, delivered promptly to the market, and kept as cool and shaded from the sun as possible.

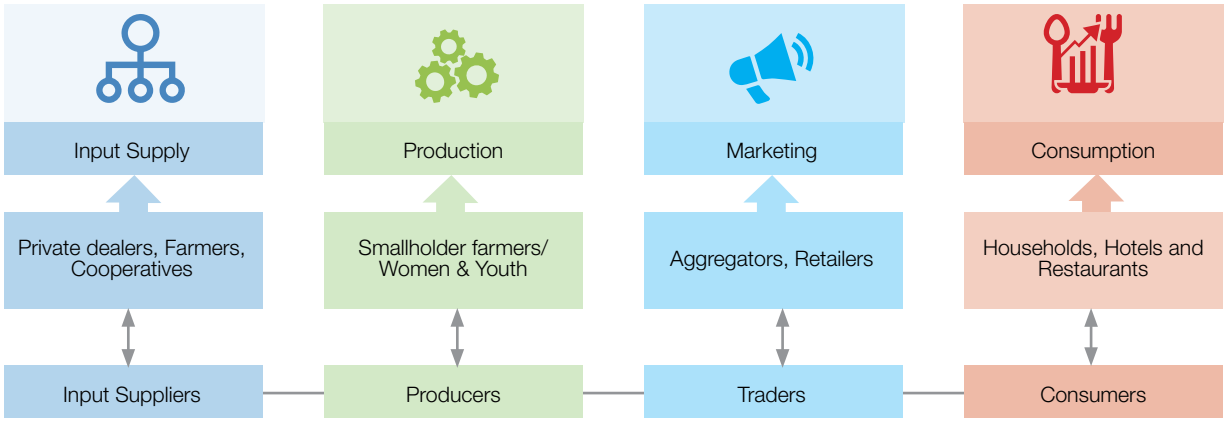


Figure 9. Core function and market actors of Kale Value Chain

Smallholders Kale broadcasted plot in Wolmera (left) and row planted plot in Woliso (right)

Most kale is produced using irrigation systems, while some farmers also use rain-fed systems. In 2020/21 production 145-hectare land was cultivated and produced 15,912 quintals of Kale using rain fed while about 93,087 quintals of kale harvested from 869 hectare using irrigation system. The total land under cultivation of Kale and total production is 1012 ha and 108,999 quintals of Kale in the same year.

Table 10. Kale Production performance in 2020/21 (2013EC) by Woreda

Woreda	Rain fed		Irrigation				Total		Yield/ ha (qt)
			1st Round (Aug-Dec)		2nd Round (Jan-Mar)				
	Area (ha)	Yield (qt)	Area (ha)	Yield (qt)	Area (ha)	Yield (qt)	Area(ha)	Yield (qt)	
Woliso	103	10,094	284	27,832	296	29,008	683	66,934	98
Wolmera	10	730	192	23,347	74	9,530	276	33,607	122
Ejere	32	5,088	10	1,620	11	1,750	53	8,458	159
Total	145	15,912	486	52,799	381	40,288	1,012	108,999	108

Source: Woreda Agricultural Offices, August 2021

There are different sources of irrigation water including rivers/springs, ponds, hand-dug and shallow wells. Kale is produced twice/year using irrigation. Most kale producers use irrigation water from rivers or streams as Table 11 below shows.

Table 11. Household survey result on sources of irrigation for kale production

Woreda	No/%	What is your source of irrigation for Kale?				
		Rivers/streams	Spring	Pond and hand-dug well	Pond and river	Total
Woliso	No	31	6	0	6	43
	%	72	14	0	14	100
Wolmera	No	41	0	1	2	44
	%	93.2	0	2.3	4.5	100
Ejere	No	10	0	0	0	10
	%	100	0	0	0	100
Total	No	82	6	1	8	97
	%	84.5	6.2	1	8.2	100

Source: Survey result

Majority of the collectors are women. They buy the "jambi" of kale directly from the producers at the local market and sell in the local market to retailers from Addis Ababa, Wolkite, Burayu and Sabata. The wholesalers are not involved in the collection/aggregation since kale is highly perishable and must reach retailers and consumers within shortest possible time.

Kale collector at Woliso market(left); Right: Aggregators with "Jambi" of kale at the road side and looking for retailers or buyers in Woliso town, Woliso Woreda

Kale leaves are sold in bulk at the local market. Large quantities of kale are rarely sold at farm gate; instead, women transport the produce to the local market carrying it on their backs. Donkeys, and carts are also used for transport.

One of the key elements influencing the supply of vegetables to the market is transportation. Renting donkeys or carts is expensive for farmers. However, the mode of transportation also has an impact on the product's quality. Due to their high level of sensitivity, leafy greens are badly impacted by heat and improper handling while in transit.

How 'Jambi' of Kale is transported by producers to local market (left) and collectors to Addis Ababa (right) captured at Kolobo Market Wolmera woreda

The price of kale leaf depends on the production season—high during dry season and very low during wet season. Price of "Jambi" weighing about 25-30kg on the average sold for birr 150 to 200 depending the quality of the leaf and size of "Jambi" in Woliso and Holeta markets whereas small bunch (almost handful) sold for Birr 8-10. The price doubles during the dry season.

Small handful bundle of kale leaf sold for Birr 10 at Holeta Market, Wolmera Woreda

Processing kale leaves include clipping off any unwanted parts or adding cold water and preparing them for sale, primarily after they have arrived at the market environment. For retail sites, it's essential to provide the right shade. Kale that has been processed – after the leaves are cut into 2 cm lengths, washed in chlorinated water, manually centrifuged, and stored in unopened LDPE bags in a cool environment of 0°C (A. Alboronz et al, (2016) – has a shelf life of 42 days. This demonstrates the technical options that are available to change or lengthen the shelf life of kale when necessary by the value chain actors, including VBNs.

Market channel

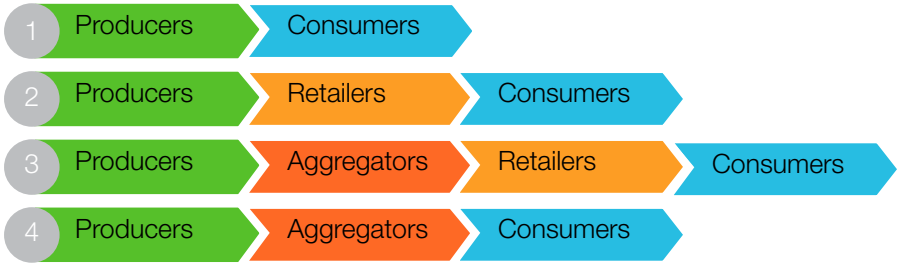


Figure 10. Market channel of Kale in three V4P&P Project Woredas (Woliso, Wolmera and Ejere)

Market destination of kale

Kale is also offered in regional markets in Woliso, Wolmera, Kolobo (Menagesha), and Ejere. Kale surplus is sold to local markets, primarily in Addis Ababa and other adjacent towns. Over 80% of the produce's sales go toward supplying Addis Ababa and nearby towns like Burayu and Sabata. While produce from Woliso is transported to Addis Ababa as well as Tulu Bollo and Wolkite, while that from Wolmera and Ejere is delivered to Addis Ababa and Burayu.

A kale retailer in Ejere Woreda

Onion value chain

One of the most economically significant vegetable crops in Ethiopia is the onion. It is primarily made on a small scale in the woredas of Woliso and Ejere. Due to its high profitability per unit area, ease of production, and the expansion of small-scale irrigation areas, the output of irrigated onions has significantly increased. The crop is grown both under rainfed conditions during the lengthy rainy season and is planted both in the off-season and when the rain begins to slack off. The majority of the acreage used for onion production in many regions of the country is taken up by the off-season crop, which is grown under irrigation.

Value chain mapping

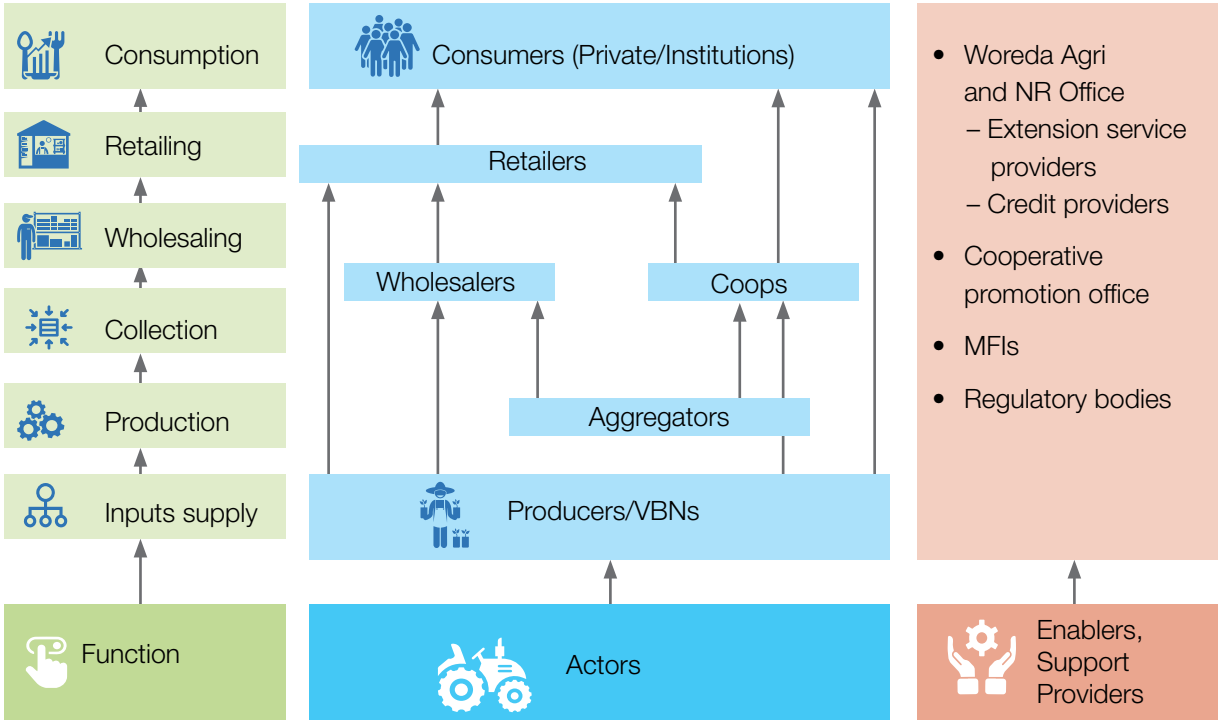


Figure 11. Onion value chain mapping

Market Channel

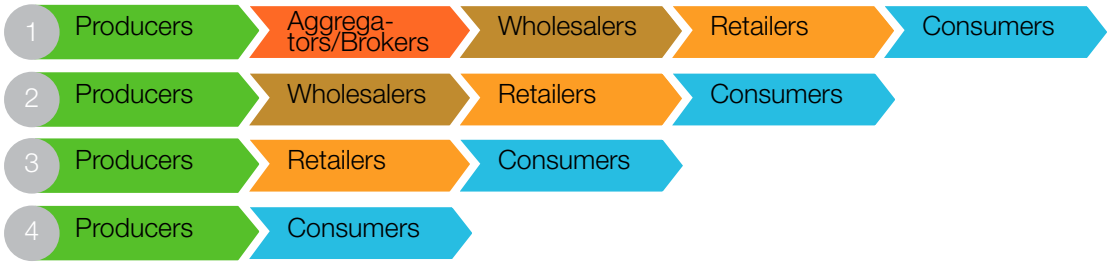


Figure 12: Onion Market channel

Geographic product flow

There are various market outlets for onion produced in Ejere and Woliso woredas. However, all these outlets are not used at a time. Individuals and groups with better access to market information, technologies, and contacts with different buyers first check price differences in different areas and decide on which outlet to use. VBNs in Ejere Woreda were seen to be in a better position with this regard. However, still there are some differences on geographic flow of onion in both woredas.

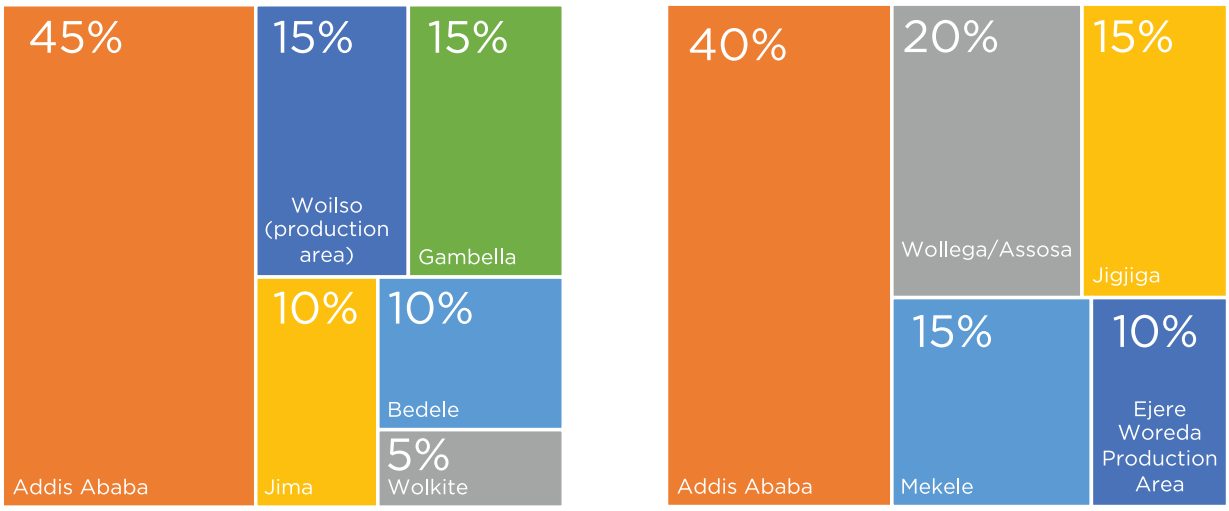


Figure 13 Onion geographic flow and volume of produce in Woliso (left) and Ejere (right)

Two wholesalers sorting onion in a wholesale shop.

Tomato value chain

One of the most important vegetable crops is the tomato. More than any other vegetable, it is frequently used in a range of recipes fresh, cooked, or processed. It is also a significant source of vitamins A and C. It is one of the important cash-generating crops to small-scale farmers and provides employment opportunity in the production and processing industries. It is one of the commodities identified for the value chain analysis in Woliso Woreda.

1. Tomato value chain mapping

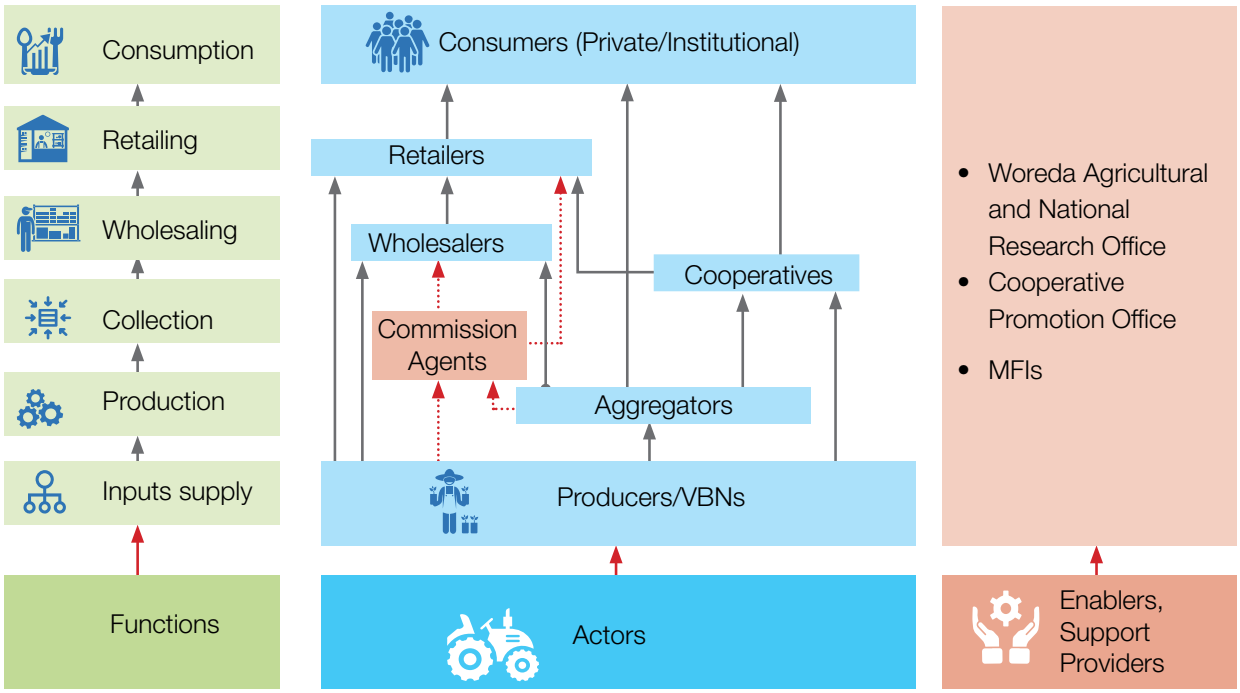


Figure 14 Tomato value chain map in Woliso

Market Channel

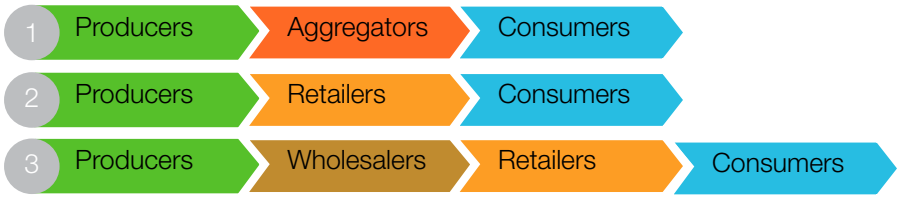


Figure 15. Tomato market channels in Woliso woreda

Geographic flow and volume of tomato sale

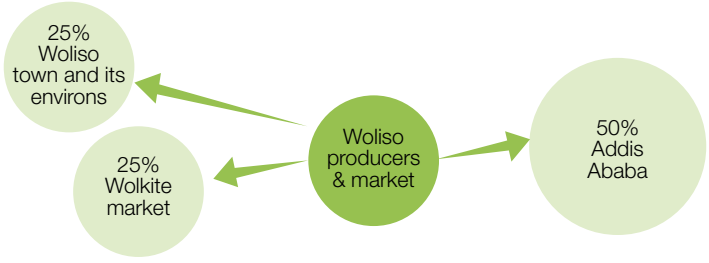


Figure 16. Geographic flow of tomato from Woliso Woreda

Green pepper value chain

Woliso and Ejere woredas have a good green pepper production potential. Suitable agro-ecology and availability of irrigation water are among the factors considered for high green pepper production. Green paper is one of income generation sources for VBNs.

Green pepper value chain map

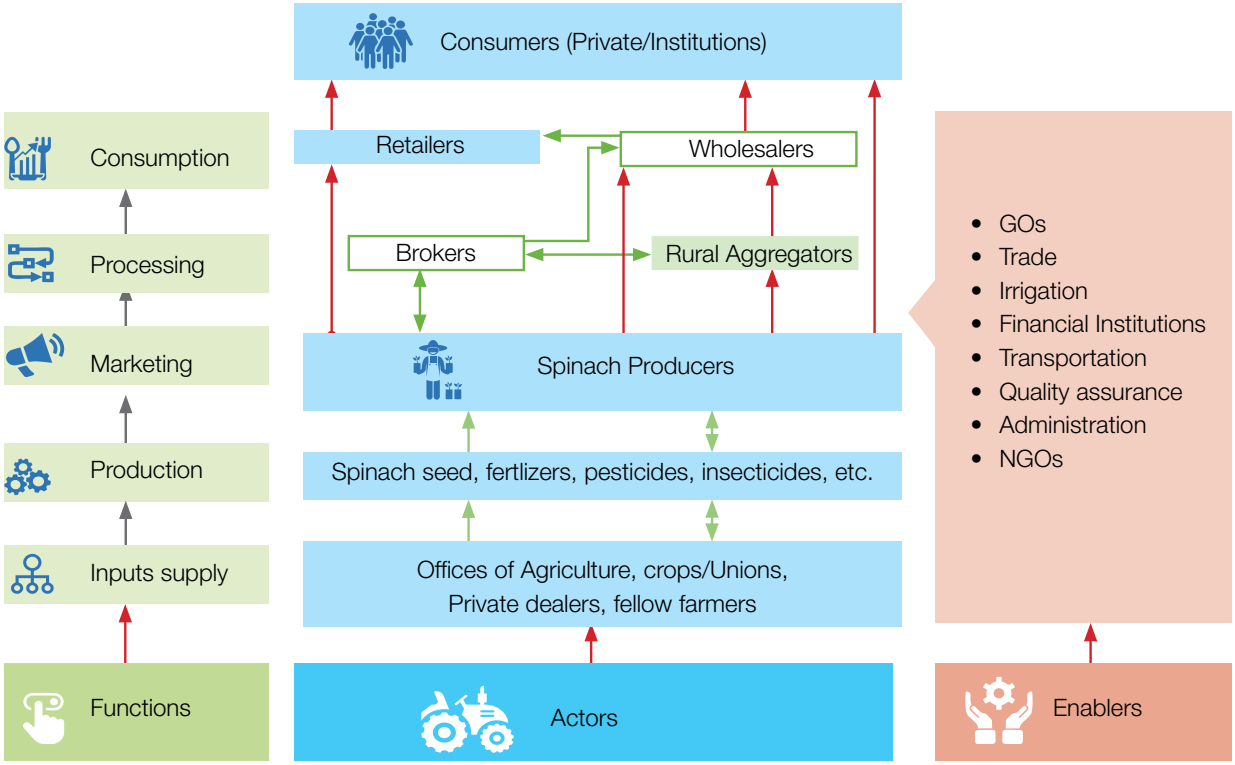


Figure 17. Green pepper value chain map

Value chain function and key actors

Green pepper's value chain function primarily consists of input supply, production, marketing, and consumption. Green pepper is grown by farmers for both domestic and commercial use. Farmers typically use rainwater on their homesteads to plant the majority of their vegetables, including green peppers, for domestic use. In contrast, farmers who grow food for the market frequently employ irrigation and cultivate relatively large plots of land.

Table 12. Green Pepper production performance in 2020/21 (2013EC) by woreda

Woreda	Rain fed		Irrigation				Total		Yield/ha (qt)
			1st Round (Aug-Dec)		2nd Round (Jan-Mar)				
	Area (ha)	Yield (qt)	Area (ha)	Yield (qt)	Area (ha)	Yield (qt)	Area (ha)	Yield (Qt)	
Woliso	25	875	123	4,305	47	1,645	195	6,825	35
Ejere	5	405	66	5,378	33	2,693	105	8,476	81
Total	30	1,280	189	9,683	80	4,338	300	15,301	51

Source: Woreda Agriculture Offices, August 2021

Retailers in the Woliso, Holeta and Ejere market buy green pepper from locations like Meki. Green paper is in short supply during the rainy (Meher or Kiremit) season in some areas, pushing up the retail price to more than Birr 50 per kilogram in some cases.

Value chain actors

The green pepper VC actors are input suppliers, producers, collectors, wholesalers, brokers, retailers and consumers and almost similar to the kale VC.

Women retailing vegetables including green pepper in Holeta (left) and Woliso (right) market on market days

Market channel of green pepper in Woliso and Ejere

There are seven possible market channels for green pepper (Figure 19). Compared to leafy vegetables such as kale, lettuce and spinach, the market actors of green pepper are greater in number and this mainly because pepper has longer shelf life and attractive price for the traders.

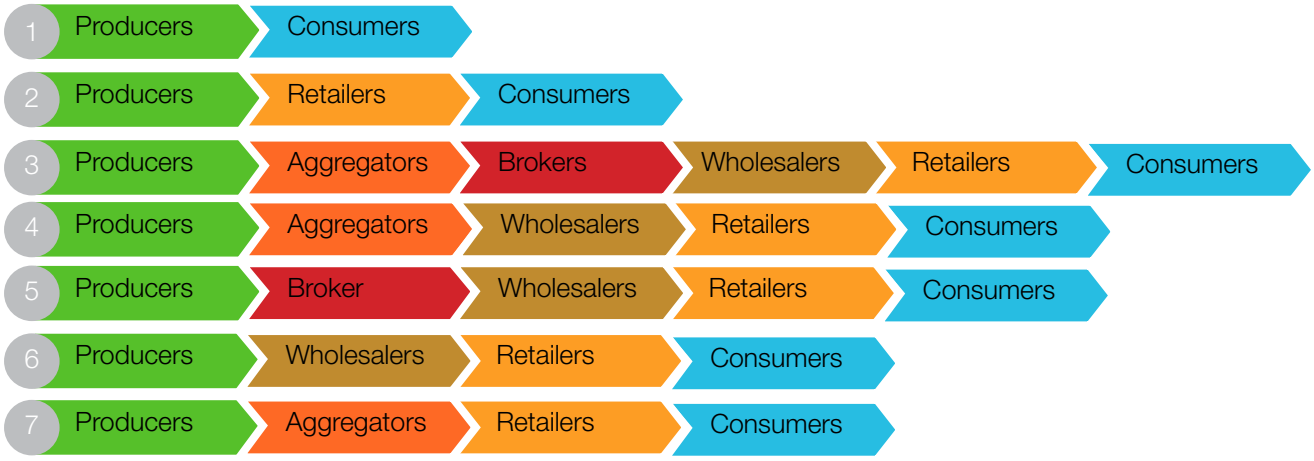


Figure 18. Market channel of green pepper

Green pepper flow

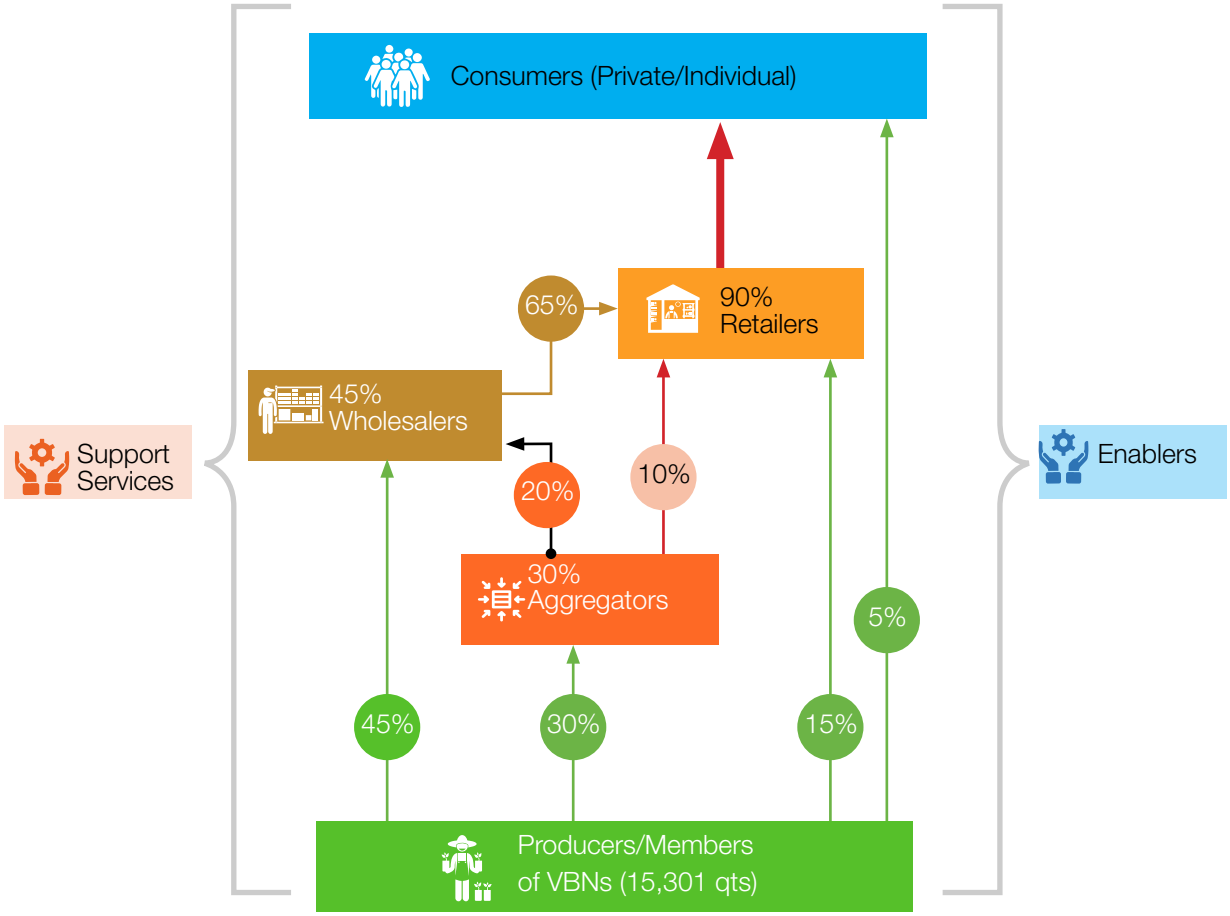


Figure 19 Product flow Map of the green pepper by major market actors

Spinach value chain

Spinach is one of the selected vegetables for the value chain analysis in Wolmera Woreda. It is one of the leafy vegetables grown in high altitudes. Spinach is among the widely grown vegetable crops in Ethiopia. It is an important dietary vegetable. It is extensively grown in most parts of Ethiopia on diverse agro-ecology. The Wolmera woreda has favourable condition and good potential for production and supply of spinach to the central market.

Similar to other vegetable crops, there are various actors involved in production and marketing or trading of Spinach in Wolmera Woreda. These actors are input suppliers, producers, collectors, retailers and consumers. There is no formal market relationship among these actors, and they get together only when there is a need for an exchange.

Spinach Value Chain Map

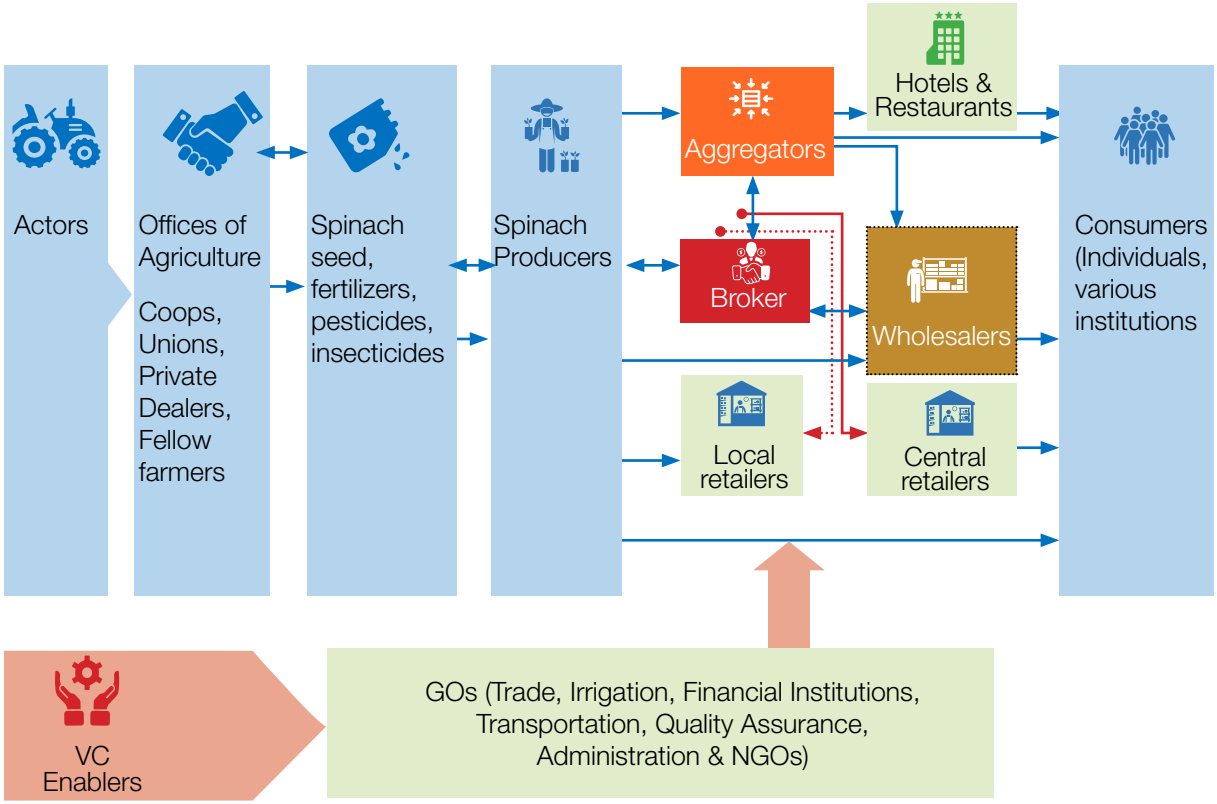


Figure 20. Value Chain of Spinach

Spinach is largely produced by the smallholder farmers in Wolmera Woreda. It is often produced through irrigation, but during the wet season (Keremet), through rain.

Table 13. Wolmera Woreda Spinach production performance in 2020/21 (2013EC)

Production system	Area(Ha)	Production(qt)	Yield/Ha (qt)
Rain	0	0	0
1st Round (Aug-Dec) Irrigation	83	6824	82
2nd Round (Jan-Mar) Irrigation	73	5816	80
Total	**156**	**12,640**	**81**

Source: Wolmera Agriculture Office

Spinach is a short value chain product, much like kale and other green vegetables. Lengthening the chain means a reduction in shelf life, which would require the use of cooling technologies. It is produced at least three times year, once through irrigation and twice using rain.

Retail size (left) and a woman retailing Spinach (left) in the Holeta market, Wolmera Woreda

Market channel of the spinach

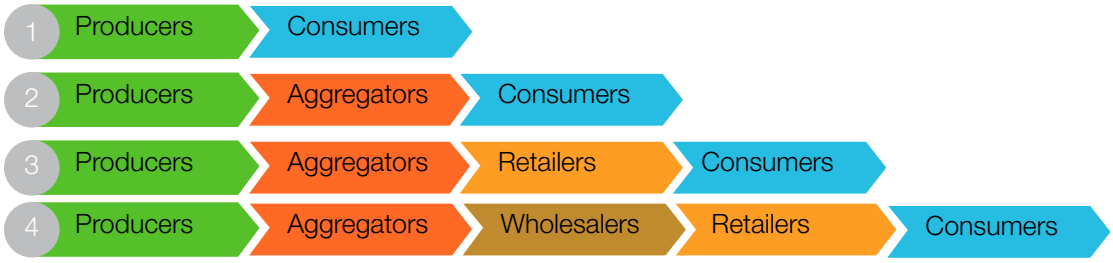


Figure 21. Spinach market channel

4. Geographical flow of Spinach

Only 20% of the spinach grown in Wolmera Woreda is consumed there and in neighbouring woredas such as Ejere, with the remaining 80% supplied to Addis Ababa and Burayu markets.

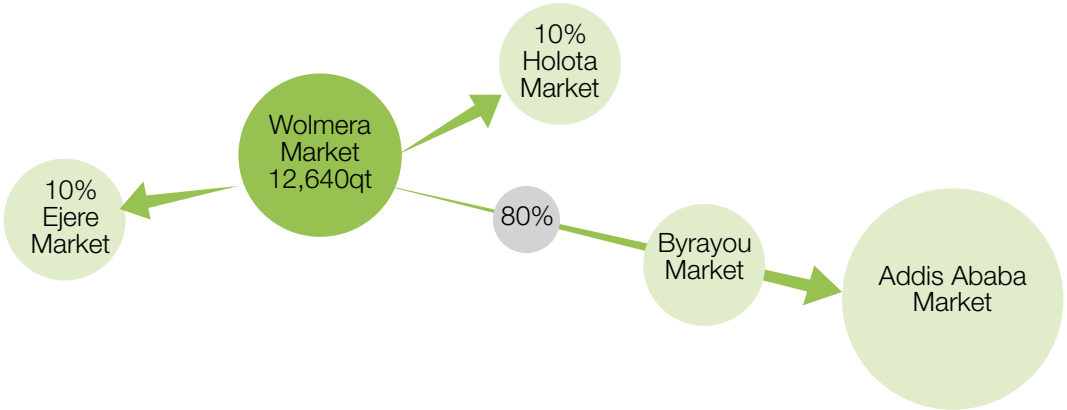


Figure 22. Geographical flow of Spinach

Lettuce value chain

Lettuce is an important dietary vegetable and is primarily consumed fresh in salads. It is extensively grown in most parts of Ethiopia in diverse agro ecology. It is inceasingly common to see lettuce production in most urban and peri-urban cities of the country. Wolmera woreda has favourable condition for the growing of lettuce and good potential for production and supply to the central market.

Value Chain Functions and Key Actors

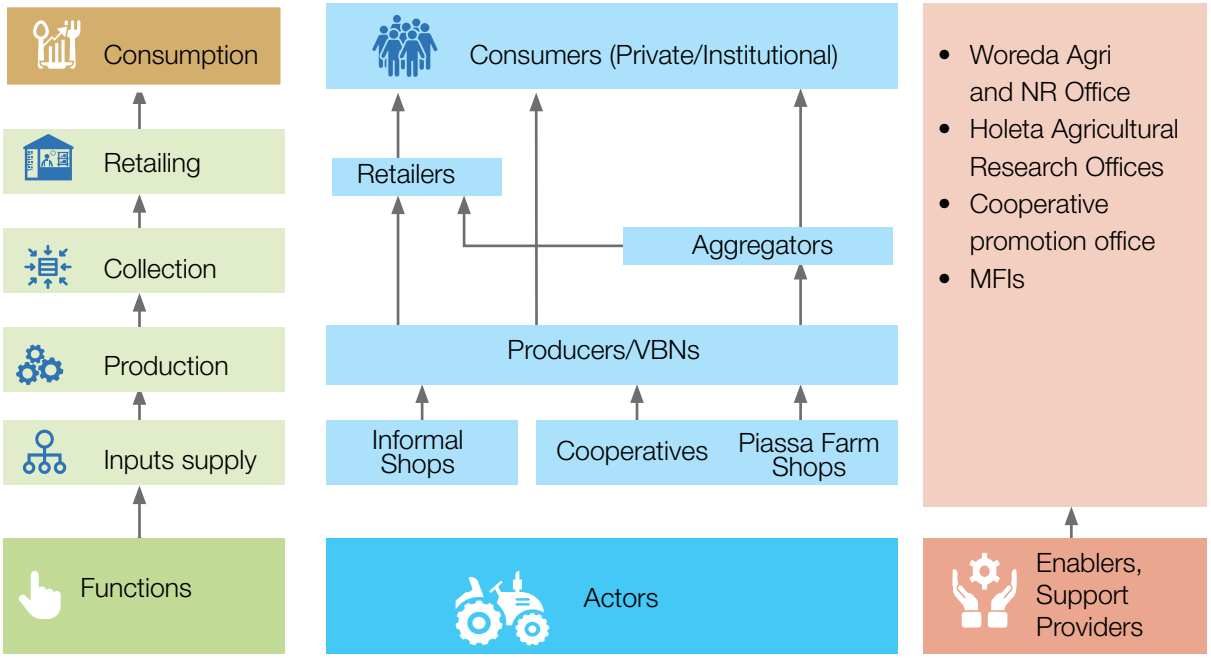


Figure 23. Lettuce Value chain mapping

Market channel

Lettuce producers have different options to sell their produce. Below are four possible channels.

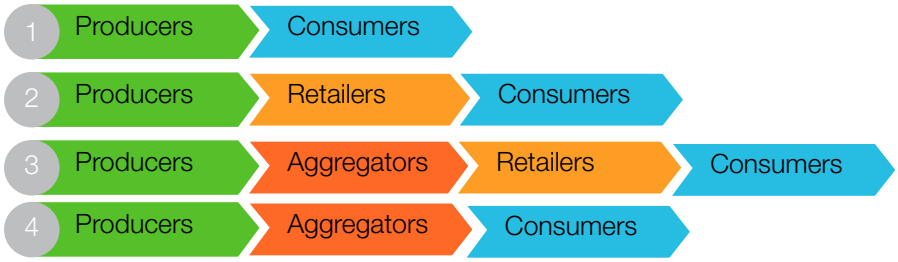


Figure 24. Market channel oflettuce

Geographic flow and volume of Lettuce products

Lettuce has short and specific geographic flow (Figure 25) which includes markets in Ejere, Kolobo/Menagesha, Burayu and Addis Ababa. Most of the lettuce produced is channeled to Addis Ababa market, and a small amount is used for markets in Ejere and Holeta markets.

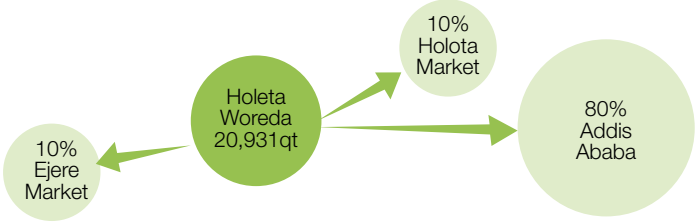


Figure 25. Geographic product flow of lettuce

Leek (Baro) value chain -Wolmera Woreda

Leek (Baro) Value Chain Map

The Leak (Baro) value chain is short VC as described in figure 26 below consisting key actors, major functions from input supply to consumption as well the enablers and support providers commonly involved in the value chain.

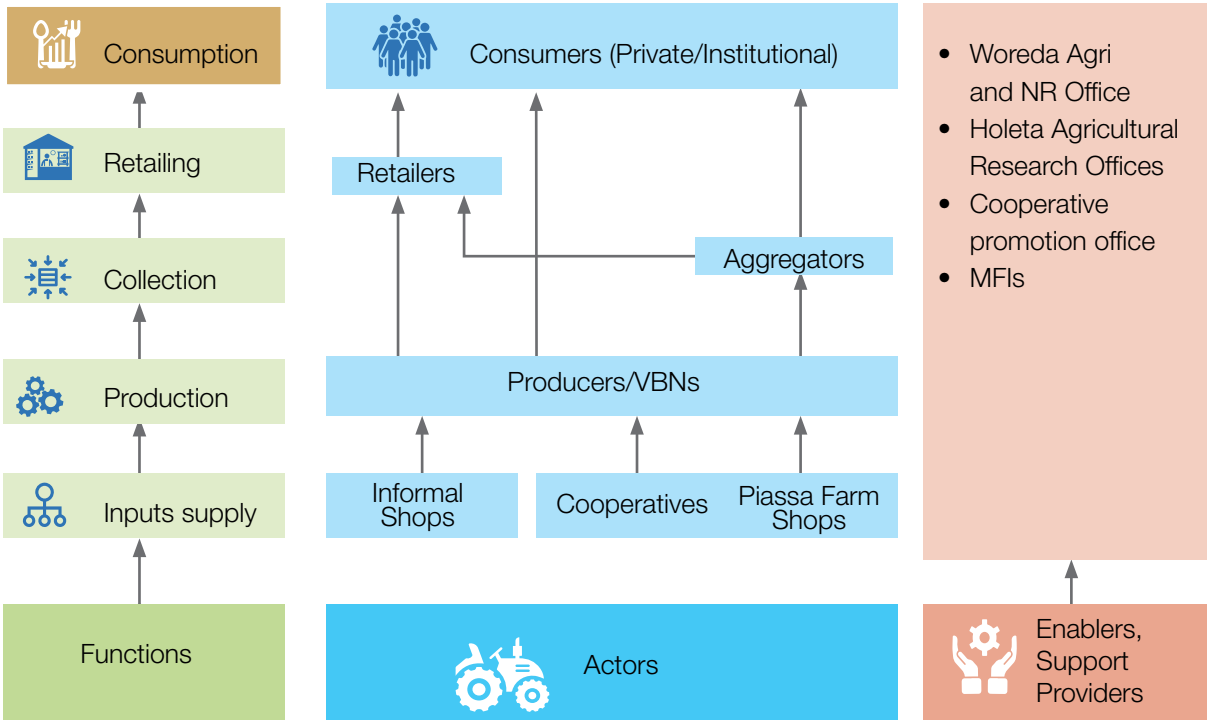


Figure 26. Leek value chain mapping

Value chain functions and actors

Data obtained on production performance of the year 2020/21 (2013EC) form woreda agriculture office indicates that out of the total 4,370 ha covered by vegetables, 486 ha which is 11.2% was used for Leek production. Production wise, the same data indicated that about 67,757 qt Leek was harvested in the production year which equates to 13.3% of the total vegetable produced.

Aggregators in Markos Kebele/Wolmera preparing Leek for Addis Ababa Market

Leek market channel

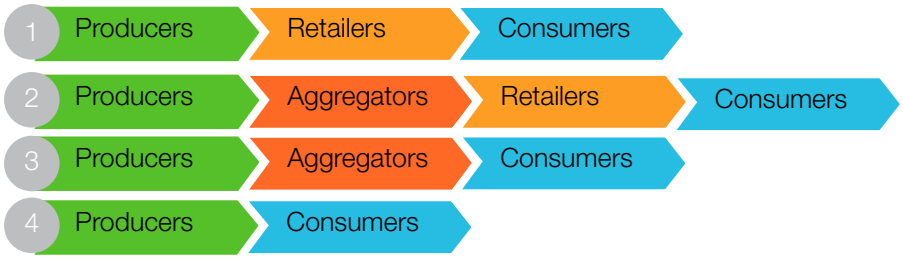


Figure 27. Market channel of Leek

4. Geographic flow and volume of products

The highland agro ecosystem of Wolmera woreda affords ideal conditions for good leek production. The woreda is among production and distribution center for this crop. That the major market outlet for leek is Addis Ababa where collectors sell either to retailers or directly to consumers.

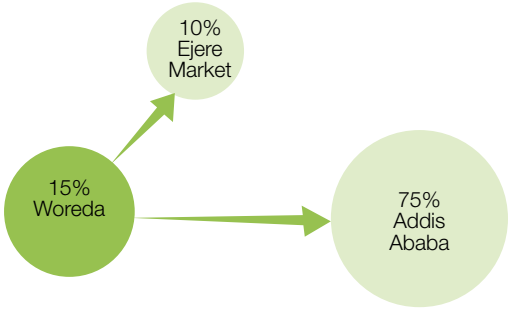


Figure 28. Geographic product flow of leek

Garlic value chain, Ejere Woreda

Value chain actors and function

One of the vegetables chosen for the value chain analysis in Ejere Woreda is garlic. It is grown on farms and at homesteads, where women are typically in charge of planting and maintenance. Garlic has a number of advantages and offers chances for money generation, which encourages growers to enhance production while also boosting productivity and yield per unit.

Table 14. Ejere Woreda Garlic production performance in 2020/21 (2013EC)

Production system	Area (Ha)	Yield (qt)	Yield/Ha (qt)
Rain	18	1476	82.0
1st Round (Aug-Dec) Irrigation	144	11774	81.8
2nd Round (Jan-Mar) Irrigation	37	3008	81.3
Total	**199**	**16,258**	**81.7**

Source: Ejere Woreda Agriculture Office

Garlic is produced by most of the households at small scale; but it is possible to produce at large scale using rain and under irrigation. Garlic is produced at homestead predominantly under close management of women and youth.

Garlic market channel

More than 90% of garlic produced in the Ejere Woreda is supplied to Addis Ababa, Burayu, and Holeta.

The major destination or geographic flow of garlic is Addis Ababa and local markets such as Ejere, Holeta and Kolobo (Menagesha) and Burayu markets. The possible market channels of garlic in Ejere woreda is presented below:

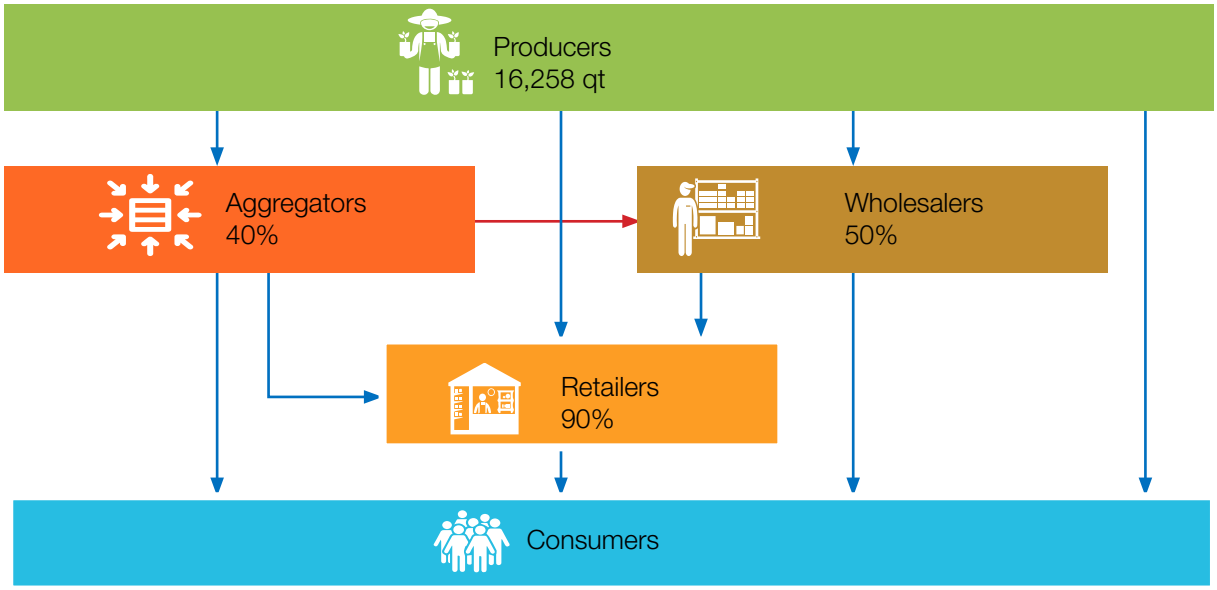


Figure 29. Market channel and product flow proportion of garlic in Ejere Woreda

Value chain map

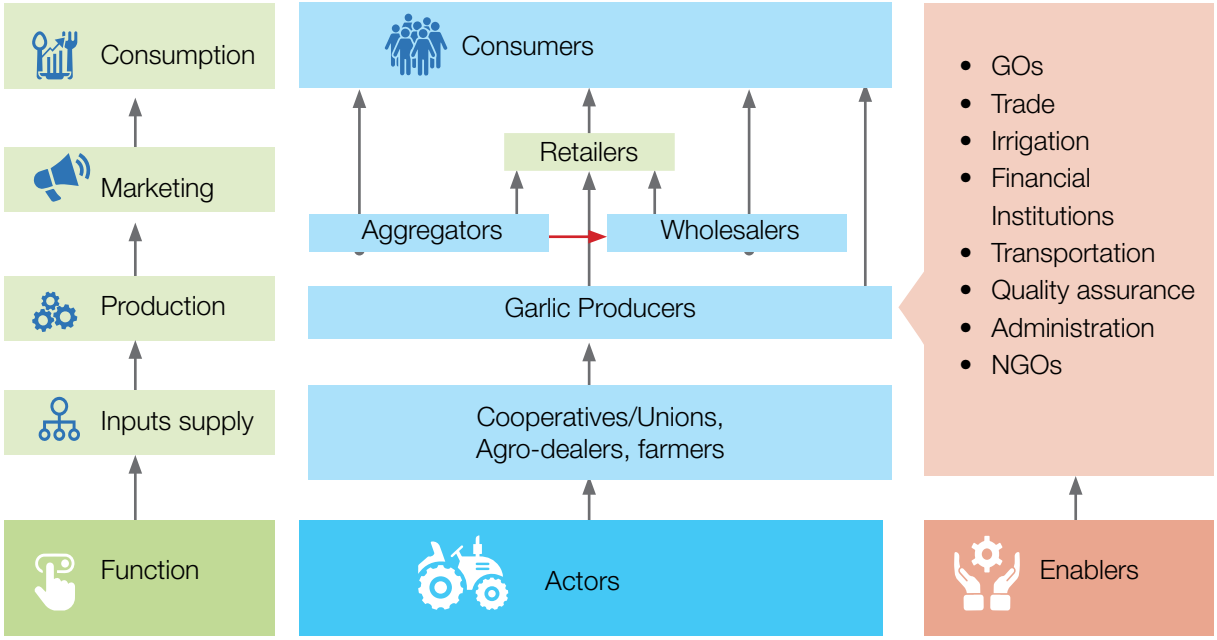


Figure 30. Garlic value chain map Ejere Woreda

Vegetable value chains: Potentials and challenges

Potential of the Project Woredas

The study areas have high potential for vegetable production and marketing due to their suitable agro-climatic conditions. Vegetables can be cultivated on the land using irrigation and rain. There are numerous perennial rivers and even suitable groundwater for shallow well irrigation. Vegetable production is labor intensive and there is a large number of potential youth labor in rural areas.

The following are some of the study woredas' exploitable potentials:

- There is a huge unmet local market demand for any type of vegetable (verified by the fact that price is increasing at a high rate),
- Favourable agro-ecology, soil type, availability of surface and shallow ground water for irrigation (in each woreda more than 50% Kebeles have irrigation potential,
- Strong government policy support, availability multipurpose trained woreda level staff or capacity to support vegetable production and marketing,
- Increase in interest by farmers to engage in vegetable business,
- Existence of government and NGOs that run projects working on promotion of organic farming or have interest to practice environment friendly agriculture,
- Proximity to the central or Addis Ababa market, and potential for commodities to use diverse inlet for inputs and outlets for produce,
- Availability of a large number institutional consumers – high class hotels and restaurants, universities, private farms, cement and factories –to serve as alternative end markets,
- A steady rise in dietry shift by middle-class consumers from animal products and cereals to vegetables,
- Proximity of the study areas to Ambo University, Holeta Research Center and others; and
- Good road accessibility, transport services and better access to market.

Challenges in vegetable value chains

Vegetable value chains face various challenges – from input supply to marketing through production and various intermediary activities. The challenges are broadly categorized under major value chain functions including input supply, production, marketing, and consumption, and cross-cutting issues. They are summarized as follows:

1. Input supply

- Shortage of quality input supply.
- the input supply side is dominated by informal suppliers.

2. Production

- Basic skill gaps and knowhow of vegetable producers in agronomic practice, post-harvest handling, vegetable business/marketing and others (as result skilled laborers are hired from other areas to produce onion, pepper and tomato.
- Uncoordinated follow up and technical support from woreda level support providers/enablers.
- Improper use and application of agrochemicals mainly due to lack of know-how.
- Less emphasis and knowledge on circular or regenerative technologies.
- Decreasing volume of irrigation in the second-round production (starting from January) due to decline (shortage) of available water for irrigation.
- Weak irrigation water users' associations and frequent dispute over use of water.
- Lack of strong support to strengthen water user associations.
- Traditional irrigation facilities (canals) affecting water use efficiency and resulted wastage of water.
- Improper use and diversion of water by individuals who collect/harvest sand for use in construction of buildings.
- Prevalence of disease (locally called "Kolera") and insect pest affecting leaves and roots of vegetable crops.
- Competition on the existing water resources and reduced volume of irrigation water from factories and flower farms raising possible challenges for water availability now and in the future.
- No or poor storage and post-harvest handling practices and facilities.

3. Marketing

- Wholesalers and collectors, who have a financial and/or capital edge over the other chain participants, have an impact on the market chain. Since farmers have very little influence over how the market price is set, their ability to profit from selling their produce is affected.
- No or weak links between chosen actors in the vegetable value chain, or weak or nonexistent established output market links between producers and potential customers.
- Limited vegetable collecting center that draws customers and improves collective vegetable selling, which in turn increases producers' negotiating leverage.
- Road inaccessibility (from the farm/home to all-weather road), which interferes with timely produce sales.
- Vegetable perishability risk, which depends on a number of variables, including the kind (nature) of the vegetable (for instance, green vegetables are more prone to loss), the weather at the time of harvest.

- Poor product handling during and after harvest up until it reaches end users.
- Mode and suitability of transport used to take the product from field to home and home to market, as well as distance from the market.
- Poor packing, sorting, loading, and unloading of the vegetables prior to marketing (washing and/or sanitation), until products reach their final market.

4. Consumption

- Producers' ignorance of consumer needs leads to little or no consideration for their satisfaction or quality standards.
- The challenges of nutrition, sanitation, and food contamination, as well as health problems caused by numerous chemicals.
- Lack of organic vegetable production with regenerative technology and quality marketing systems.
- Long supply chain and large number of brokers and middle men that control vegetable market affecting the consumer price.
- Huge price fluctuation with increasing trend and big seasonal variation of prices.

5. Cross-cutting

- Low access to agricultural extension by women and youth.
- Poor access to market information—brokers are the major sources of information.
- Poor access to formal financial institutions.

6 KEY AREAS OF SUPPORT AND STRATEGIC INTERVENTION PROPOSED TO IMPROVE VEGETABLE VCS & VBNS

Table 15. Key constraints and areas of support and possible interventions by responsible bodies

Constraints along the CVs	Areas of support	Possible Interventions	Responsible body
Input supply: • Poor/lack of strong input (seeds and agrochemicals) supply system. As a result: • Dominance of informal input suppliers • Supply of poor quality inputs (seeds and agrochemicals) on local market, • Lack of regulatory system on local input market, • Lack of support and shortage of appropriate regenerative technology,	• Strengthening input supply system and enhance access to formal input supply system (through private sector engagement), • Strengthen the existing regulatory system on inputs,	Strengthening legal private farm shops or agro dealers • Provide capacity building support (technical, financial, material) support to established farm shops • Farm shops linkage to bigger suppliers/ lead firms, • Strengthen/create local seed and seedling production system, link farm shops/agro dealers to producers through workshops, market activation events, etc. in all woredas	• NGOs/Projects • Woreda agriculture office • Woreda trade office (to legalize the farm shops) • Cooperatives/ Unions • Nearby research centres
Production: • Low productivity, skill gap to use improved agronomic/ management practice • Lack of knowledge and technologies on post-harvest management and high post-harvest loss • Poor quality and increase use of inorganic inputs • Water scarcity especially during the second irrigation (dry) season. • Limited capacity of water user associations, occasional sign of conflict over water use schedule • Disease and insect attack of vegetables	• Provide technical capacity building, • Expand Proper use of inputs and promote use of regenerative technologies. • Promotion of use TAVs and regenerative technologies • Improving water use efficiency • Support farmers to control diseases and pests,	• Provide full-fledged training on improved agronomic/ management practice, disease and insect pest control, and storage and post-harvest handling: • Train (+demo) VBN members on organic farming • Select and support promotion of appropriate regenerative technologies • Train VBN members on irrigation water use efficiency. • Train and strengthen water user associations committees on group and scheme management, • In collaboration with pertinent offices support vegetable farmers to access irrigation water sources: shallow well construction in potential areas, etc.	• NGOs/Projects • Woreda Agriculture and Natural Resources Office • Woreda Cooperative promotion office • Woreda & Zone Water, Irrigation and Energy Office

Constraints along the CVs	Areas of support	Possible Interventions	Responsible body
Marketing/ Output selling • The output market is highly influenced/ dominated by brokers and bigger buyers • Producers have no dependable source to get the timely and reliable market information • Producers' lack of awareness of the market channel that is more rewarding • Poor road access and transport means • Lack of collection centers to exercise collective marketing/ sell of produce	• Support VBNs to serve as collective selling/market centers to ease for bulk sell and buying. • Enhance farmers access to market information including technologies • Strengthen output market linkage to all key actors	• Train VBNs members on market linkage and collective marketing • Support establishment of market centers starting with Model VBNs • Strengthen woreda level market information system to be hosted by woreda market development offices • Link VBNs to woreda level market information system.	• NGOs/Projects • Woreda cooperative promotion office • Woreda market development offices
Consumption/Consumer • Lack of demand driven production (such as organic and vegetable with regenerative technology) and marketing system (quality issues), • Long supply chain and Large number of brokers and middle men that control vegetable market & create huge demand, • Huge price fluctuation with increasing trend and big seasonal variation	• Promote production and supply preferred vegetables on demand, • Improve post-harvest handling (safe cleaning, packing, and transportation), • Strengthen the regulatory activities to enhance minimum quality	• Making the vegetable production and marketing system market (demand) driven, • Promote rules and regulations on production quality, health issues, Informal rules and norms,	• NGOs/Projects • Woreda agriculture office • Zone & Woreda Market development offices, • Woreda Cooperative & Trade office, • Woreda Regulatory and Standard body
Cross-cutting • Low women and youth access to agricultural extension • Poor access to market information (brokers are the major sources of information • Poor accessibility to formal financial institution	• Women/wives and youth access to extension system • Market information asymmetry/gaps • Accessing formal financial institutions	• Facilitate women and youth access to extension system • Create market information system accessible to all key market actors • Improve farmers access to formal financial institutions	• NGOs/Projects • Market development office • Formal and informal financial institutions

7 CONCLUSION AND RECOMMENDATION

Conclusion

This study was conducted mainly to identify commodities/vegetables and conduct value chain analysis on identified vegetables in all study woredas. Accordingly, value chain analysis of commodities was undertaken after completing commodities selection by woreda. Key market actors and constraints identified for each selected commodity. The market chains of the selected vegetables (onion, tomato, kale, garlic, leek, lettuce, green pepper, and spinach) in the study woredas are simple, traditional and dominated by the informal actors. The producers have limited power to determine price and do not have option than to accept the determined price usually by buyers. Producers are scattered and unorganized and approach buyers individually in a scattered way. Such status or approach of producers is convenient for the buyers to separately approach and exploit producers. Vegetable farmers collecting products together and trying to attract buyers at one center is not developed or existing in the study areas. Rather the producers are dispersed and supply their products in scattered way. The new approach of V4P&P supporting vegetable producers through VBNs is vital to implement agribusiness cluster approach that have numerous purposes including creation of product collection centers at strategic locations and attract buyers. Other market actors' gaps along the value chain were assessed and solutions were proposed.

Developing the vegetable sector requires various resources, improved approach, concerted efforts of enablers, strong linkage of key value chain actors including producers and traders, etc.

Recommendation

Based on gaps identified recommendations were as follows.

- Creating direct link of the producers to wholesalers, agro-processors and institutional buyers through VBNs involving all pertinent support providers and enables at the Woreda, zonal, regional and national levels;
- Introduce and strengthen the existing use of Mobile and ICT application for market information in collaboration with donors, Ethio-Telecom and Ministry of Agriculture and Natural Resources;
- Training manual/guides development and provide capacity building training on selected vegetables post-harvest management and marketing;
- Training of VBN farmers and stakeholders on Processing mechanisms such assorting, grading and packing protocols for selected vegetables;
- Provide awareness on appropriate transport management system of vegetable products
- Support vegetable producers to reduce post-harvest loss using appropriate practices for example; build and use traditional cold store, suitable transport, etc.;
- Strengthening VBNs and enable them to create product collection center (follow collective approach than individual approach);
- Aggressive promotion incorporating market education in conventional extension system, traditional media (such as radio and television) and digital (social) media of use of regenerative technologies and production of TAVs.

- Provide basic business skill and ethics to the key market actors (input suppliers, local collectors, wholesalers and big retailers)
- Create discussion (innovative) platform that sustainably bring producers and major traders (key actors along the value chain) and make all part of the solution of vegetable production and marketing. Furthermore, this platform could be that of Multi Stakeholder Planform where all concerned actors get together on regular bases, discuss on issues and propose solutions.
- Making all round efforts involving all pertinent actors and transform the marketing system from informal to formal
- Making vegetable production market oriented (as marketing starts from planning) or changing vegetable farmers mind set from "grow and sell" to "grow to sell".

Table 16. Strengthening the Value chains support providers and enablers to alleviate the gaps identified

Institutions	Role	Gaps	Recommendation
1. Agriculture Develop. Offices	Provision of extension services, facilitate supply of input and credit when deem necessary.	The extension service is less or not reach women and youth that are not household heads as it is focused on those who are engaged in farming; lack market extension	Make extension to reach none HH head women (wives) and youths; make the appropriate support services to marketing and enable vegetable production market oriented
2. Cooperatives Promotion Offices	Establish, train, legalize, audit, follow up & Support coops to serve all farmers	Failure of coops/unions to fulfill members interest and failure to adhere to coops principles	Orient coops to focus to meet members interest by working in line with basic coops principles.
3. Market Development Offices	Create market for the producers or link producers to buyers	Vegetable producers market problem is not solved and the existing market system is dominated by informal actors.	Focus on solving farmers vegetable market problem by improving the marketing system.
4. Trade Offices	Issue and renew trade licenses (regulatory)	Hard to find list of traders (collectors, wholesalers, brokers, retailers), most traders are informal	Give license, keep record, document able to avail information of all major market actors operating in their locality.
5. Agricultural Research Center	Conduct research on problems of surrounding farmers (complement extension service)	Weak complement research and extension	Strengthen complementation of extension work(research-extension-research)
6. Cooperative Unions	Support members including vegetable producers in enhancing their input and output market.	No/ less emphasis is given so far to vegetable producer; even those started failed not able to withstand brokers/ traders' competition.	Give priority to solve problems of vegetable producers in inputs and output marketing; enhancing their competitiveness in the market.
7. Oromia Credit and Saving SC and others	Provide credit to the rural farmers and others	High interest rate (17.5%) and low accessibility to the vegetable farmers (formal financial institutions)	Consider the interest rate; improve accessibility to the vegetable farmers.

8 ANNEXES

Annex 1: The criteria used for the selection and prioritization and steps implemented

1. Criteria

The criteria used for the selection and prioritization of vegetables on which consensus has been reached during inception were:

- High potential and ease for production
- Economic and market potential
- Impact on the environment and Suitability
- Potential for Involvement of women and youth
- Create employment and involves large number of population & Impact on poverty reduction (pro-poor):
- Ease for postharvest handling
- Positive impact and synergies on ongoing local development programs
- Supportive to business environment
- Business attractiveness.

2. Steps Implemented during selection and prioritization

The selection or determination of vegetables for the value chain study has been done through implementation of the following steps:

i. Made the participants to have good understanding of the purpose of the selection of the commodities and value chain study;

ii. Briefed participants on the criteria of selecting the vegetables;

iii. The participants long listed TAVs and other vegetables grown in their woredas;

iv. The participants reduced to 5-6 vegetables from the long list by cancellation using both subjective and objective(yield/ha, area coverage, etc.) criteria of the once that are least beneficial to the majority of the farmers in their woreda

v. Experts rated the shortlisted vegetables by giving score (1-5) to each evaluation criteria

vi. Rated the shortlisted vegetables based on experts' cumulative result

vii. Determined the first 3-4 rated vegetables based on experts' valuation and completed the selection of commodities at the woreda level.

Annex 2: Process of scoring, ranking and selection of vegetable value chains by woreda

First Step			Second Step			Third Step			Forth and final Step		
Long list of TAVs by Woreda			Commodities cancelled from the long list			Shortlisted Commodities from Long List			Commodities Finally Selected / ranked		
Woliso	Wolemera	Ejere	Woliso	Wolmera	Ejere	Woliso	Wolmera	Ejere	Woliso	Wolmera	Ejere
Tomato (*Solanum lycopersicum*)	Tomato (*Solanumly copersicum*) x8	Tomato (*Solanum lycopersicum*)		Tomato x8	Tomato	Tomato			Tomato 4th		
Onion (*Allium sepa*)	Onion (*Allium sepa*) x2	Onion (*Allium sepa*)		Onion x2		Onion		Onion	Onion-1st		Onion-1st
Pepper (*Capsicum annuum*)	Pepper (*Capsicum annuum*) x5	Pepper (*Capsicum annuum*)		Pepper x5		Pepper		Pepper	Pepper -5th		Pepper-3rd
Ethiopian mustard x7	Ethiopian mustard x3	Ethiopian mustard x5	Ethiopian mustard x7	Ethiopian mustard x3	Ethiopian mustard x5						
Kale (*Brassica oleracea*)	Kale (*Brassica oleracea*)	Kale (Brassica oleracea)				Kale	Kale	Kale	Kale 3rd	Kale 2nd	Kale5th
Swiss chard, Spinach x4	Swiss chard, Spinach	Swiss chard, Spinach x2	Swiss chard, Spinach x4		Swiss chard, Spinach x2		Swiss chard, Spinach			Sw/ch-3rd	
Pumpkin fruits (*Cucurbita moschata*) x1	Pumpkin fruits (*Cucurbita moschata*) x2	Pumpkin fruits (*Cucurbita moschata*) x1	Pumpkin fruits x1	Pumpkin fruits x2	Pumpkin fruits x1						
Potato	Potato	Potato				Potato xx	Potato xx	Potato	Potato-2nd	Potato-1st	Potato-2nd
Lettuce x3	Lettuce	Lettuce x3	Lettuce x3	Lettuce	Lettuce x3		Lettuce			Lettuce-4th	
Bet root x8	Bet root x7	Bet root x6	Bet root x8	Bet root x7	Bet root x6						
Carrot x5	Carrot x6	Carrot x4	Carrot x5	Carrot x6	Carrot x4						
Garlic x6	Garlic x4	Garlic	Garlic x6	Garlic x4				Garlic			Galic-4th
Sweet potato x2	Sweet potato x1	Sweet potat-omited1st	Sweet potato x2	Sweet potato x1	Sweet potat-omited1st						
	Head Cabbage	Head cabbage x8		Head Cabbage	Head cabbage x8		Head Cabbage				
	Leak (Baro)			Leak			Leak			Leak-5th	

Source: Study team

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