International Labour Organization

SKILL-UP Ethiopia project and GPSL3

Skills for Trade and

Economic Diversification (STED)

STED Strategic Skills Recommendations for the Agro-Processing Industry in Ethiopia

This strategy document is prepared within the framework of the STED-based intervention under The “SKILL-UP” Project and with guidance from the ILO, Geneva

SKILLUP

Upgrading skills for the changing world of work

STED Strategic Skills Recommendations for the Agro-Processing Industry in Ethiopia

This strategy document is prepared within the framework of the STED-based intervention under the “SKILL-UP” project, and under the guidance of the ILO, Geneva

---

STED Strategic Skills Recommendations for the Agro-Processing Industry in Ethiopia

ISBN 9789220380048

ILO publications and electronic products can be obtained through major booksellers or ILO local offices in many countries, or direct from ILO Publications, International Labour Office, CH-1211 Geneva 22, Switzerland, or ILO Regional Office for Asia and the Pacific, 11 th Floor, United Nations Building, Rajdamnern Nok Avenue, Bangkok 10200, Thailand, or by email: BANGKOK@ilo.org. Catalogues or lists of new publications are available free of charge from the above address, or by email: pubvente@ilo.org

Visit our website: www.ilo.org/publns

Photo credits: © ILO / Crozet M.
Design by the International Training Centre of the ILO, Turin – Italy

Acknowledgments

This document has been prepared by Girum Abebe, Tsegay Gebrekidan Tekleselassie and Jibril Haji. It draws on inputs from the STED Background Study of the agro-processing industry,[1] the Rapid STED Technical and Policy Workshop conducted in Addis Ababa in December 2019, and follow-up consultations. The document is informed by a paper on good international practices in the sector by Jan Hilger. Bolormaa Tumurchudur Klok and Cornelius Gregg have provided technical inputs and oversight.

Thanks are due to the participants in the workshop, and to all the sector stakeholders consulted individually.

Comments on the text by Belinda Smith and Laura Schmid are acknowledged with appreciation. Technical inputs from the "One ILO" team in Ethiopia are appreciated.

The contributions of Sergio André Iriarte Quezada, Adame Traore and Alemayehu Zewdie of the "Skill-up" project are also acknowledged.

Thanks are due to Alexio Musindo, ILO Country Director, Addis Ababa, and to Srinivas Reddy, Branch Chief of ILO Skills and Employability Branch, Employment Policy Department.

Financial support from the Government of Norway and from the Swedish International Development Agency (SIDA) is acknowledged with gratitude.

[1] Skills for Trade and Economic Diversification in Ethiopia: A background paper for the drafting of a sector skills strategy for the garment sector in Ethiopia", Girum Abebe, Tsegay Gebrekidan Tekleselassie and Jibril Haji.

Table of contents

Introduction

Background

Ethiopia has developed a multitude of policies and strategies to diversify and deepen its economy. Since the publication of the Industrial Development Strategy in 2002, the country has recognized the importance of a strong and competitive manufacturing sector for industrial development and economic transformation. As documented in the second Growth and Transformation Plan (GTP-II), the Government has planned to increase the manufacturing sector's contribution to GDP from about 4.8 per cent in 2014/15 to 8 per cent in 2019/20 and to 18 per cent by 2025 (NPC, 2016). With an explicit focus on export promotion, the labour-intensive tradable sector has been a key pillar of this strategy.

The agro-processing industry has been one of the priority sectors identified in various Government strategy documents, such as the Plan for Accelerated and Sustained Development to End Poverty (PASDEP), GTP-I and GTP-II. The presence of abundant agricultural resources for raising livestock and growing crops, an active labour force and suitable climatic conditions offer great opportunities for growth and upgrading. The expansion of agro-processing activities will help the country to diversify its exports from primary commodities to more value-added products, thereby creating more jobs and earning more foreign currency.

The importance of the agro-processing industry can be seen by looking at its contribution to employment creation and value addition within manufacturing as a whole. It is currently the leading sector and is expected to play a key role in the coming years, with strong potential for direct and indirect job creation.

Despite this great potential and a strong policy focus, however, the sector's performance has lagged far behind expectations, failing to meet the export targets set by government in strategic policy documents such as PASDEP, GTP-I and GTP-II. Export performance has also lagged behind that of competitor countries, such as Kenya, despite Ethiopia's competitive advantage. In fact, Ethiopia remains dependent on imports for processed (finished and semi-finished) agricultural products.

Apart from poor business practices, an inadequate supply of inputs (notably raw materials) and a shortage of skilled labour have prevented firms from operating at full capacity, thereby undermining the growth and expansion of the sector. The lack of a skilled labour force results in poor quality and substandard products.

Skills development is therefore essential for the expansion and upgrading of the agro-processing industry and its contribution to the rapid industrial development and structural transformation of the economy. Skills development is critical for enhancing the effectiveness and efficiency of manufacturing enterprises because it improves productivity and compliance with quality standards. It also contributes to the creation of more decent jobs. As the sector moves towards high-technology production, the development of skilled human resources becomes a critical issue. Provision of formal training is therefore important to ensure the availability of skills and capabilities that will attract firms with better technologies into the sector.

The development of the agro-processing sector is expected to play a central role in reducing the country's dependence on imported products, as well as driving the transformation from a subsistence economy to a modern agricultural system. However, the diversification effort is impeded by a lack of the skills required to support the transformation of production, processing and distribution within the sector.

The agro-processing industry is the largest manufacturing industry in Ethiopia, having grown rapidly in recent years. This growth has increased the demand for skilled labour – demand that will be further stimulated by the establishment of integrated agro-processing industrial parks.

Understanding the types of skills that are in high demand but short supply, both now and in the future, is essential to improving the effectiveness and efficiency of the industry, contributing to improvements in productivity and increasing workers' earnings.

The need for a strategic sector-level focus on skills

Education is vital to the economic development of any country. Since the present Government came to power in 1991, Ethiopia has experienced huge investment in formal education, resulting in a massive improvement in access. The Ethiopian Growth and Transformation Plans (I and II) assign a key role to the education sector in accelerating economic development. As a result, the country has made great strides in the quantitative expansion of education and has recorded substantial increments in educational attainment and completion rates over the last two decades.

However, the quality and relevance of the education delivered remains a daunting challenge. Neither higher education nor technical and vocational education and training (TVET) takes the skills needs of the economy into account. Lacking a practical focus, they contribute to high youth unemployment and skills mismatches in the labour market. Furthermore, the current education policies and strategies are generic, with no emphasis on the needs of the various economic and industrial sectors. Only two TVET institutions provide training in

agro-processing, having begun to deliver courses on a pilot basis in 2019. Sector-specific skills policies are needed to narrow the skills gaps in the agro-processing sector, including the food, beverage, dairy and meat subsectors, which are the main focus of this document.

Sector definition and scope[1]

This sector skills strategy is intended for agro-processing industries that have the potential to create employment, generate export revenue and service growing domestic markets that would otherwise be serviced by imports. It focuses on the food, beverage, meat and dairy subsectors of the economy. These subsectors are currently the largest contributors to GDP, employment and export earnings within the agro-processing industry and receive special attention and support from the Government.

The agro-processing industry involves various processes: receiving and storing inputs, production (for example, biscuits are produced by mixing flour, fat, sugar, water and other ingredients, forming, baking and cooling) and distribution. We therefore examine the key occupations, skills gaps and possible interventions at each stage of the agro-processing value chain.

Recommendations, aims and scope of the sector skills strategy

This document provides important information concerning the current status of skills in each main occupation in the agro-processing industry, reporting on the extent of skills shortages and gaps. In doing so, it will contribute to ensuring an appropriate supply of labour for the industry, both now and in the future. The document also calls for further investment where serious skills shortages and deficiencies are identified and thus has the potential to boost the sector's productivity and competitiveness, nationally and internationally. By ensuring a better match between the demand for and supply of skills, it should also help to improve the welfare of workers.

Methodology

This report is based on a combination of research and consultations, using the ILO's Rapid STED approach. The process began with a background study combining secondary research, consultations with key stakeholders, including 15 firms in the Amhara and Oromia regions (a list is appended as Table 5), and the experience of consultants doing other policy work in Ethiopia on the agro-processing industry and on skills development.

[1] Throughout this document, unless otherwise stated, the terms "industry" and "sector" are used interchangeably and refer to the agro-processing industry. Subdivisions within agro-processing, namely food and beverages, diary, and meat processing, are referred to as "subsectors".

A major two-day technical and policy workshop on skills for the agro-processing industry was organized in December 2019. The workshop examined the main findings of the background study and involved a collaborative process of forward-looking analysis and strategy formation with representatives of key stakeholders. They included employers, institutions involved in the sector, education and training providers, and representatives of relevant ministries and agencies (listed in Table 6 in the Appendix). This workshop provided the core of the analysis and policy proposals presented in this document. The document and its recommendations are due to be considered at a validation workshop in May 2020.

Unless explicitly cited, all data and figures in this document derive from the background study or the STED workshop held in December 2019 in Addis Ababa.

Structure of this document

The remainder of the document is organized as follows. The next section presents a short profile and situational analysis of the agro-processing industry. Section 3 digs deeper into the key occupational categories and the current skills gaps in each category. Sections 4 and 5 examine the present supply of skills and the critical supply-side challenges and constraints. Section 6 outlines a vision for the sector based on consultations during the STED workshop and supported by follow-up discussions. Section 7 discusses gaps in the capabilities needed to achieve the vision for the industry set out in the previous section. Sections 8 makes recommendations for meeting the skills needs and system-level priorities identified.

1. Short profile and situational analysis

1.1. Economic and workforce profile

1.1.1. Economic profile

Since the early 2000s, Ethiopia has registered rapid and sustained economic growth to become one of the fastest-growing economies in the world with an average growth rate of 10 per cent per annum, double that of much of the rest of Africa. However, the Ethiopian economy is one in which the vast majority of the population derive their livelihoods from agricultural activities. Only in recent times has the contribution of the industrial sector begun to grow. The industrial sector's share of GDP increased from 13 per cent in 2012/13 to 27 per cent in 2017/18. Within this sector, the agro-processing industry, producing mainly food and beverages, has always made a considerable contribution to output and employment, accounting for almost a third of manufacturing added value in 2016/17.

The agro-processing industry has received considerable attention from the Ethiopian Government in recent years. The initiative to develop integrated agro-processing industrial parks (IAIPs) represents a strategic step in efforts to transform the economy and achieve the country's industrial development goals. By linking the agricultural sector with agro-processing industries, IAIPs are designed to ensure a reliable supply-chain infrastructure and to increase the flow of investment into the sector, thus playing a pivotal role in its development. Closely connected to IAIPs are rural transformation centres (RTCs), which collect and aggregate produce from the surrounding area and/or transitional markets, where producers, cooperative and private aggregators can sell their produce and so supply industry in the IAIPs with raw materials.[2]

Recent improvements in the sector are apparent from the statistics. Over the last five years, foreign exchange earnings from food and beverage products have greatly improved, tripling from about US$21 million in 2014/15 to around US$63 million in 2018/19. Similarly, the subsector has created some 41,760 additional jobs over the last four years.

The completion of IAIPs under construction is expected to increase the contribution of the sector in terms of output, employment and export-revenue generation. The parks are expected to attract about 400 local and foreign firms, thereby creating direct job opportunities for more than 16 thousand people. In addition, they are expected to indirectly create temporary and permanent on- and off-farm job opportunities for about 3 million skilled and low-skilled persons.

[2] More detail on the IAIPs is provided in Section 2.2

1.1.2. Workforce profile

Agricultural activities, mainly food production by smallholders, account for the vast majority of the active population in Ethiopia, with more than 30 million people engaged in agricultural and related activities in 2013. Similarly, agriculture-based manufacturing industries employ the largest share of manufacturing workers in the country. The food and beverage subsector was employing roughly 843 thousand people in 2013. More jobs are expected to be created with the ongoing construction of IAIPs. All in all, the agro-processing industry is expected to generate some 1.2 million new jobs directly and 2.7 million jobs indirectly by 2025.

The sector employs mostly Ethiopian workers, since the vast majority of agro-processors are domestic firms. As almost no education and training centres provide training in agro-processing, the overwhelming majority of workers involved in such tasks as input-receiving and storage, production processing, machine operation and setting, and machine maintenance and repair are recruited either as workers with previous experience and/or with relevant qualifications not specific to the sector. For applicants with relevant qualifications not specific to the sector or with no experience/skills specifically relevant to the sector, firms usually provide short-term in-house training before they begin production work.

1.2. Drivers of change: major trends and their likely impact on employment

Agro-processing in Ethiopia is dominated by domestic firms. Most firms in the sector have transitioned from simply trading agricultural goods to also undertaking processing. Except for meat products, which are also sold in export markets, most firms sell their products on the domestic market. Domestic supply lags far behind demand, with the country still dependent on imports for many processed (finished or semi-finished) agricultural products. Firms engaged in agro-processing operate in a very competitive environment within Ethiopia. In this section, we examine key factors shaping the sector, together with their implications for employment.

Agricultural resources. Underutilized resources in both arable and livestock farming, as well as an active labour force and suitable climatic conditions, provide the sector with considerable opportunities for growth and upgrading. This is one of the factors behind the establishment of AIAPs, which are expected to spur broad-based growth by linking farms with the agro-processing industry.

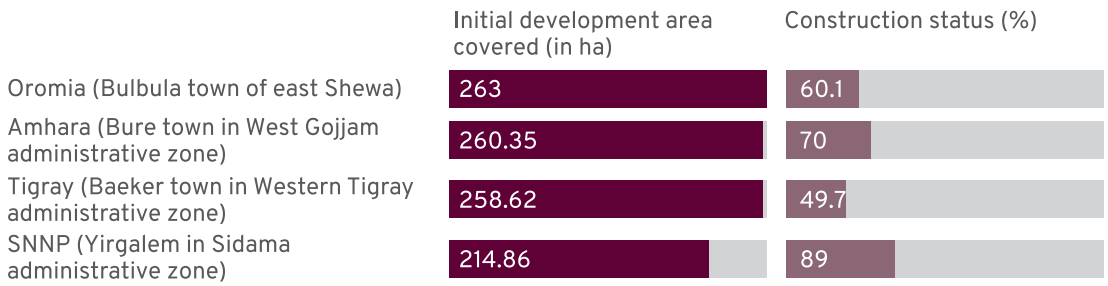
Government policy and strategy. Ethiopia has implemented various policies and strategies for diversifying and building domestic value chains, with the main focus on export promotion and the labour-intensive tradable sectors. Agro-processing is one of the sectors that has most received attention, from both national and regional governments. As well as investing

to improve access to infrastructure services, the Government has been working to create a positive enabling environment for the growth and expansion of the sector.

Integrated Agro-processing Industrial Parks (IAIPs). The establishment of IAIPs is expected to be a driving force in attracting new investment into the sector, overcoming such problems as poor governance, restrictive policies, inadequate infrastructure and difficulties in access to land. Moreover, the IAIPs are expected to operate in concert with a much larger number of new Rural Transformation Centres (RTCs), which will facilitate the efficient aggregation of agricultural outputs from farmers, as well as providing services (including training and advice) to farmers and rural communities. Four IAIPs are in the process of being established, in Oromia (Bulbula); Amhara (Bure); Tigray (Baeker); and South Nations, Nationalities and People (Yirgalem) regional states. When they are completed, these IAIPs and RTCs are expected to provide the reliable supply-chain infrastructure required for the development of the sector; stimulate interaction among farmers, researchers, extension mechanisms and industries; improve value addition and connections to markets, and hence farmers' incomes; create employment opportunities for rural populations; and facilitate the commercialization of the agricultural sector.

Four areas have been selected to house IAIPs, taking into account strategic farm produce potential, the availability of the necessary infrastructure and training facilities, and proximity to large local markets, such as big towns and cities.[3] Figure 1 below shows the initial areas covered and the construction status of the first batch of four IAIPs.[4]

Figure 1: The size and status of IAIPs



[3] See UNIDO. Integrated Agro-Industrial Parks in Ethiopia: https://isid.unido.org/files/Ethiopia/Integrated-AgroIndustrial-Parks-Overview.pdf

[4] These figures do not take into account the progress that may have been made in construction in recent months.

Business environment. The number of large and medium-scale manufacturing firms engaged in agro-processing is growing, increasing from around 373 in 2005/06 to 671 in 2011 and 947 in 2017. The enabling environment for investment created by the Government has contributed to this growth, as have low labour costs, low water and energy costs and the availability of raw materials. The country's investment legislation has recently been revised to further improve the investment climate.

International market. Most Ethiopian agro-processing products are consumed domestically, except for meat products, which are also exported. The main destinations for Ethiopian meat products are the Middle East and the East African Community. The growing population in neighbouring countries and the Middle East is expected to spur demand for the industry's products, notably meat. Proximity to markets such as the East African Community and the Gulf States, as well as tariff-free exports to the EU and USA under the strategies known as Everything but Arms (EBA) and the African Growth and Opportunities Act (AGOA), could also contribute to the sector's development, although the quantity of processed food exports is currently limited. Phytosanitary requirements, the contraband trade in live animals, overvalued exchange rates and poor logistics are all constraints that hamper the export of agro-processing commodities.

Domestic market. The domestic market is important for local and foreign producers. Imports of processed agricultural products have risen rapidly. Rapid economic growth and increasing population size are the main drivers of this surge in demand for imported goods. The increasing demand for imports can also be explained in part by the weak supply of domestically produced agro-processing products.

1.2.1. Likely impact on employment

Currently, the agro-processing industry is the largest manufacturing sector in terms of employment. The number of workers absorbed by this sector is on a steep upward trend, mainly because the number of firms is increasing (from about 373 in 2005/06 to 671 in 2011 and 947 in 2017) (CSA, 2018).[5] The trend is expected to continue in the coming years as new jobs are created in the IAIPs.

It is estimated that the sector will create roughly 1.2 million new jobs directly (about 150 thousand new jobs per year) by 2025. Furthermore, the subsector is predicted to create another 2.7 million jobs indirectly.

[5] Central Statistical Agency (CSA) annual manufacturing census 2017/2018 survey wave

2. Profile of major occupations, key skills and career pathways in the sector

This section describes the major occupations and key skills required in the agro-processing industry.

2.1. Operator-level occupations

2.1.1. Occupations and key skills at operator level

The vast majority of workers in the agro-processing industry are production workers. The following are the major occupations identified at operator level. The numbers are based on a sample survey conducted in 15 enterprises operating in Oromia and Amhara regional states.

- **Input-receiving and storage workers.** These occupations account for about 14 per cent of the workforce. Workers in these occupations are tasked with the physical handling and routine checking of the raw materials received, which vary across subsectors (food-processing, beverages, dairy and meat). Skills in checking and documenting quality and conformity are required. To ensure the quality of raw materials, suitable storage facilities must also be available at the farm level, together with good packaging materials, therefore input storage skills are needed at farm level too.
- **Low-skilled operator level.** Occupations at this level accounted for the largest share of workers in the sample survey, 48.9 per cent, comprising production operators, and cleaning, packaging and shipping workers. In biscuit-making, for instance, four major steps are involved: mixing, forming, baking, and cooling. At the mixing stage, the necessary inputs (flour, sugar, fat, water and other ingredients) are mixed in the correct proportions to produce the desired product. The resulting dough must all be processed at one and the same time (with no batches left sitting longer than others). Another related job is packaging, which may be done manually or with machinery, followed by shipping.
- **Safety, hygiene and quality control occupations.** The safety and quality of food products need to be checked at all stages of production. Workers in these jobs accounted for 2.2% of total employment in the sample survey. The process of ensuring the safety and quality of food products should of course start at the farm level. This occupation also requires skilled labour, mainly at management level. To deliver high-quality products,

processing skills should therefore be supplemented with technical skills related to good manufacturing practices, food hygiene and safety, and packaging and labelling.

- **Machine maintenance and repair.** Maintaining and repairing machinery and equipment demands craft and technical skills, vital for smooth and uninterrupted production and therefore the operational efficiency of a company. When these tasks are performed, there is a high risk of product contamination, so it is important that the workers responsible understand hygiene and safety requirements, and demonstrate a high level of diligence. Since the different agro-processing subsectors and firms use different ingredients, formulations and production equipment, the detailed technical skills required by machine maintenance and repair personnel vary. In the case of modern equipment, they need a combination of mechanical, electronic and computer skills.
- **Laboratory technicians.** Laboratory technicians, who accounted for 0.4% of workers in the sample survey, need to have technical skills in microbiology and chemistry. They are chiefly responsible for performing tests on the final product, as well as on inputs, to ensure product quality and safety. Products are tested both internally by the company and externally by government-approved laboratories. External assessments are conducted to check that products comply with national or international accreditation and licensing arrangements, and so that corrective action can be taken when non-conformity or non-compliance is detected. The testing skills required differ from one subsector and firm to another.

More than three quarters of the workers in the sample survey were engaged in the above occupational areas.

The analysis indicates that each subsector requires specific technical skills to operate at full capacity. Technical skills alone, however, are not sufficient for efficient and effective operation. Core employability skills in communication and problem-solving, as well as factors relating to personality, attitude and motivation, are also important. The firms interviewed highlighted shortcomings in core employability skills, especially the lack of a sense of ownership and poor cooperation and teamwork, which prevent companies from operating to their full potential.

2.1.2. Career pathways at operator level

In Ethiopia, there are few TVET institutions that provide training in agro-processing. Only recently have Holeta and Wukro polytechnic colleges started to provide training and no students have yet graduated. The training provided in these colleges is training of trainers (ToT). Consequently, firms struggle to recruit workers with the required skills. Nearly all enterprises in the agro-processing industry therefore rely on workers lacking appropriate qualifications.

Employers indicate that, for occupations that do not require highly skilled labour, they recruit new low-skilled workers then provide short-term training (in both technical and core employability skills) before involving them in production. For operator-level occupations requiring more advanced skills, they usually hire workers with previous experience in the same industry or other areas of agro-processing. Applicants with relevant non-agro-processing qualifications are also recruited and put through short training courses before starting work in production.

2.2. Mid-level managerial occupations

2.2.1. Mid-level managerial occupations and their key skills

Mid-level occupations include supervisory-management and technician-level occupations, as well as other occupations requiring similar levels of skills.

The following are key occupations at this level:

- **Production supervisors and team leaders.** Efficiency and quality in the food-processing and beverage subsectors depends on the production team leader or supervisor. Team leaders and supervisors manage the work of their teams in such areas as processing, operating machinery and packing. Supervisors are also responsible for ensuring compliance with safety and hygiene standards and with other procedures and standards specific to the firm. They also have a mentorship and teaching function, contributing to the learning of their team members.
- **Production planning assistants.** These workers coordinate the workflows of one or more products and assist in planning and prioritizing operations. They support production management and planning by determining the manpower, equipment and raw materials needed to cover production demand.
- **Drivers and salespersons.** These occupations jointly account for around 8 per cent of the workforce. They are essential in linking their firms with input suppliers, such as farmers, and domestic consumers of finished products. The demand for salespersons is likely to surge as enterprises aim to replace imported foods and beverages in domestic markets. Similarly, when the IAIPs become operational, there will be a significant demand for drivers for transporting inputs from farms and warehouses. Moreover, when enterprises start exporting in earnest, there will be additional demand for truckers to transport outputs to ports.

2.2.2. Career pathways for mid-level managerial occupations

Agro-processing enterprises rely mainly on experienced workers to staff mid-level jobs. To this end, they recruit workers from other companies or promote the most effective workers from their own workforce. Since there are few TVET or university graduates with qualifications specific to agro-processing, firms recruit graduates with related qualifications then provide training in the additional skills they need. For instance, firms recruit TVET graduates with technical qualifications not specific to agro-processing for maintenance and repair occupations. Firms that fail to find suitable workers sometimes rely on expatriates, especially for machine-setting, maintenance and repair.

Some workers engaged in mid-level jobs could easily progress to higher-skilled jobs if appropriate mentoring and training mechanisms were in place.

2.3. High-level technical and managerial occupations

2.3.1. High-level occupations and their key skills

The followings are key occupations at this level:

- Production management and planning. This occupation involves planning, organizing, directing and controlling production activities to ensure that production runs smoothly and at the required intensity. It also includes food-safety management. Such skills ensure compliance with safety standards as stipulated in regulatory provisions, as well as protecting a firm's reputation by preventing recalls. Production and planning managers are responsible for the whole process, from procurement to release of products onto the market. This is therefore a vital occupation if agro-processing firms are to operate at full capacity. It requires highly skilled and experienced people, mostly with university-level qualifications. In our sample survey of enterprises, this occupation accounted for 1.5 per cent of workers.
- Production engineers. Production engineers are responsible for the compositional properties of products. This occupation requires skilled and experienced people familiar with agro-processing engineering and processing technologies. The focus is more on the technical packaging, processing, and food-quality aspects of the supply chain. Production engineers design systems for the processing, handling and packaging of food, including storage equipment and systems. In particular, they look after the chemical, electrical and mechanical needs of the equipment and machinery used in manufacturing food and beverages. Their task is to maximize plant productivity by taking preventive actions in relation to health and safety, good manufacturing practice, hygiene compliance, and the performance of routine maintenance of machines and equipment.

- Laboratory scientists. Senior laboratory analysts and laboratory managers typically require a bachelor degree level or higher qualification in biology, chemistry or a combination of both. Unlike the laboratory technicians discussed above, whose perform routine laboratory checks, laboratory scientists are responsible for managing laboratories and ensuring that national and international quality standards are met.
- Human resource managers. HR managers are responsible for finding, recruiting, training and developing employees, as well as maintaining good workplace relationships. The abilities of an HR manager directly or indirectly determine the quality of labour relations and communication, as well as worker motivation and, hence, company performance. HR management skills are therefore critical to ensuring good relations between workers and their employer, thus contributing to the productivity and competitiveness of the firm in local, national and international markets.
- Sales and marketing managers. This occupation accounted for 1.1 per cent of workers in the sample enterprises. Sales and marketing managers require wide experience and skills in communication, team coordination and sales. These are generally university-level qualifications. They also need the skills to ensure a timely response to requests from buyers and that goods are delivered on time.
- Logistics management. This occupation is critical for sourcing raw materials in both domestic and international markets, and for delivering final products to end-users in good time. Logistics management skills are therefore essential in the planning and controlling of the movement and storage of goods and raw materials from origin to destination. Cold-storage facilities are particularly important in reducing spoilage and post-harvest losses of fruits and vegetables when they are transported from farms to agro-processing plants.
- Administration and finance. These occupations accounted for 2.8 per cent of jobs in the sample enterprises. Administration and finance workers support the production process by providing all necessary administration services, such as paying salaries and benefits on time.

2.4. Survey information on occupations, training needs and skills shortages at selected enterprises

Based on our qualitative sample survey, in Table 1 below we have summarized the types of occupation in the agro-processing industry, the proportion of workers in each occupation requiring additional training, and skills shortage severity and thus the extent of the skills challenge in the industry.

Table 1: Skills by production process in selected food and beverage enterprises

Production process	Share of workers (%)	Share requiring additional training (%)[6]	Skill shortage severity (where 1 is not a problem at all and 5 a severe problem)
Input-receiving and storage	14.0	34.4	2.0
Low-skilled operator	48.9	21.2	2.2
Machine operator, machine setter	7.9	38.4	3.0
Machine maintenance and repair	1.2	45.4	3.2
Safety, hygiene and quality control	2.2	33.8	3.2
Production supervisor or team leader	1.5	33.2	1.6
Production management and planning	1.5	25.5	1.8
Production engineering	0.5	12.5	2.0
Laboratory testing	0.4	67.5	3.0
Human resource management	1.3	14.5	1.7
Facility management and maintenance	0.2	8.5	1.6
Logistics management	0.9	13.5	2.4
Drivers	4.6	0.0	1.0
Marketing and sales management	1.1	11.6	1.7
Sales personnel	3.4	12.0	1.4
Administration and finance	2.8	6.6	1.5
Others	7.4	0.0	1.0

Source: Agro-processing enterprise interviews in Amhara and Oromia regions

The first column of Table 1 shows the types of occupation required in the agro-processing industry, while the second, third and fourth columns respectively report the average share of workers engaged in each occupation, the share of workers in each process that require additional training and the extent of the skill shortages reported for each occupation.

The largest proportion of workers (about 48.9%) were employed as low-skilled production workers, mainly production operators. The other occupations that employed a significant proportion of workers were engaged in input-receiving and storage (14%), machine operation and setting (7.9%), driving (4.6%) and sales (3.4%).

[6] Additional training required refers to training required given workers' current skill levels (taking into account their initial training and any training that has been provided by the firm concerned).

3. The supply of skills in the agro-processing industry

3.1. Key institutions, formal programmes and qualifications

In Ethiopia, training in skills for the manufacturing sector is delivered by higher-education institutions (universities and TVET colleges), development partners and sector-related development institutes (such as the Food, Beverage and Pharmaceutical Industry Development Institute and the Meat and Dairy Industry Development Institute). In many cases, in-house training is also given by companies themselves. The followings are sources of skills for agro-processing enterprises in Ethiopia.

In-house training. Most workers in agro-processing work at operator levels that do not require high-level skills. A majority of the sample enterprises we interviewed hire unskilled labour then provide in-house training for the jobs concerned. They also recruit newly qualified graduates (from TVET colleges and universities) in fields that are relevant but not specific to agro-processing and give them short-term training, especially for mid-level technical jobs and positions on a career track to high-level jobs. Most firms prefer to hire experienced operators for more skilled operator jobs.

It is quite difficult for firms to find skilled workers for positions involving machine maintenance and repair, safety, hygiene, and quality-control, and technical laboratory work. This problem may well be aggravated when the IAIPs start operations, unless TVET colleges and universities train students with the required skills and qualifications. In some cases, firms (mainly large enterprises) provide in-house initial training or send workers abroad for initial training for these jobs.

In addition to initial training, firms also provide continuing training to varying degrees. However, unlike the practice in industrial parks, in-house training of this kind appears to be given on an ad hoc basis to meet specific needs, rather than being comprehensive, transferable and systematic.

Skills provision by the TVET system. TVET institutions develop skills, knowledge and work readiness by delivering general education and vocationally specific programmes. Some of these programmes are sector-specific and others are relevant across sectors. TVET institutions have been established in Ethiopia to supply the lower and mid-level skills demanded by the economy. The TVET system is growing rapidly, with one TVET centre established in almost every woreda (district, the country's third administrative level). It is believed that low labour productivity for a given level of technology is mainly due to skills

gaps. The TVET system, by providing training in different specialist areas to meet the needs of the industry, is seen by the Government as the best way to ensure skills development.

While there was previously no TVET provision specifically for the agro-processing industry, an important initiative is now in progress to fill this gap. Pilot training-of-trainer courses have been established at Holeta Polytechnic College in Oromia and Wukro Polytechnic College in Tigray, with support from the TVET Institute, to train trainers to staff agro-processing programmes at TVET colleges across the country. These courses are at bachelor degree level.

Recently, the Ethiopian Meat and Dairy Industry Development Institute, in collaboration with the Federal Small and Medium Industry Development Agency, has identified some 21 polytechnic colleges in areas associated with the meat and dairy industries, and has assessed their capacities (staffing, class availability, machinery and equipment, and available resources in the vicinity of each college), as well as the challenges they would face in providing training in agro-processing. While most of them wish to provide such training, none of them has yet begun to do so. This is mainly due to the lack of skilled trainers, machinery and equipment, and laboratories.

Skills supplied by universities. It is expected that the skills for high-level occupations in the agro-processing industry will generally be generated by university-level courses. The courses would cover such advanced technical disciplines occupations as production engineering, chemistry, senior laboratory work, and production and planning management.

There are few universities in Ethiopia that train students specifically in agro-processing. Haramaya University has started programmes at bachelor, master and PhD levels in fields related to agro-processing, including animal science, dairy science and technology, and animal nutrition (BSc courses), and dairy science (MSc course). Mekelle University trains students in food science and technology at first-degree level. Similarly, Hawassa University offers courses in food science and technology, as well as food safety, at first-degree and master levels.

The sector also recruits university graduates with qualifications not specific to agro-processing, in both technical and managerial fields.

3.2. Other sources of skills

Besides TVET colleges, universities and in-house training delivered by agro-processing firms, there are also governmental and non-governmental actors engaged in skills development.

3.2.1. Skills provided by industry development institutions

The Ethiopian Government, acting through the Ministry of Industry and Trade, has established various sector-based industry development institutes to pursue the objective of

making Ethiopia a hub for light manufacturing industries in Africa. There are seven of these institutes, established for priority sectors of the economy. The Ethiopian Food, Beverages, and Pharmaceutical Industry Development Institute (EFBPIDI) and the Ethiopian Meat and Dairy Industry Development Institute (EMDIDI) support the development of the agro-processing industry. They serve as centres of excellence for the industry, focusing on skills development and technology transfer, among other functions.

The EFBPIDI was established to support the food, beverage and pharmaceutical subsectors. It has partnerships with more than 14 universities, TVET colleges, research institutes, regional industrial bureaus and industries. The linkages between the EFBPIDI and industry stakeholders, however, are weak and have mostly not yet progressed beyond signing partnership agreements. The Institute does not provide in-house training, as it has not yet been resourced with training equipment and laboratory facilities. It engages mainly in arranging short-term training on topics such as Kaizen, management and environmental assessment. The EFBPIDI also prepares feasibility studies and performs consulting and facilitating work for firms entering the subsector. The Institute has not yet achieved its aim of serving as a skills and technology hub.

The EMDIDI focuses on the dairy and meat-processing subsectors. Its aim is to make Ethiopia a leading nation in meat products in Africa, the Middle East and Asia. In addition, the Institute aims to make Ethiopia the leading country in the world in honey and wax products by 2025 and a strong African competitor in milk and dairy products. It provides short training courses for the dairy industry on topics such as milk quality, safety and quality assurance, milk processing, input collection techniques, milk promotion, milk technology and milk packaging. According to the Institute, these courses last for between two and ten days. They are either delivered in house or outsourced to external providers. In some cases, the Institute works with NGOs to provide training. The EMDIDI has also been involved in preparing for and facilitating workshops and exhibitions to promote the subsectors' products and attract investors to the sector.

The Institute provides some internships for university and TVET college students. However, the provision of effective and efficient training is constrained by the inadequacy of its training laboratory equipment and machinery, and by shortages of trainers. The availability of staff with exposure to new technology is limited. These factors hinder the Institute's efforts to function as a centre of excellence in skills development, and as a technology transfer hub for the various subsectors.

3.2.2. Non-governmental organizations

NGOs are also engaged in the provision of skills for Ethiopia's agro-processing industry, either directly by providing training or indirectly by helping create an enabling environment for improving training quality. NGOs involved in skills development include the following.

The GIZ. This NGO works on behalf of the Germany Ministry for Economic Cooperation and Development to support Ethiopian development. It cooperates with the Ministry of Education, the Ministry of Science and Higher Education and the National TVET Agency to support the provision of quality, relevant and equitable education and training and so enhance employment opportunities for young people. Through its Sustainable Training and Education Programme (STEP), the GIZ works to improve the relevance of the TVET system by promoting linkages between TVET institutes and companies, improving the quality of TVET trainers, improving occupational standards and assisting in the assessment of TVET colleges. In addition to its work in TVET, the GIZ seeks to improve the quality and relevance of higher education by helping to develop a long-term strategy, establish and sustain a higher-education management system, and improve the skills of higher-education managers and leaders. One of the mechanisms whereby the GIZ supports skills development is by providing short-term training.

UNESCO. UNESCO's Better Education for Africa's Rise II (BEAR II) programme, supported by the Republic of Korea, focuses on enhancing the quality and relevance of the TVET system and its institutions. The programme includes specific interventions and capacity-building activities for the agro-processing sector. The effectiveness of the programme is yet to be evaluated.

UNDP. The Entrepreneurship Development Centre (EDC), supported by the United Nations Development Programme (UNDP), provides firms with training in soft skills and management in collaboration with the sector-related development institutes. The EDC focuses particularly on entrepreneurship training for small business start-ups, mostly in urban areas. To our knowledge, the EDC's engagement in the agro-processing sector is limited.

UNIDO. Through its Country Partnership Programme for Ethiopia, the United Nations Industrial Development Organization (UNIDO) is supporting development of the country's IAIPs and RTCs. Apart from serving as the key linkage points for farmers and processors, the RCTs will also be engaged in the training and capacity-building of rural populations. This will have a direct impact on the quality of the raw materials the agro-processing industry will use. With financial support from the Italian Embassy, the UNIDO is providing training in agro-processing, mainly in the Tigray, Oromia, Amhara and South, Nations, Nationalities and People regional states in collaboration with the TVET Agency. The UNIDO project aims to introduce formal training programmes in agro-processing into the TVET system.

4. The supply of skills: Status, challenges and constraints

The competitiveness and growth of the agro-processing industry hinges on the availability of educated and skilled labour. In this section, we explore the current position in relation to skills provision and the extent to which this meets companies' requirements. The main supply-side constraints are also examined.

4.1. Gap between skills demand and supply

The agro-processing industry is growing rapidly in terms of employment. However, there is not yet any basic TVET provision specifically for the sector. There is some specialized university provision, and the EFBPIDI and the EMDIDI provide some continuing training, as do some NGOs.

Evidence from the sample industry survey undertaken in two regions and confirmed by participants in the STED technical and policy workshop indicates that there are significant gaps between the demand for and supply of skills for a range of occupations. This is especially true for middle and high-level occupations in such areas as laboratory testing, machine maintenance and repair, safety, hygiene and quality control, machine setting, and machine operator roles requiring relatively high skills. There is also a great need for additional training for persons recruited into these occupations, as well as for production supervisors and team leaders, and input-receiving and storage workers.

The relevant survey results are set out in Table 2 below.

Table 2: Skills gaps and shortages by production process in the sample of agro-processing enterprises in Amhara and Oromia

Production process	Share requiring additional training (%)	Skills shortage severity (from 1 "not a problem at all" to 5 "a severe problem")
Input-receiving and storage	34.4	2.0
Production/Process (low-skilled)	21.2	2.2
Production/Process (skilled machine operator, machine setter)	38.4	3.0
Machine maintenance and repair	45.4	3.2
Safety, hygiene and quality control	33.8	3.2
Production supervisor or team leader	33.2	1.6
Production management and planning	25.5	1.8
Production engineering and science	12.5	2.0
Laboratory testing	67.5	3.0
Human resource management	14.5	1.7
Facility management and maintenance	8.5	1.6
Logistics management	13.5	2.4
Drivers	0.0	1.0
Marketing and sales management	11.6	1.7
Salespersons	12.0	1.4
Administration and finance	6.6	1.5
Others	0.0	1.0

Source: Agro-processing enterprise interviews in Amhara and Oromia regions

A labour-market assessment conducted by the TVET and Enterprise Development Bureau of Amhara Region for the period 2018/9 - 2019/20 predicted that there would be demand for 37,548 workers with TVET-level skills relevant to the sector in the region (lower limit). This was based on anticipated growth in jobs that that might require TVET-level skills. The authors noted that there were no specialized agro-processing TVET courses available, and therefore identified a demand/supply gap equal to total demand. Assessments for other regions would be broadly similar.

While it is important as a matter of policy that workers should be qualified, ideally with a qualification that matches their job, the number of workers with the specialized agro-processing TVET qualifications needed to fill the immediate demand/supply gap identified by firms is probably much lower than this. Firms can recruit workers with non-specialized qualifications for many roles, and relatively few mention an urgent need for qualified workers for low-skilled manual jobs.

However, there will be benefits to recruiting workers with more specialized qualifications whose skills better match the needs of the sector, especially as it grows and modernizes. Even in the case of low-skilled work, firms and workers will benefit from initial training to TVET Level 1 or Level 2. Moreover, while there is currently significant demand for low-skilled workers from firms operating at a low technological level, international experience and the experience of leading firms in Ethiopia shows that agro-processing businesses need more skilled recruits as they adopt more modern technologies. The result is a relative fall in demand for low-skilled labour and a corresponding rise in demand for well-skilled machine operators and technicians.

For this reason, the objective of meeting all demand for workers in the sector with graduates qualified at least to TVET Level 1 is well-founded, and the ideal mix of qualifications will rise in level over time.

Recently, two polytechnic colleges (Holeta, Oromia and Wukro, Amhara) were selected to provide training for students who, on graduation, are expected to serve as trainers in their regions' TVET colleges. These two colleges deliver training at bachelor-degree level. Graduates of these programmes are not expected to increase the supply of skills available to the sector directly, but they will enable the TVET system to introduce specialized agro-processing courses that will increase the future skills supply. Running these courses also develops the capability of these two institutions to themselves provide agro-processing TVET courses and so supply the sector's skills needs directly.

Table 3 shows the number of students enrolled for degree courses at the Holeta Polytechnic College in collaboration with the Federal TVET Institute. Among the 222 trainees enrolled for these courses, the majority are studying plant- and animal-production technologies, which are more directly related to agriculture than to agro-processing. The number of students taking courses directly related to agro-processing technology is 97. Roughly 26 students are being trained in dairy processing. Similar numbers are being trained at Wukro Polytechnic College.

▶ Table 3: Enrolment in agro-processing courses at Holeta Polytechnic College

Department	Total
Animal production technology	59
Plant production technology	66
Fruit and vegetable processing technology	48
Dairy processing technology	26
Meat processing technology	23
Total	222

Source: Holeta Polytechnic College

When the IAIPs are fully up and running, there will be greater demand for specialized skills in agro-processing. The industry will then face more pressing skills shortages unless new TVET courses are introduced on a significant scale.

Discussion with leaders at Holeta Polytechnic College indicated that lack of teaching equipment and machinery, and poor lab facilities, coupled with only limited cooperation on the part of enterprises in providing on-site training, is affecting the quality of the training delivered by the College. Although the College has been chosen as a centre of excellence for agro-processing, delays in procurement of the necessary machinery has adversely affected teaching quality. Moreover, because specialists in agro-processing are not available, training is delivered by professionals in related fields rather than by agro-processing specialists.

4.2. Governance, policies and constraints on skills provision

Skills policies for the agro-processing industry must comply with and complement national policies for development, education, training and skills. They also have to take account of practical and policy constraints.

4.2.1. National skills policy and strategy

Ethiopia has produced various macroeconomic development programmes since the mid-1990s to accelerate economic growth and reduce poverty. These development plans include the Sustainable Development and Poverty Reduction Programme (1995-2005), the Plan for Accelerated and Sustained Development to End Poverty (2005-2010), the Growth and Transformation Plan-I (2010-2015) and the Growth and Transformation Plan-II (2015-2020).

Achieving the long-term vision of transforming Ethiopia into a middle-income country depends on skills development. This depends on the expansion of training and education provision, which in-turn requires the formulation and implementation of education and training strategies and policies. To meet this need, in 1994 the Ethiopian Government produced an Education and Training Policy to implement the various strategies designed to improve the performance of the education sector.

Subsequent Education Sector Development Programmes (ESDPs) have been developed to implement the Education and Training Policy at different periods. To date, five ESDPs have been implemented, aligned with national development plans: ESDP-I (1997/98–2001/02), ESDP-II (2000/01-2004/05), ESDP-III (2005/06-2009/10), ESDP-IV (2010/11-2014/15), and ESDP-V (2015/06 – 2019/20).

The roadmaps for education focus on general education, TVET and higher education. For each branch of education and training, there is a roadmap with targets for enrolments and

graduations, occupational standards and quality assurance. The current ESDP is a five-year plan with various targets, but the rationale of the plan and strategy is not adequately explained.

Aligned to the ESDPs, in 2002 the Ethiopian Government prepared a National TVET Strategy (revised in 2008) as a means of closing the skills gaps in the economy. As a result, the TVET system has expanded rapidly over the last two decades and there is now at least one TVET centre in almost every woreda in the country. The 2008 National TVET Strategy is the latest version of the strategy implemented by the Government. The 2002 TVET Strategy emphasized the number of graduates produced by the system, based on a curriculum dependent on the resources available to TVET institutions in terms of instructors and equipment, but without paying attention to skills demand. The 2008 Strategy, in contrast, focuses on ensuring the quality and relevance of graduates' skills by developing occupational standards, accrediting competencies and performing occupational assessments. However, the TVET system in Ethiopia continues to be generally supply-driven. Consequently, there is huge mismatch between the demand for and supply of skills, in terms of both the numbers with qualifications suited to existing jobs and the quality and relevance of the skills possessed by "qualified" workers.

Ethiopia's 2008 National TVET Strategy states that TVET quality and relevance should be enhanced by making the system outcomes-based, in other words the training delivered in TVET colleges should develop skills that can be measured in skills assessments based on occupational standards. At the end of their formal education, TVET graduates have the option of undergoing an official assessment of their skills, separately from the award of their qualification.

4.2.2. Governance and stakeholder coordination

Skills development is a major concern of national labour-market policy, occasioned largely by the mismatch between the effective skills sets of graduates and workers and the demand articulated by the industries concerned. Skills development therefore requires collective leadership, cooperation and decision-making among the key stakeholders. Coordination between ministries and agencies is important for implementing national education and training policy and strategy. Coordination between industry, government and education/training providers is also vital.

The Ministry of Science and Higher Education is the ministry with overall responsibility for the development of science, higher education and TVET.

The Federal TVET Agency is responsible for organizing, facilitating and endorsing the occupational standards of the TVET system by building the capacity of TVET institutions, while regional Centres of Competency (CoCs), in collaboration with the Federal TVET Agency, are responsible for developing occupational standards in collaboration with industry.

The Federal TVET Institute is responsible for training instructors for the TVET system.

For effective skills development, coordination is needed among development partners, the private sector and government at the local, regional and federal levels. For instance, there is a need to agree on the specialized curricula on agro-processing delivered by the TVET colleges. There also needs to be close cooperation between the Federal TVET Agency, industry and regional TVET agencies where curriculum development is concerned. Moreover, coordination between industrial enterprises and raw input suppliers (mainly farmers) is important to ensure the quality and quantity of the raw materials supplied. Improving the entrepreneurial, agronomic, post-harvest, inputs-handling, storage and shipping skills of farmers requires support from industry, government and NGOs. Where the IAIPs are concerned, the RTCs, when functional, will play a crucial role in linking farmers and agro-processers.

Skills governance at sector level is another important factor. The existing skills governance system already has some sector-based features with, for example, several sets of occupational standards under development. However, this has not previously been the case for agro-processing. More positively, many TVET institutions and universities specialize in specific sectors or sets of sectors. Current developments are strengthening this approach to governance in a number of sectors, including agro-processing. This is evidenced by the creation of Sector Skills Councils (SSCs) to coordinate the efforts of different stakeholders and guide policy, and by the current initiative to create and build up TVET provision targeting the sector, starting with the training of TVET trainers to staff new courses.

4.3. Funding

The implementation of skills development policies and strategies requires access to finance. Investment and capacity development at TVET colleges and universities is constrained by a lack of funds. TVET polytechnic colleges are expected to make a greater contribution and have an important role to play in realizing the country's development vision. However, the system is not adequately resourced. The vast majority of TVET providers operate with outdated and substandard equipment and facilities, and with poorly qualified training staff. Providing sufficient resources to redress this problem is vital if quality training is to be provided and the mismatch between the skills of graduates and the needs of employers is to be addressed. A large share of funding comes from the Government, amounting to about 5 per cent of all public spending on education (GIZ, 2018).

Currently, TVET provision focused specifically on agro-processing is in preparation, meaning that even more resources will be needed annually than would be required if provision were already well established. Investing in machinery and equipment, buildings, laboratories, curriculum development and trainer skills is challenging but important. Substantial

government investment is needed, but there is also considerable scope for investment by development partners. Moreover, partnerships with local employers could led to local solutions. For example, practical components of training could be delivered on employers' premises. There is also scope for synergies with RTCs and IAIPs, for example by sharing facilities, and by TVET centres providing services to RTCs and IAIPs or the businesses they host.

Our enterprise interviewees and workshop participants highlighted a lack of funding for the training of existing workers as a barrier to skills upgrading. However, not all employers wish to provide their employees with certified external training for fear that they will lose such workers to other companies.

Training delivered by NGOs and private TVET colleges is an important part of the TVET system as a whole but limited for agro-processing, with almost no private TVET colleges running agro-processing training programmes. However, some private TVET institutions, such as Tegbare-Ed, provide training in related fields, such as machine maintenance and repair, albeit not specific to the agro-processing industry.

Government, firms, NGOs and development partners are therefore all have an important part to play in skills development by providing facilities, machinery, laboratory equipment and the necessary financial support, even though they have been unable to provide sufficient resources to date.

4.4. Relevance of curricula and qualifications

The development and delivery of relevant curricula requires close cooperation between education/training providers and industry. However, such cooperation is currently limited. While occupational standards are periodically updated with input from industry sources, the curricula delivered in TVET institutions are often out-of-step with industry's skills needs. Compliance with an occupational standard is sometimes regarded as sufficient, whereas, to be relevant, curricula need to be tailored to take account of ongoing industrial developments and local priorities. As Ethiopia's industries are changing rapidly, even occupational standards well matched to the skills needed when they were developed can be out of date within a few years, making curricula based on them less relevant.

It is therefore important to promote and establish dialogue and cooperation between education providers and industry to make training content more relevant and to facilitate pathways into employment for TVET and higher-education graduates.

In particular, all the key stakeholders (Ministry of Higher Education and Science; local, regional and federal TVET agencies; TVET institutions and universities; industrial enterprises) need to be actively involved in curriculum development, to ensure that trainees' skills match technological progress in the agro-processing industry.

One of the main reasons why almost no TVET institutions or universities provide training in agro-processing is the lack of cooperation among the key stakeholders on curriculum development. There is therefore a pressing need for cooperation among university and TVET managers, lecturers and the industry in the area of curriculum design, implementation and monitoring so as to strengthen their sense of ownership of agro-processing programmes.

4.5. Delivery and assessment practices

Evidence from the sample industry survey and the STED Technical and Policy Workshop indicates a need to boost the practical component of courses beyond what is currently practised in the TVET system. In theory, this can be achieved through practical work at TVET institutions and work-based learning on employers' premises. In practice, the equipment at TVET institutions is usually insufficient to support relevant learning, the trainers' skills and industry knowledge is often insufficient, and the work-based learning component of courses is usually neglected or well below standard duration.

At university level, these same deficiencies are present but less acute.

4.6. Access to training

Creating the skills development infrastructure to supply the skills needs of the agro-processing industry will benefit a number of groups that are often disadvantaged in the labour market. Whether agro-processing enterprises are based in IAIPs or in other locations, they will recruit large numbers of young people, especially from rural areas. Developing supply chains for IAIP-based enterprises will stimulate development of RTCs, which will in turn stimulate the delivery of training for rural enterprises and workers at the RTCs themselves.

Making TVET in agriculture and food processing more generally available will result in relevant courses being delivered by TVET colleges in rural woredas and may boost the number of young people – both women and men – from rural areas who achieve a TVET qualification. On average, this will improve their long-term labour market prospects, whether they are employed in agro-processing or other occupations.

Boosting continuing learning, whether in-company, at TVET colleges or universities or in the community (e.g. at an RTC), will particularly benefit workers with low skills, who are at the greatest risk of being left behind. It will also benefit women, who are employed in significant numbers in agro-processing industries but tend to be more concentrated in lower-skilled occupations, by providing them with a path to higher skills, greater productivity and, potentially, career advancement.

4.7. Industry/training institution linkages and support for workplace learning

The linkages between industry and the TVET-level education and training providers that supply industry with skills are generally weak, and this is as true for agro-processing as for other industries.

Close linkages between TVET institutions/universities and industry are crucial to the quality and relevance of training. They can have practical application in providing work-based learning for trainees in the form of apprenticeships and internships; providing workplace experience for educators; organizing workplace tours; arranging for work shadowing; inviting industry representatives to speak at education and training institutions; providing industry mentoring for trainees and students, and industry experience and mentoring for educators; running short courses or participating in the mainstream courses of training providers; and training managers and team leaders as mentors. At a more systemic level, industrial enterprises can be represented on the governing and advisory boards of education and training providers, and participate in updating and revising curricula. There can also be collaboration on recruitment, for example by organizing campus recruitment fairs.

Currently, relatively little of this sort of collaborative activity occurs in the relationships between the agro-processing industry and the TVET sector in Ethiopia. While all of these potential areas of collaboration could benefit both sides, the lack of effective apprenticeship and internship arrangements is a particular problem. It impacts negatively on the quality and relevance of the skills acquired by TVET students on the courses not specific to agro-processing that currently serve the industry, and is likely to continue to be a problem for the new sector-related TVET courses planned for the future.

Information gleaned from industry interviews indicates that there are a number of difficulties in organizing apprenticeships and internships. These include the commitment and effort required to support these arrangements. A specific difficulty mentioned in a number of cases was the risk that a trainee might damage important production equipment while learning, thus disrupting production. This is an important issue because the shortage of skills in maintenance and repair makes damage to equipment and machinery especially disruptive in the Ethiopian agro-processing context.

5. Vision for the future of the sector

Ethiopia has the ambition to become a leading manufacturing hub in Africa. The Government expects to realize this vision by promoting and integrating light-manufacturing industries that are labour-intensive, using agricultural products as their main inputs.

Agro-processing is one of the light-manufacturing industries that has received significant government attention. This industry is seen as presenting the country with an opportunity to achieve its industrial development goals, thereby accelerating general economic progress. In its plans for the sector, expressed in GTP-II, the government strategy is to promote exports and replace imports with home-grown products. In particular, the objective is to increase production and productivity, and attract domestic and foreign investment, with the ultimate aims of increasing export revenues, creating job opportunities in the sector and accelerating the economic transformation of the country.

Integrated agro-processing industrial parks (IAIPs) are regarded as key to developing the industry. The purpose of IAIPs is to attract investment into the sector. This will add value to agricultural products and ensure the prosperity of farmers by linking them with processing plants, as well as reducing post-harvest losses and accelerating rural economic growth. The main activities of the IAIPs include final processing, storage, packaging, marketing and distribution.

The STED workshop participants echoed this positive vision for the agro-processing industry as a key source of export earnings, import substitution and employment. They also viewed the IAIPs as an essential aspect of a big-push approach to developing the agro-processing industry. They saw them as a positive sign of the Government's commitment to supporting the sector. It is also hoped that the rural transformation centres (RTCs), intended to work hand in hand with the IAIPs, will boost technology transfer to farmers. The IAIPs are expected to attract large multinational companies that will enhance the Ethiopian brand in agro-processing worldwide. Moreover, technology transfer to local enterprises linked with the large IAIP-based companies is expected to boost the productivity and competitiveness of the industry as a whole. The training delivered by large firms at the IAIPs will boost the skills pool available to the agro-processing industry in general. The plan to provide agro-processing training in TVET colleges to meet the needs of the IAIPs is also expected to address some of the current shortages in skills supply.

6. Gaps in the capabilities and skills needed to realize the vision for the future

There are several factors that hinder the operation of agro-processing businesses at a fully productive and competitive level.

6.1. Business capability gaps in the agro-processing industry

Business capability enables a firm to operate and compete successfully. A business capability gap exists where a firm's level of capability is inadequate to deliver on its vision for the sector's future.

Firms and other stakeholders in the sector were asked about business capability gaps during interviews, and the issue was further discussed at the STED Technical and Policy Workshop. Consultations for a "Skills Need Assessment and Gap Analysis" report on the sector conducted by GIZ (2019) also focused on this question, with generally similar findings. The main business capability gaps identified were as follows.

- Raw materials and supply chain. Across all subsectors, businesses that rely on sources of supply from within Ethiopia find supplies unreliable and inconsistent in quality, often causing them to operate below capacity and raising issues of quality in their manufacturing processes. Many rely on imports for inputs that could potentially be supplied from within Ethiopia and, here too, there can be issues with the quality, cost and continuity of international supplies. For the future, there is a need to shift from what are often ad hoc relationships with suppliers to more stable supply-chain arrangements, and to develop the capabilities of agricultural producers and intermediaries. The system of RTCs and IAIPs is designed to facilitate these developments, as are investments in enterprises of significant scale.
- Product development and technology transfer. The sector is primarily focused on producing and selling lightly processed agricultural products. If it is to add more value and diversify its markets, it will have to add more heavily processed products to its portfolio, which will involve both the inward transfer of production and food technologies and original work on product development.
- Marketing and sales. An important opportunity and challenge for the sector is growth in domestic demand for processed foods, much of which is being supplied from abroad. If the sector is to be successful in achieving its vision, it will have to become more effective

in competing with imports at the higher-added-value end of its domestic market, both to increase sales directly and to build a platform for future exporting.

- Logistics and cold-chain management. The operation of supply chains and the quality of raw materials depends heavily on transport and logistics between producers and processors. Cold-chain equipment and infrastructure is important for many types of agricultural input, both in preserving quality while in transit and in storing perishable products so that they need not be processed immediately. Better logistics and cold-chain management is therefore necessary for the future of the sector in connecting Ethiopian producers to processors, imported supplies to processors, and processors to domestic and export markets.
- Productivity and quality in manufacturing. There are many difficulties relating to productivity and quality in Ethiopia's agro-processing activities. Much of the sector relies on out-of-date technologies, while production management systems are uneven in quality and effectiveness. Skills across a range of occupations lag behind those of international competitors. There is a particularly obvious problem with equipment maintenance, which results in production-line failures, interrupts production and wastes improperly processed raw materials.
- Compliance with standards of hygiene and food safety. The sector's level of compliance with food safety standards is a barrier to exporting, especially to the EU, which is very demanding where documentation is concerned. As regulatory requirements and consumer expectations are in the ascendant everywhere, compliance with standards will be important when it comes to selling in international markets, and even in the domestic market as the years go by. A better monitoring, testing and enforcement system will be needed, covering both public regulations and in-house processes.
- Social and environmental compliance. The sector's future development hinges in part on how responsible it is perceived to be by the Ethiopian public and by international customers. The sector will need to be seen as socially responsible, offering decent work to its direct employees and fair opportunities to its domestic suppliers. It will also need to improve its environmental compliance, especially as regards the sustainable use of resources and waste management. As packaging practices change globally, it will need to adjust so as encourage recycling and limit the impact of packaging waste.
- Talent (people) management: A key challenge facing the sector is to move from a people management model based on low skills, low pay and often low commitment to a model that aims to raise skills, productivity and commitment, and reward workers with decent work and decent pay. One of the keys to this is to reform people management practices and the attitudes inculcated by managers at all levels in their HR management functions.

Table 4 sets out existing business capability gaps and their implications for skills.

Table 4: Business capability gaps and main skills implications

Business capability gaps	Skills implications for main occupations, measures and personnel required
Raw materials and supply chain	• Train farmers in modern harvesting, storage, and packaging techniques • Provide farmers with information on farming methods and fertilizers. This can be done by agricultural extension workers with adequate skills and by RTCs • Deliver regular training to farmers on hygiene and food safety
Product development and technology transfer	• Need for first and graduate degrees in food sciences, food technology and engineering, and food marketing • Advanced degree holders in mechanical engineering are needed for machine maintenance • Strengthen sector-related development institutes such as the EFBPIDS and the EMDIDI to make them hubs for skills and technology transfer
Marketing and sales	• Intermediate (TVET 1-5) and advanced degrees (university level) required in food marketing • Intermediate (TVET 1-5) and advanced degrees (university level) required in packaging and logistics • Experience required in export marketing of food and beverages
Logistics and cold-chain management	• Intermediate and advanced degrees required in logistics and supply-chain and storage management for effective interaction with farmers and intermediaries (upstream) and with domestic and global wholesalers and consumers (downstream)
Productivity and quality in manufacturing	• Intermediate (TVET level) and advanced (university level) technicians and engineers required for production and maintenance • Quality control and assurance technicians needed • Production managers required specializing in food, beverage, diary and meat processing
Compliance with standards on hygiene and food safety	• Laboratory technicians • Food scientists • Trainers to delivery regular training to staff at all levels regarding hygiene and food safety
Social and environmental compliance	• Lawyers specializing in labour issues and union management who can ensure that health and safety procedures are implemented and documented • Environmental scientists aware of national and international environmental compliance requirements who can ensure they are respected • Industry waste management professionals and specialists in public health and fields such as occupational safety, industrial hygiene, toxicology, chemistry and biology
People management	• Intermediate and advanced degrees in HR management • Labour-relations specialists • Training and development managers

6.2. Core skills

In addition to advanced technical skills, core skills are also required if workers are to operate effectively and efficiently. Though often overlooked, core skills play an important role in the development of any industry. Core skills can be defined as character traits and interpersonal skills that characterize a person's relationships with others. They include communication skills, critical thinking, interpersonal skills, time management, leadership capabilities and adaptability. Communication and leadership skills are particularly important in creating an environment conducive to work. During our discussions with the sample enterprises and the Enterprise and Industry Bureaus of Amhara and Oromia Regional States, it emerged that soft skills pose serious problems. Workers in agro-processing often exhibit weak communication skills, poor time management, a lack of discipline and inability to work as part of a team.

Despite their importance in the workplace, core skill are overlooked in academic curricula, which focus mainly on developing students' technical skills. It is therefore extremely important to introduce soft skills (punctuality, constructive thinking, leadership and communication) into the curriculum. Work needs to be done at the grassroots (primary and secondary school levels) to improve the soft skills of future workers.

6.3. Management skills

Agro-processing products are dynamic in nature due to intense competition, high levels of regulation, technological progress and consumer demand for an ever-greater variety of goods. This puts a premium on management skills across all stages of operation, from raw materials procurement, through processing operations, to marketing. The following are some of the management-level occupations requiring intensive attention where skills development is concerned.

Human resource management. HR management is one of the most important and in-demand occupations in manufacturing industry. HR management refers to the administrative activities associated with recruiting and screening job applicants, employee relations, performance management, and the remuneration and benefits of workers. HR managers are also responsible for the leadership of an organization, workforce planning, training and skills development. Given the diversity of workers in the industry in terms of age, sex, attitude to work and discipline, HR managers have an important role to play in ensuring a decent work environment (a healthy, skilled and adaptable workforce) and thereby improving the productivity of the sector.

An effective HR manager needs skills and competencies in business management and leadership, human capital development, communication, strategic planning, and the development of a positive workplace culture.

Production management and planning. One of the important tasks of production management is production planning and control. This involved the coordination of a series of functions, ensuring the economical use of plant facilities and regulating the movement of goods through the entire production cycle, from input-receiving to the packaging and shipping of final products.

6.4. Production skills

The agro-processing industry is highly dependent on workers with the technical skills to operate at full productive level, as well as to produce high-quality standardized products. In Ethiopia, however, the absence of TVET colleges that provide training in agro-processing (at lower and intermediate levels) presents a major challenge. In the following paragraphs, we discuss the main technical skills required by agro-processors.

Production operators. Production-operator skills are necessary for the efficient production of high-quality processed agricultural products. The skills concerned are key to using machines and equipment effectively. In biscuit production, for instance, technical skills are required for mixing inputs (flour, fat, sugar, water and other ingredients), forming, baking, and cooling the finished biscuits. However, hardly any training/education institutions provide training in technical skills of this kind. Hence, the vast majority of enterprises have difficulty in recruiting staff with the required qualifications. Some agro-processing factories recruit unqualified workers or graduates with related qualification and give them short-term in-house training before they go onto the production line. However, most of firms are reliant on experienced workers, especially in the production and/or packaging of food products (cheeses and dairy products, ice-cream, fresh-cut and dried meats, bread, biscuits, sweets). There is also an acute need for food product and packaging technologists, who are in very short supply.

Machine maintenance and repair: Workers in this occupation are responsible for ensuring that machinery is working properly, setting machines before use and keeping the equipment in continuous operation. Maintenance and repairs must also be carried out in compliance with food hygiene requirements to ensure that food is safe when production resumes. Unfortunately, this skills set is not well developed in the agro-processing industry and the shortage of skilled workers can lead to production inefficiencies. According to the qualitative survey conducted in sample enterprises in Amhara and Oromia regional states, nearly half of the workers employed there required additional training in machine maintenance and repair. In some cases, firms use expatriates to repair and maintain machinery, which is naturally expensive. This highlights the importance of training people in the maintenance and repair of equipment specific to the different subsectors (food, beverages, dairy and meat) of the agro-processing industry.

Production engineers and scientists. This is a multidisciplinary field combining microbiology, applied physical sciences, chemistry and engineering. Specialists in these areas are essential to ensure efficient and reliable production. Qualifications are therefore required in food processing, food machinery, packaging, ingredient manufacturing, instrumentation and control, drug/food products, the design and installation of food/biological/pharmaceutical production processes, the design and operation of environmentally responsible waste treatment systems, and marketing and technical support for manufacturing plants. There is a great shortage of staff skilled in these occupations and even those who are available have critical skills gaps as they lack practical experience and so fail to meet firms' expectations where quality is concerned.

6.5. Safety/compliance skills

Safety, hygiene and quality control. In this era of globalization, there is increasing consumer concern that food and beverages be safe and of high quality. To be competitive at both national and international level, it is therefore critically important to ensure the safety and quality of agro-processing products. It is imperative to ensure food/beverage safety in preparation, handling and storage to minimize the risk of food-borne illness and other health hazards. In addition, there is a need for facilities- and machine-management skills on the part of both managers and workers to improve workplace safety. This occupation therefore requires skilled workers with qualifications in safety, hygiene and quality control for each subsector. Unfortunately, the education system does not currently produce safety, hygiene and quality-control specialists who can be reliably employed in the agro-processing industry. The qualitative survey results showed that more than one-third of the workers concerned required additional training, and this was aggravated by the fact that graduates with related qualifications were not well equipped with practical skills. This occupation therefore needs a great deal of attention, particularly as food/beverage products are very sensitive to safety and quality issues. Besides improving workers' skills, the Government needs to improve legal enforcement to ensure that firms comply with safety, hygiene and quality-control standards.

Laboratory testing. Testing is important to ensure that products are of high quality, safe and free from contamination. However, the country suffers from a lack of laboratory technicians. Graduates in food-production biochemistry and microbiology, for instance, are in short supply. The sample enterprises stated that was very difficult to recruit skilled applicants with the required qualifications. That may partly explain the poor competitiveness of Ethiopian agro-processing firms as their products are substandard as compared to those of competitor countries.

Compliance skills. Compliance and quality assurance are becoming ever more critical, as is the traceability of products. Compliance means applying and following national and

international requirements in terms of standards, regulations and other specifications related to the manufacturing of food and beverages. Skills in this discipline are needed to ensure that a factory is doing business in full compliance with the local, national and international laws and regulations pertaining to the industry. This is especially the case given the dynamics of regulatory requirements relating to labelling, record-keeping, the origin of ingredients and the packaging of food/beverage products. Food/beverage operators must therefore have complete oversight and control of product development in order to be compliant and to manage product information easily and efficiently. Government commitments to green industrialization mean that enterprises will have to conform to environmental and social standards. This is necessary if they are to be more competitive internationally as there is increasing concern among consumers about environmental and labour-related issues.

Where environmental issues are concerned, is also important to ensure that firms comply with national and international standards. In particular, knowledge and skills relating to the discharge of chemicals are required in the agro-processing industry, and firms need support in this area in terms of training and capacity-building.

6.6. Logistics/distribution skills

Logistics and distribution managers play a key role in organizing the safe and efficient storage and distribution of goods, and ensuring that orders are carried out efficiently and on time. Distribution and logistical skills are of vital importance, given that some agro-processing products have a short lifespan. In the following paragraphs, sales, marketing and logistics management skills are briefly discussed.

Sales and marketing management. Responsiveness to a rapidly evolving market is key to remaining competitive in agro-processing. Highly skilled sales and marketing managers are required to cope with changing economic circumstances, establish good customer relations and sales partnerships, and devise a strategic approach to selling. Good marketing communications (in customer service, selling, negotiating and influencing, advertising, sales promotion and publicity), as well as shrewd use of marketing intelligence, are particularly important. As well as being generally responsible for the development and implementation of an organization's sales activities, sales and marketing managers play a vital role in identifying and anticipating the needs of current and potential customers, developing new solutions to fulfil those needs, and drawing up strategies to update an organization's products or services. To date, firms operating in agro-processing have not fully exploited the domestic market, which could be partly explained by skills gaps in sales and marketing.

Logistics Management. Logistics is concerned with transporting inputs to processing facilities and delivering end products on time. Logistics management is important in planning and

controlling the flow and storage of agro-processing products from the point of origin to the point of consumption so as to meet customer requirements. Most manufacturing firms are constrained by logistical problems due to the long distances to ports and delays in customs handling and clearing.

6.7. Further challenges

In addition to skills deficiencies in the sector, our review of existing materials and discussions with key stakeholders evidenced a number of other constraints worth mentioning before we conclude this section. While the agro-processing industry is on a rising trend and likely to grow more rapidly in the coming years, there are significant factors that hinder its development. In the interests of brevity, we present just three of the key challenges here.

Shortages and quality deficiencies in raw materials. A large number of firms rely on imported raw materials due to shortages and the poor quality of domestic sources of supply. This can be partly explained by smallholder farmers' lack of skills in the production, storage, packaging and shipping of inputs. Quality problems with milk products, for example, are mainly due to deficiencies in packaging and logistics. Linkages between producers and processors leave much to be desired in most agro-processing value chains, which makes it difficult to establish a stable flow of raw materials to meet the needs of processors. Part of the logic of establishing IAIPs and RTCs is to address this issue.

Low productivity. Ethiopia's agricultural sector is characterized by low productivity. For instance, the Government had planned to improve livestock productivity under GTP-II, but so far achievement lags well behind the set targets. This is mainly due to the low genetic potential and productivity of indigenous breeds, limited use of more advanced technologies, a weak institutional framework, a lack of quality enhancement measures, and inadequate credit facilities. The agro-processing industry is also characterized by low productivity, caused by the poor supply of suitably skilled labour at all occupational levels, in terms of both quality and relevance of skills and the numbers of skilled workers available. The deficiencies are apparent in both technical and core employability skills. There are also difficulties with the cultural fit between the demands of efficient and flexible manufacturing industry and a workforce drawn from non-industrial backgrounds.

Shortages of equipment and machinery for training purposes. In all TVET colleges and in the sectoral development institutes, such as the Ethiopian Food, Beverages and Pharmaceutical Industry Development Institute (EFBPIDI) and the Ethiopian Meat and Dairy Industry Development Institute (EMDIDI), there are serious shortages of laboratory equipment and machinery for the delivery of training.

7. Recommendations on meeting priority skills needs and filling gaps

The agro-processing industry currently faces a shortage of skilled workers in terms of both quality and quality due to skills mismatches and the lack of relevance of training. Based on the findings of the previous sections, these recommendations are made as a way of narrowing the skills gaps identified.

The TVET system does not at present provide training in agro-processing, except at a pilot level in two TVET colleges. The industry therefore relies on workers who have training in related fields or whose skills have been developed through experience.

Currently, the TVET system faces a range of challenges, and simply introducing training programmes in agro-processing will not by itself be sufficient to produce graduates with the required skills. The aim of our recommendations is therefore to address the basic problems in the TVET system as they relate to the agro-processing industry. In particular, they focus on enhancing the quality and relevance of training for the sector; improving the recruitment and training of unqualified workers; strengthening continuing training so as to upskill workers, facilitate career progression and improve business performance; and improving systems for the quantitative and qualitative analysis of skills needs.

A Sector Skills Committee (SSC) is currently being established to ensure demand-driven education and improved industry-education linkages. One purpose of the SSC for agro-processing is to support skills training. It is envisaged that these recommendations will be used by the SSC and by sector stakeholders and partners.

In the following sections, we address the issues as they relate to core skills, management skills (supervisory, middle and higher-management), production skills (operators, quality control and maintenance), and systemic/cross-cutting skills.

7.1. Core skills

- **Introduce formal pre-employment core employability skills[7] training** Pre-employment and soft skills training is important in preparing recruits without a formal employment or industrial background for employment in the sector. While core skills are important for employees at all levels, they are particularly relevant for operator-level workers.

[7] While the term “soft skills” is used frequently by agro-industry sector stakeholders, “core skills” or “core employability skills” are the terms usually used by the ILO.

- **Develop a standard core-skills training curriculum.** The various actors concerned with core (soft) skills training for the agro-industry sector should work together to review, improve and standardize pre-employment soft-skills training provision. A standard soft-skills training curriculum should be developed.
- **Embed core skills in occupational standards and TVET curricula.** Occupational standards should be designed to take into account core skills, and training in core skills should be embedded in all agro-industry-related curricula, where possible. Since courses in agro-processing are currently under development, with pilot training programmes being run in two colleges, it is important to embed core skills from the outset.
- **TVET colleges should provide short-term pre-employment core-skills training, particularly for workers recruited to work in IAIPs.** Enterprises based at IAIPs should be able to contract TVET colleges in the locality and ask them to provide short-term training in core skills for new employees, particularly at operator level.

7.2. Management skills

- **Improve systems for developing middle-level management:** The skills of local recruits into supervisory and team leadership roles in the industrial sector in Ethiopia, including agro-processing, are still inadequate. Currently, enterprises promote operators to middle management roles, but they lack the requisite skills, especially in the key people-management aspects of the work. Effective middle-level management is crucial for worker retention, good industrial relations, productivity, and worker wellbeing.
  - **Introduce a supervisory management training programme for the sector.** High-quality supervisory management training should be made widely available for existing workers preparing to take up supervisor roles, and for those already in supervisory roles who need formal training to improve their skills. The training should combine a formal taught component with a structured work-practice component delivered in the workplace.
  - **Include a supervisory management component in upper-level TVET agro-industry courses.** The pilot training programmes at Holeta and Wukro do not include supervisory and team-leadership modules. There is a need to mainstream these subjects in TVET courses designed for the sector at Level 3 or higher, while university courses designed for the sector should include at least a supervisory management or team-leadership module. Even where the main content of the course is technical, it should be borne in mind that many jobs at this level include supervisory responsibilities, and career opportunities in the sector are likely to involve supervision.

- **Strengthen training for management and professional occupations.** Universities running bachelors' and masters' courses with specialized agro-industry components should provide training for skills in higher-level production management, production engineering, general management, human resource management, sales and marketing management and logistics, and social and environmental management compliance, both initially and on a continuing, part-time basis. The EFBPIDI and the EDIDI should organize short on-the-job management training and continuing training programmes.

7.3. Production skills (operator, quality control, and maintenance)

- **Roll out TVET training for operators in most TVET colleges in the country, especially those in the vicinity of IAIPs.** Following a critical review of the pilot training courses in agro-processing at Holeta and Wukro, expand the training to most colleges, as the industry is implanted throughout the country.
- **Review and implement good practices in labour-sourcing and grading centres.** There are currently no sourcing and grading centres for the agro-processing industry. Lessons learned from the labour-sourcing and grading centre at Hawassa Industrial Park could be applied in all IAIPs.
- **Strengthen the quality of TVET training** for machine operators, quality-control and laboratory technicians, and maintenance technicians. Similarly, strengthen university training in production engineering, particularly industrial and mechanical engineering.
  - **Explore the possibility of offering short-term machine-operator courses at TVET colleges.** TVET colleges located near agro-industry operations should explore the possibility of offering employers short, certified initial training courses for machine operators on a full cost-recovery basis, thus providing an alternative to in-company initial training. This would also enhance collaboration between TVET institutions and employers.
  - **Ensure consistency between TVET modules and the in-house training given to machine operators by employers.** The design of TVET course units should take into account the content and standards of entry-level training for machine operators provided by leading agro-industry sector employers. As these courses also represent a career track into machine maintenance and servicing, graduates should be able to meet workplace standards of machine maintenance to the appropriate level, at least on the machines available to the training provider (and those to which employers might provide access).

- **TVET colleges should begin offering training in machine maintenance, laboratory work and quality control, which is in critically short supply**. There is currently no training provision at TVET level in machine maintenance, laboratory work and quality control as applied to agro-processing. The IAIPs will soon be operational, so there is an acute need to begin providing training in these skills at TVET level (in collaboration with industry for practical experience).
- **Enhance the quality of food science, industrial engineering and mechanical engineering at university level by making it more practically orientated**. Advanced training in quality control, food safety and maintenance engineering as related to agro-processing should also be given at university level. Effective undergraduate programmes in these fields should be developed and implemented, with the aim of meeting international standards. Courses should include a change-management component that takes account of Ethiopian cultural norms.
- **Strengthen training in food safety and social/environmental compliance**. Little attention is currently paid to food safety and social and environmental compliance in the agro-processing industry. This has severely limited the capacity of enterprises to penetrate the global market. Such training should be provided by universities and high-level TVET colleges (Levels 4 and 5). Actors from the agro-processing industry should be involved in the curriculum design.

More continuing training for machine operators, maintenance technicians, laboratory technicians and quality control and production engineers. The provision of continuing learning for machine operators and production engineers is currently very limited.

- **Provide continuing education for machine operators at TVET colleges.** TVET colleges located near to agro-industry operations should offer certified courses and modules to machine operators on a continuing-education basis, either on their own premises or in the workplace (subject to the employer's agreement). These courses could be designed to enhance the career options of workers by focusing on in-demand skills in such areas as food safety, quality control, maintenance and supervision.
- **Link skills development to strategies to improve productivity.** Employers should build skills development for machine operators into their strategies to improve productivity in areas such as the use of multiple machines, communication and teamwork.
- **Link productivity-related training to the National Qualifications Framework.** National institutions and development partners working at scale with groups of employers to improve productivity should consider structuring substantial blocks of training so that they can be certified under the National Qualifications Framework or through a CoC. They should be assisted in this, where feasible, by the federal and regional TVET agencies and by CoCs.

- **Widen the availability of EFBPIDI and EMDIDI courses at operator level**. The EFBPIDI and the EMDIDI should extend their short-course offerings at operator and other levels beyond the Addis Ababa/Bishoftu area, focusing on large, as well as small and medium-sized, operations. They should also offer recognized certifications, as far as possible.

7.4. Systemic actions cutting across occupational levels

- **Regularly update occupational standards and ensure the participation of the industry players.** Working with regional TVET bureaus and industry players, the Federal TVET Agency has recently developed occupational standards (OS) for the agro-processing industry. These standards were developed and approved less than a year ago. There needs to be continuous involvement on the part of both the domestically owned and FDI parts of the industry in the creation and revision of occupational standards and curricula. This will be particularly important as the sector begins to expand rapidly when all the IAIPs become operational.
- **Develop the skills of teachers in TVET institutions and universities.** The Federal TVET Agency should take measures to raise and certify the skill levels of TVET and university teachers, in parallel with the updating of occupational standards and curricula. Moreover, TVET providers, universities and the Federal TVET Agency should collaborate to develop and implement a system of short ToT courses for TVET and university teachers delivering training designed to serve the sector.
- **Develop partnerships for skills and work placements, while supporting institutional arrangements.** A observed in the pilot agro-processing training programmes in Holeta and Wukro, one of the key challenges for skills development, cutting across all occupational levels, is the need for systematic collaboration between employers and education/training providers in offering structured work placement opportunities for trainees. The Job Creation Commission envisages introducing an industry/training-institution partnership system to strengthen linkages between industry and technical institutes and universities.

A possible way forward is to introduce a system of group training organizations (GTOs), which has been successful in a number of other countries, to address the poor provision of internships and apprenticeships. A GTO hires apprentices and interns and acts as their employer while they are in the workplace, reducing the burden on host employers, fostering coordination between the workplace and the off-the-job training provider, and ensuring quality.

- **Develop partnerships between industry and training providers.** Industry employer groups and education/training providers should establish formal partnerships for their mutual benefit, covering the curriculum; the training of teaching staff; internships and

work placements; continuing education and training; and graduate placement and recruitment. All courses should include a substantial work placement. Recognizing the current difficulties in obtaining sufficient placements, the TVET Agency should also carry out an analysis to identify appropriate models for work-based learning and explore alternatives, such as factory-based learning and simulations. To promote linkages with the industry, it is important to provide cooperative training for students of TVET institutions and universities as well as for teachers, and to offer practical apprenticeships to complement the theoretical knowledge acquired in the classroom. The training should target students who have a keen interest in the agro-processing industry and should be matched with employers' needs. Public-private partnership could play a crucial role in delivering outcome-based cooperative training. A delivery model of this kind would enable students and teachers to become familiar with the technological changes taking place in the agro-processing industry.

- **Pilot a GTO for the sector.** As part of the process of fostering cooperation between employers and TVET institutions in providing work placements, the industry/training provider partnership cell should consider piloting a GTO for the sector. It would focus on piloting apprenticeships and other forms of work-based learning in accordance with the revised occupational standards, initially in one or more mid-level technical occupations.

- **Extend institutional coordination:** The sector has attracted the participation of various NGOs concerned with skills development. The ILO, DfID, GIZ and others have run projects to extend employment services in industrial parks and develop systems for upgrading skills, including projects to establish and support training centres. These are being implemented in various sectors, in particular the textile and garment industry. The UNIDO and the GIZ are working to improve the skills supply in the agro-processing industry. However, there appears to be a lack of coordination between government, industry and development partners, which leads to duplication of effort. The following measures are suggested to address the problem of coordination.

  - **Extend coordination between industry and education/training institutions.** There needs to be close, productive coordination between education/training institutions (universities, TVET colleges, the Ethiopian Agro-industry Industry Development Institute) and industry to generate demand-driven, industry-specific skills. This is the specific task of the Sector Skills Committee for the Agro-processing Industry. The SSC should also coordinate with development partners engaged in skills development for the sector.

  - **Improve the capacity of public institutions.** Develop and implement measures to improve the capacity of the public institutions engaged in regulatory activities and service provision for the agro-industry sector, to equip them with the necessary capacity to implement policies and strategies relating to skills development. Responsibility

for skills in the agro-industry sector is spread across a range of institutions at both national and provincial levels. While the work of most of these is not limited to the agro-processing sector, underpinning the sector's development by meeting its skills needs is a high policy priority. For example, strengthening the EFBPIDI and the EMDIDI will enable these two institutions to become hubs for skills and technology diffusion in the agro-processing industry, while strengthening the agro-processing departments at the Federal Ministry of Trade and Industry and its regional counterparts will help to improve the effectiveness of the agro-processing industry support system.

- **Broaden sources of funding.** Investing in skills has both public and private economic benefits. In the face of high labour turnover, individual employers have less incentive to invest in skills due to the risk of poaching by other firms. In the context of the Ethiopian agro-industry sector, co-financing arrangements are vital for programme sustainability, responsiveness to demand and a sense of ownership of these interventions by private firms.

  - **Increase the budget for agro-processing industry TVET provision.** The government budget for TVET serving the agro-processing industry should be increased, with a focus on strengthening the quality and relevance of provision. Currently, only a limited amount of donor funding passes through the Ministry of Science and Higher Education or the Federal TVET Agency (Channel Two), as most donor funding for training is managed by the donors themselves (Channel Three). Increased Channel Two funding, combined with a clear approach to reporting and evaluation, would improve efficiency and coordination. Similarly, donors could be requested to grant some sort of matching funding to the regions, as TVET colleges are built and managed by regional governments. This would encourage regional governments to invest more in the TVET system.

- **Improve labour market information (LMI) for the sector.** Labour market information is essential for guiding policy, improving decision-making by education/training providers and other stakeholders as regards skills development provision, and informing entrants considering training for the sector. Potential entrants to higher education, including the TVET system, are not adequately informed about the different fields of study and their job prospects after qualifying. This is particularly true of fields relating to agro-processing.

  - **Develop a system for skills analysis and anticipation.** The Government should establish a system for anticipating future skills needs, in terms of both quantity and quality, at overall national level and for different economic sectors. It should aim to develop expertise in skills policy analysis, with the purpose of serving national, regional and sectoral institutions, including the Sector Skills Committee for the Agro-processing Industry and its stakeholders.

- **Provide information for potential entrants to training courses for agro-industry sector occupations.** The Sector Skills Committee for the Agro- processing Industry and sector-related development institutes (such as the EFBPIDI and the EMDIDI) should work together to develop careers information, based on up-to-date LMI relating to the agro-processing sector and its main occupations and should update this information annually. They should communicate the information through a range of channels, in particular through TVET institutions and universities,
- Assist new university graduates in agro-processing-related fields such as food engineering by linking them with agro-processing employers. Job-search assistance of this kind should also be extended to future TVET graduates in agro-processing.

8. References

GIZ (2018). *Employment and Labour Market Analysis (ELMA) Ethiopia*, Deutsche Gesellschaft für Internationale Zuammenarbeit GmbH, Memo.

FDRE, (2002). *Ethiopian Industrial Development Strategy* (Amharic version). Addis Ababa, Ethiopia.

International Trade Center (ITC, 2016). "Textile and Clothing Value Chain Roadmap of Ethiopia:2016-2020", Geneva, Switzerland," Available online at http://www.intracen.org (accessed on 14 April 2019).

International Trade Center (ITC) and UKAID (2016). "Investment Opportunity Study for Ethiopia, Kenya, Mozambique And Zambia", Partnership for Investment and Growth in Africa.

Ministry of Finance and Economic Development (2010). "Growth and Transformation Plan I (GTP-I) (2010/11-2014/15)", Volume I: Main Text, The Federal Democratic Republic of Ethiopia.

Ministry of Industry (MOI, 2013). "Ethiopian Industrial Development Strategic Plan (2013-2025)", Federal Democratic Republic of Ethiopia.

UNIDO (Undated). *Integrated Agro-Industrial Parks in Ethiopia*: https://isid.unido.org/files/Ethiopia/Integrated-AgroIndustrial-Parks-Overview.pdf

National Planning Commission (NPC, 2016). "Growth and Transformation Plan II (GTP-II) (2015/16-2019/20)", Volume I: Main Text, The Federal Democratic Republic of Ethiopia.

Appendix

Table 5 - Firms and stakeholders interviewed

Name	Type	Ownership	Region
Emebet & Her Children Milk Processing	Enterprise/Dairy	Domestic	Amhara
Ethio-california Flour-processing Factory	Enterprise/Food/Flour	Domestic (previously FDI)	Amhara
Minabe Maize and Starch Products	Enterprise /Coffee	Domestic	Amhara
Unique Macaroni and Flour Factory	Enterprise/Food	Domestic	Amhara
Enabe Coffee Processing	Enterprise /Coffee	Domestic	Amhara
Abeba Biscuit Factory	Enterprise/Food	Domestic	Amhara
Bereket Flour Factory	Enterprise/Food/Flour	Domestic	Amhara
Choice Flour Factory	Enterprise/Food/Flour	Domestic	Amhara
Misgana Candy Factory	Enterprise/Food	Domestic	Amhara
YGK Food-processing Industry	Enterprise/Food	Domestic	Amhara
Ahadu Food Products	Enterprise/Food	Joint venture	Oromia
Ad'a Food Complex	Enterprise/Food/Flour	Domestic	Oromia
Two Brothers Food Complex	Enterprise/Food	Domestic	Oromia
Abyssinia Abbatoire	Enterprise/Meat	Domestic	Oromia
Leos Edible Oil and Soya Products	Enterprise/Food/Oil	Domestic	Oromia
EMDIDI	Gov. Agency		Federal
Oromia Regional Centre of Competency	Gov. Agency		Oromia
Oromia TVET Bureau	Gov. Agency		Oromia
Regional TVET and Enterprise Dev Agency	Gov. Agency		Amhara
Amhara Regional Centre of Competency	Gov. Agency		Amhara
Amhara Industry and Investment Bureau	Gov. Agency		Amhara
Amhara TEVET and Enterprise Development Bureau	Gov. Agency		Amhara
EFBPIDI	Gov. Agency		Federal
Holeta Polytechnic College	TVET		Oromia

Table 6 - List of STED workshop participants

	Name	Organization	Position
1	Bizuayehu Dubale	AICS	Asso. Programme Manager
2	Kasahun Taye	Amhara Industry and Investment Bureau	Agro-processing Director
3	Fekadu Gezahegn	CETU	Expert
4	Haymanot Ashenafi	EIC	Planning Expert
5	Assefa Mekonnen	AICS	Supplies Consultant
6	Girum Abebe	Policy Studies Institute	Lead Researcher
7	Tesfaye Amare	Chamber of Commerce	Research Expert
8	Teklewongel Kassaye	ECCSA	Senior Researcher/Adv. expert
9	Ediget Alebel	Amhara Industry parks	Human Resource Expert
10	Teshale Berecha	Federal TVET Institute	Director General
11	Jibril Hadji	Econ Insight	Research Assistant
12	Fekadu Nigussie	EIC	Project Manager
13	Belinda Smith	ILO	Consultant
14	Federica Labgadia	Italian Cooperation	TVET Coordinator
15	Diriba Legesse	CETU	I/R and Org. Head
16	Tadesse Guta	EMDIDI	Deputy Director General
17	Ayaelw Asfaw	EMDIDI	Dairy Technologist
18	Muluneh Woldekidan	UNIDO	Technical Expert
19	Helen Peth	ECCSA	Research Expert
20	Evelien Blom	GIZ	STEP Agro-processing
21	Yemisrach Gebru	ECCSA	Associate Research Expert
22	Sergio Irierte Qvezada	ILO	Global Coordinator
23	Yeferawork Ayene	FeSMMDAF	Director
24	Dagnachew Gebeyehu	EFBPIDI	Assistant Researcher
25	Fasika Genzebe	GIZ	STEP Agro-processing
26	Sewharge Adugna	ECCSA	Consultant
27	Con Gregg	ILO	Consultant
28	Alemayehu Zewdie	ILO	NPC
29	Shiferaw bejie	ILO	FAA
30	Gadisa Desalegn	Farm Federation	Labour Org. and PR Dept. Head
31	Tsegay G Tekleselassie	Policy Studies Institute	Lead Researcher
32	Hamid Hussie	Federal TVET Agency	Expert
33	Demire	EMDI	

ISBN: 9789220380048