Wheat Sector Development Strategy
# Table of Contents

LIST OF FIGURES ................................................................................................................................... III

LIST OF TABLES ...................................................................................................................................... III

LIST OF ACRONYMS ................................................................................................................................. IV

EXECUTIVE SUMMARY ............................................................................................................................ 1

CHAPTER 1. INTRODUCTION ..................................................................................................................... 8
1.1. Purpose and scope of the strategy ........................................................................................................ 8
1.2. Overview of the wheat sector in Ethiopia ............................................................................................ 8
1.3. Gender roles in wheat production ........................................................................................................ 12
1.4. Strategy development approach .......................................................................................................... 15
1.5. Major stakeholders of the wheat sector .............................................................................................. 15

CHAPTER 2: VISION, GOAL, SYSTEMIC BOTTLENECKS AND INTERVENTIONS .......................... 16
2.1. Overall vision and goal .......................................................................................................................... 16
2.2. Research and technology goal ............................................................................................................ 17
  2.2.1. Strategic goal for research and technology development ............................................................ 17
  2.2.2. Systemic bottlenecks ...................................................................................................................... 17
  2.2.3. Strategic interventions .................................................................................................................. 21
2.3. Access to inputs .................................................................................................................................... 24
  2.3.1. Strategic goal for input production and distribution ..................................................................... 24
  2.3.2. Systemic bottlenecks ...................................................................................................................... 24
  2.3.3. Strategic interventions .................................................................................................................. 30
2.4. On-farm production .............................................................................................................................. 37
  2.4.1. Strategic goal for on-farm production ......................................................................................... 37
  2.4.2. Systemic bottlenecks ...................................................................................................................... 37
  2.4.3. Strategic interventions .................................................................................................................. 39
2.5. Post-harvest processing and storage ..................................................................................................... 43
  2.5.1. Strategic goal for post-harvest processing and storage ............................................................... 43
  2.5.2. Systemic bottlenecks ...................................................................................................................... 43
  2.5.3. Strategic interventions .................................................................................................................. 43
2.6. Trade, marketing, and demand sinks ..................................................................................................... 44
  2.6.1 Strategic goal for trade, marketing and demand sinks ................................................................. 44
  2.6.2. Systemic bottlenecks ...................................................................................................................... 44
  2.6.3. Strategic interventions .................................................................................................................. 46
2.7. Summary of bottlenecks and interventions ........................................................................................ 48
CHAPTER 3: IMPLEMENTATION ........................................................................................................... 50
  3.1. Implementation framework ........................................................................................................... 50
  3.2. Sequencing of Interventions ......................................................................................................... 50
  3.3 Partner institutions ........................................................................................................................ 52

CHAPTER 4: MONITORING, LEARNING, AND EVALUATION (MLE)...................................................... 54
  4.1. Impact and outcome indicators .................................................................................................... 54

CHAPTER 5. POTENTIAL CHALLENGES IN THE IMPLEMENTATION OF THE STRATEGY AND MITIGATING MEASURES ........................................................................................................... 56

CHAPTER 6. WHEAT SECTOR STRATEGY REVIEW ............................................................................... 57

ANNEX 1: MAJOR STAKEHOLDERS OF THE WHEAT SECTOR ............................................................. 58

REFERENCES ......................................................................................................................................... 63
List of Figures

Figure 1: Trend of wheat import in Ethiopia ................................................................. 2
Figure 2: Domestic wheat production and marketable surplus ..................................... 2
Figure 3: Prioritization of interventions proposed within the wheat sector strategy .......... 7
Figure 4: High wheat producing zones in Ethiopia (%) ................................................. 9
Figure 5: Major wheat producing zones of Ethiopia ..................................................... 9
Figure 6: Land area under wheat production, compared to other cereals ....................... 11
Figure 7: Ethiopian wheat production growth relative to all cereals, 2003-2012 .................. 11
Figure 8: Wheat Productivity relative to all cereals .................................................... 12
Figure 9: National variety testing sites for wheat ......................................................... 14
Figure 10: Wheat initiative woredas relative to location of wheat flour mills in the country 14
Figure 11: Strategic goals of each component of the wheat value chain ....................... 16
Figure 12: Top yielding wheat varieties in Ethiopia, with their rust resistance properties 17
Figure 13: Proportion of durum wheat varieties released relative to bread wheat from 1970-2012 19
Figure 14: Cultivated area coverage of top cereals by certified and informal seed, '000s of hectares in 2010 25
Figure 15: Proposed inputs delivery channel ................................................................ 33
Figure 16: Alternative Inputs Credit Delivery System ................................................... 35
Figure 17: Local Wheat Production and Marketable surplus Vs. Millers Demand for Wheat 45

List of Tables

Table 1: Major wheat producing zones and their relative contribution to national production 10
Table 2: Men and women labor division in agricultural activity at Bure, and Ada’a Libon, woredas 13
Table 3: Yield loss levels of bread wheat variety, Digalu, at three stem rust epidemic districts of Bale zone, meher season, 2013. 18
Table 4: Attrition rate of researchers across the federal and regional research institutes from 2008-2012 20
Table 5: Estimated number of holders who used improved wheat seed and area covered by improved wheat seed for meher season of private holdings from 2006-2012 25
Table 6: Summery of goals, bottlenecks and interventions along the value chain components 48
Table 7: Prioritization and sequencing of strategic interventions 50
Table 8: Key actors in the wheat value chain 52
Table 9: Performance indicators 54
### List of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACDI/VOCA</td>
<td>Agricultural Cooperative Development International/Volunteers in Overseas Cooperative Assistance</td>
</tr>
<tr>
<td>ACSI</td>
<td>Amhara Credit and Savings Institution</td>
</tr>
<tr>
<td>ADB</td>
<td>African Development Bank</td>
</tr>
<tr>
<td>ADPLAC</td>
<td>Agricultural Development Partners Linkage Advisory Council</td>
</tr>
<tr>
<td>AGP</td>
<td>Agricultural Growth Program</td>
</tr>
<tr>
<td>AISE</td>
<td>Agricultural Input Supply Enterprise</td>
</tr>
<tr>
<td>AMDe</td>
<td>Agribusiness and Market Development</td>
</tr>
<tr>
<td>APHRD</td>
<td>Animal and Plant Health Regulatory Directorate</td>
</tr>
<tr>
<td>ASARECA</td>
<td>Association for Strengthening Agricultural Research in Eastern and Central Africa</td>
</tr>
<tr>
<td>ATA</td>
<td>Ethiopian Agricultural Transformation Agency</td>
</tr>
<tr>
<td>ATVET</td>
<td>Agricultural Technical and Vocational Training</td>
</tr>
<tr>
<td>BA</td>
<td>Bachelor of Art</td>
</tr>
<tr>
<td>BBM</td>
<td>Broad Bed Maker</td>
</tr>
<tr>
<td>BoA</td>
<td>Bureau of Agriculture</td>
</tr>
<tr>
<td>BSc</td>
<td>Bachelor of Science</td>
</tr>
<tr>
<td>CAADP</td>
<td>Comprehensive African Agricultural Development Program</td>
</tr>
<tr>
<td>CBE</td>
<td>The Commercial Bank of Ethiopia</td>
</tr>
<tr>
<td>CGIAR</td>
<td>Consultative Groups for International Agricultural Research Centers</td>
</tr>
<tr>
<td>CIMMYT</td>
<td>International Center for Maize and Wheat Improvement</td>
</tr>
<tr>
<td>CSA</td>
<td>Central Statistical Agency</td>
</tr>
<tr>
<td>CBSP</td>
<td>Community-Based Seed Producer</td>
</tr>
<tr>
<td>CIMMYT</td>
<td>International Center for Maize and Wheat Improvement</td>
</tr>
<tr>
<td>CPA</td>
<td>cooperative promotion agency</td>
</tr>
<tr>
<td>CU</td>
<td>Cooperative Union</td>
</tr>
<tr>
<td>DA</td>
<td>Development Agent</td>
</tr>
<tr>
<td>DAP</td>
<td>Diammonium Phosphate</td>
</tr>
<tr>
<td>DSM</td>
<td>Direct Seeds Marketing</td>
</tr>
<tr>
<td>DVM</td>
<td>Doctor of Veterinary Medicine</td>
</tr>
<tr>
<td>EAAPP</td>
<td>Eastern Africa Agricultural Productivity Program</td>
</tr>
<tr>
<td>ECFA</td>
<td>Ethiopian Consumer Protection Agency</td>
</tr>
<tr>
<td>ECX</td>
<td>The Ethiopian Commodity Exchange</td>
</tr>
<tr>
<td>EDRI</td>
<td>Ethiopian Development Research Institute</td>
</tr>
<tr>
<td>EGTE</td>
<td>Ethiopian Grain Trade Enterprise</td>
</tr>
<tr>
<td>EIAR</td>
<td>Ethiopian Institute of Agricultural Research</td>
</tr>
<tr>
<td>ENHI</td>
<td>Ethiopian Nutrition and Health Institute</td>
</tr>
<tr>
<td>ERCA</td>
<td>Ethiopian Revenue and Custom Authority</td>
</tr>
<tr>
<td>ESE</td>
<td>Ethiopian Seed Enterprise</td>
</tr>
<tr>
<td>ETB</td>
<td>Ethiopian Birr</td>
</tr>
<tr>
<td>ETE</td>
<td>Ethiopian Trading Enterprise</td>
</tr>
<tr>
<td>EthioSIS</td>
<td>Ethiopian Soil Information System</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agricultural Organization</td>
</tr>
<tr>
<td>FCA</td>
<td>Federal Cooperative Agency</td>
</tr>
<tr>
<td>FTC</td>
<td>Farmers training Center</td>
</tr>
<tr>
<td>GDP</td>
<td>Growth Domestic Product</td>
</tr>
<tr>
<td>GTP</td>
<td>Growth and Transformation Plan</td>
</tr>
<tr>
<td>Ha</td>
<td>Hectare</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------</td>
</tr>
<tr>
<td>IBC</td>
<td>Institute of Biodiversity Conservation</td>
</tr>
<tr>
<td>ICARDA</td>
<td>International Center for Agricultural Research in the Dry Areas</td>
</tr>
<tr>
<td>ICM</td>
<td>Integrated Crop Management</td>
</tr>
<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
</tr>
<tr>
<td>IFPRI</td>
<td>International Food Policy Institute</td>
</tr>
<tr>
<td>IDM</td>
<td>Integrated Disease Management</td>
</tr>
<tr>
<td>IPM</td>
<td>Integrated Pest Management</td>
</tr>
<tr>
<td>ISSD</td>
<td>Integrated Seed Sector Development</td>
</tr>
<tr>
<td>ISTA</td>
<td>International Seed Testing Agency</td>
</tr>
<tr>
<td>IWM</td>
<td>Integrated Weed Management</td>
</tr>
<tr>
<td>MA</td>
<td>Master of Art</td>
</tr>
<tr>
<td>MFI</td>
<td>Micro Finance Institution</td>
</tr>
<tr>
<td>MLE</td>
<td>Monitoring, Learning and Evaluation</td>
</tr>
<tr>
<td>MoA</td>
<td>Ministry of Agriculture</td>
</tr>
<tr>
<td>MoARD</td>
<td>Ministry of Agriculture and Rural Development</td>
</tr>
<tr>
<td>MoFA</td>
<td>Ministry of Foreign Affairs</td>
</tr>
<tr>
<td>MoFED</td>
<td>Ministry of Finance and Economic development</td>
</tr>
<tr>
<td>MoI</td>
<td>Ministry of Industry</td>
</tr>
<tr>
<td>MoT</td>
<td>Ministry of Trade</td>
</tr>
<tr>
<td>MoWCYA</td>
<td>Ministry of Women, Children and Youth Affairs</td>
</tr>
<tr>
<td>MSc</td>
<td>Master of Science</td>
</tr>
<tr>
<td>MSP</td>
<td>Multi-stakeholder platform</td>
</tr>
<tr>
<td>MT</td>
<td>Metric Tone</td>
</tr>
<tr>
<td>MVSc</td>
<td>Master of Veterinary Science</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
</tr>
<tr>
<td>NISCO</td>
<td>Nyala Insurance Share Company</td>
</tr>
<tr>
<td>NPS</td>
<td>Nitrogen, Phosphorous, Sulfur</td>
</tr>
<tr>
<td>OAPME</td>
<td>Oromia Agricultural Products Marketing Enterprise</td>
</tr>
<tr>
<td>OCSSCO</td>
<td>Oromia Credit and Savings Share Company</td>
</tr>
<tr>
<td>OMO</td>
<td>Omo Micro Finance</td>
</tr>
<tr>
<td>PC</td>
<td>Primary Cooperative</td>
</tr>
<tr>
<td>PhD</td>
<td>Doctor of Philosophy</td>
</tr>
<tr>
<td>PPP</td>
<td>Public, Private Partnership</td>
</tr>
<tr>
<td>PSE</td>
<td>Public Seed Enterprise</td>
</tr>
<tr>
<td>Qt</td>
<td>Quintal</td>
</tr>
<tr>
<td>RARI</td>
<td>Regional Agricultural Institute</td>
</tr>
<tr>
<td>RBoA</td>
<td>Regional Bureau of Agriculture</td>
</tr>
<tr>
<td>RSE</td>
<td>Regional Seed Enterprise</td>
</tr>
<tr>
<td>RWCoE</td>
<td>Regional Wheat Center of Excellence</td>
</tr>
<tr>
<td>RUSACCO</td>
<td>Rural Savings and Credit Cooperatives</td>
</tr>
<tr>
<td>SAA</td>
<td>Sasakawa Africa Association</td>
</tr>
<tr>
<td>SARD-SC</td>
<td>Supporting Agricultural Research for Development on Strategic Crop</td>
</tr>
<tr>
<td>SG 2000</td>
<td>Sasakawa Global 2000</td>
</tr>
<tr>
<td>SHF</td>
<td>Small Holder Farmer</td>
</tr>
<tr>
<td>SMS</td>
<td>Subject Matter Specialist</td>
</tr>
<tr>
<td>SNNPR</td>
<td>Southern Nations, Nationalities, and People's Region</td>
</tr>
<tr>
<td>SWOT</td>
<td>Strengths, Weaknesses, Opportunities and Threats</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
</tr>
<tr>
<td>WMY</td>
<td>Women, Men and Youths</td>
</tr>
</tbody>
</table>


Executive Summary

Wheat is a strategic crop in Ethiopian Agriculture

Wheat is one of Ethiopia’s most important cereal crops in terms of the area of land allocated, volume produced and the number of farmers engaged in its production. About 4.7 million farmers produce 3.9 million tons of wheat across 1.6 million hectares of land with average productivity of 2.4 t/ha (CSA, 2014). In 2013/14 season, with a share of 15.6% and 18.1%, wheat ranked third in total volume of production of grain crops and cereals respectively (CSA, 2014) next to maize and tef. Ethiopia is also the most important wheat producer in sub-Saharan Africa. In the period 2009-2011, the country ranked first both in area and production of wheat in sub-Saharan Africa with a share of 55% and 47.8% respectively (Negassa, A. et al, 2013), showing a potential to become a regional exporter.

Nationally, wheat contributes an estimated 12% to the daily per capita calorie intake, making it the third most important contributor to national calorie intake, after maize and sorghum (Guush, et al., 2011).

Both Bread and durum wheat are widely grown in the country constituting 60% and 40% of the total wheat production, respectively (CIMMYT: Wheat Atlas).

Wheat production has experienced significant growth in the past 6 years. Total wheat production reached 3,925,174 MT in 2013/14 showing a remarkable 55% growth from what it was in 2008/9 (Fig 2)

Annual Agricultural Sample Surveys published by CSA (2008-12) confirm that compared to other cereals, farmers sell higher proportion of wheat that they produce - an estimated 20% - which is second only to Tef at around 25%, making it an important cash generation crop for about a third of the farming households in the country.

Despite huge potential, Ethiopia sadly remains a net importer of Wheat

Since 2001, wheat production has lagged behind consumption resulting in increased annual average imports of more than one million tons between 2008 and 2012 (Fig 1). Such imports coupled with the marketed surplus wheat that comes from the locally produced wheat falls way short of meeting the demands of the more than 200 flour mills found in the country. These flour mills have an aggregated annual capacity of 2,340,000 MT (EGTE reports).

Although the increase in total wheat production has been a remarkable 55% and 69% from what it was in 2008/9 and 2007/8 respectively, the volume of marketed surplus in the same period remained largely constant at an average of 19.25 % of the total production (Fig 2).

This volume, if all of it can reach the mills, it can meet only about 26% of their annual demand; the remaining can only be met by imports, and or increased domestic production. The demand of the flour mills may not necessarily indicate the true average national annual demand for wheat – it can only be a proxy indicator – as there could be no direct correlation between the two. None the less, at present the gap between demand and supply of wheat in the country is huge and demands a concerted action by all stakeholders.

Although detail and extensive studies on future supply and demand trends are limited, one study by Kathryn, B., et al , 2012, indicated that both supply and demand for wheat tend to grow between 2010 and 2030 period, with the rate of growth of demand exceeding that of supply. All these figures show that for Ethiopia to exit from wheat imports in the short term, domestic production of wheat need to increase quite significantly.
**Figure 1:** Trend of wheat import in Ethiopia

![Graph showing the trend of wheat import in Ethiopia from 2002 to 2013.](image)

Source: USDA in wheatatlas.org; Author's analysis

**Figure 2:** Domestic wheat production and marketable surplus

![Graph showing domestic wheat production and marketable surplus from 2008 to 2013.](image)

Source: CSA annual reports; marketed surplus for 2013 estimated based on average of previous five years data
**What holds the country from becoming wheat self-sufficient?**

Current policy focuses on rapidly increasing total production to achieve national wheat self-sufficiency and exit from imports in few years. Achieving this goal would require identifying and addressing the key challenges that are holding the nation from attaining wheat self-sufficiency. These challenges are spread across the wheat value chain, from research & technology development all along the chain to Trade, Marketing and Demand Sinks. Each challenge requires specific interventions to resolve.

In the research & technology development segment of the chain key challenges include: Inadequacy of released Wheat varieties to meet the diverse agro-ecologies and needs of farmers; limited focus in Durum wheat research, resulting in less competitive varieties; Human and infrastructure capacity gaps at Research institutions; Input and agronomic practices recommendations are not sufficiently tailored by agro-ecology; Increased pressure of diseases, insect pests and weeds; Insufficient research focus on agricultural mechanization; Limited research focus in wheat irrigation technologies; and Limited national capacity of research on the economics of wheat production and marketing.

Similarly, challenges in “Access to inputs” include: Limited availability of inputs (seeds, fertilizer, herbicides and fungicides); Untimely delivery of inputs (seeds, fertilizer, herbicides and fungicides); Lack of finance for full inputs purchase; Lack of input warehouse at primary cooperative and union level; Limited availability of farm machineries, implements, spare parts and after sale services; and Lack of crop insurance.

The “On-farm Production” segment of the wheat value chain is also constrained by a range of important challenges: Inadequacies in the agricultural extension service; Low level of appropriate input utilization; Limited control of weeds (especially grass weeds); Limited control of disease (specially rusts); Limited awareness on Integrated Crop Management (ICM) practices by farmers and extension personnel; Limited awareness and low production of durum wheat; Limited use of farm machineries and implements; Limited awareness on practice of irrigation; and Insufficient support for private sector.

The key challenges in the last two segments of the chain – Post-harvest Processing and storage, and Trade, Marketing and Demand Sinks—include: Lack of access to post-harvest technologies for wheat; Lack of awareness on proper post-harvest handling; Limited commercialization of local wheat and the influence of the large sales of subsidized imported wheat; Limited involvement of primary cooperatives and unions in output marketing; and Limited availability of durum wheat that meets processors’ needs.

**Ethiopia needs a Comprehensive wheat sector development strategy**

In response to the urgency to systematically address the challenges in the wheat sector, concurrent actions of developing the sector development strategy and implementing the wheat production and productivity increase initiative were pursued. The initiative aims at increasing the average productivity of 1 million wheat farmers by 50% by 2015 and was launched in 2013.

The wheat sector development strategy was thus formulated following the value chain approach identifying Key bottlenecks at each component of the chain and the corresponding means to address them.

The strategy was developed through a participatory and consultative process involving consultations with key stakeholders. Ministry of Agriculture and Ethiopian Institute of Agricultural Research played key roles with the Agricultural Transformation Agency coordinating the process. Over 100 stakeholders and a number of smallholder farmers were consulted as part of the process at the kebele, woreda, zonal, regional and federal level. Government institutions, Development partners, NGOs, and other actors also provided input and feedback. Extensive review of literature and consultative workshops were also held to refine the content. A final review workshop was also held in July 2014 involving more than 70 key stakeholders from Ministry of Agriculture, Ethiopian Agricultural Transformation Agency, Ethiopian Institute of Agricultural Research, Ministry of Trade,
Overall vision for Ethiopia’s Wheat Sector

The Wheat Sector envisions for Ethiopia to attain national wheat self-sufficiency and become a regional wheat exporter

**Overall Goal:**

To enhance wheat production, productivity and incomes of smallholder wheat farmers

The following strategic goals of each component of the wheat value chain must be attained to achieve the overall vision of the wheat sector:

- **Research & Technology Development**
  - The research system generates appropriate, productivity and quality enhancing agro-ecology specific wheat technologies through a demand-based approach, including also shopping of ready-to-use technologies from abroad with strong links to the extension service
  - Economics of wheat production and marketing studied and policy recommendations developed and communicated to government

- **Access to Inputs**
  - Increased knowledge of and sustainable access to quality inputs including high yielding and disease resistant varieties, fertilizers, and pesticides by smallholder wheat farmers
  - Sustainable and easily accessible finance made available to smallholder wheat farmers for the purchase of inputs

- **On-farm Production**
  - Increased awareness and adoption of best Integrated Crop and Pest Management practices
  - Increased adoption of improved mechanization technologies by WMY smallholder farmers

- **Post-harvest Processing and storage**
  - Increased awareness, access and adoption of improved post-harvest technologies and practices by WMY smallholder farmers
  - Adequate access to improved storage facilities and awareness on appropriate storage techniques by WMY smallholder farmers

- **Trade, Marketing and Demand Sinks**
  - An efficient wheat supply chain, linking WMY smallholder farmers, through efficient aggregators, to large, sustainable demand sinks
  - Increased access to finance for wheat market actors including traders, coops and unions
The strategy identified a total of 29 Strategic challenges and 31 comprehensive interventions required to address them.

<table>
<thead>
<tr>
<th>Value chain components</th>
<th>Challenges</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Research &amp; Technology Development</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>2 Access to inputs</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>3 On-farm production</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>4 Post-Harvest Processing &amp; storage</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5 Trade, Marketing, &amp; Demand Sinks</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>29</strong></td>
<td><strong>31</strong></td>
</tr>
</tbody>
</table>

The strategic bottlenecks and interventions are discussed in detail in the document; the following table summarizes key interventions in each of the components of the value chain.

<table>
<thead>
<tr>
<th>Value Chain Component</th>
<th>Core Interventions / Further Necessary Interventions</th>
</tr>
</thead>
</table>
| Research & Technology Development | • Continued investment in the wheat research system to develop higher yielding disease resistant varieties that are suitable to different agro-ecologies, meet farmers’ needs and also international quality standards  
• Increase focus in Durum wheat research  
• Improve human and physical capacity of research centers  
• Develop agro-ecologically tailored fertilizer, agronomic practices and variety recommendations  
• Develop wheat Integrated Pest Management (IPM) technologies  
• Increased research focus on agricultural mechanization  
• Increased research focus on wheat irrigation technologies  
• Strengthen research on Economics of wheat production and marketing |
| Access to Inputs | • Ensure sufficient availability of inputs (seeds, fertilizer, herbicides and fungicides)  
• Implement systems to coordinate and track timely delivery of inputs  
• Implement Direct Seeds Marketing (DSM)  
• Increase access to finance for the purchase of full package inputs by SHFs  
• Support primary cooperatives and unions financially and technically to improve their input storage capacity  
• Encourage increased investment to avail farm machineries, implements and spare parts  
• Promote more crop insurance schemes |
| On-Farm Production | • Increase public investment on agricultural extension system  
• Create awareness on optimal inputs package  
• Promote Integrated Weed Management (IWM)  
• Promote Integrated Disease Management (IDM)  
• Create awareness on best Integrated Crop Management (ICM) practice  
• Promote awareness on durum wheat production  
• Promote awareness on farm machinery and implements to farmers  
• Increase irrigated wheat production  
• Increase technical support, access to finance and input supply for the private sector (commercial farms) |
| Post-Harvest Processing & storage | • Increase awareness on proper post-harvest handling techniques  
• Increase access to post-harvest technologies for SHF,  
• Increased access to community-based storage facilities for farmers through cooperatives and unions |
<table>
<thead>
<tr>
<th>Value Chain Component</th>
<th>Core Interventions / Further Necessary Interventions</th>
</tr>
</thead>
</table>
| Trade, Marketing, & Demand Sinks | • Encourage increased commercialization and production of wheat through increased market information and linkages,  
• Gradual withdrawal from distribution of subsidized imported wheat (substitute through local wheat purchase encouraging the local producers)  
• Increase the role of primary coops and unions in output marketing and value addition  
• Strengthen linkage between producers, traders, aggregators and processors of wheat through Multi-Stakeholder Platforms (MSP) |

The implementation process to realize the sector vision and achieve the overall goal will require synergistic interactions amongst all stakeholders including policy level and other public actors, the various actors in the private sector, as well as the millions of smallholder wheat farmers. An effective monitoring, learning and evaluation system should be in place to track progress and challenges during implementation based on agreed performance and impact indicators, and to take corrective measures proactively when the need arises.
Figure 3: Prioritization of interventions proposed within the wheat sector strategy

- **Short-term**
  - Develop agro-ecologically tailored fertilizer, agronomic practices and variety recommendations
  - Develop wheat Integrated Pest Management (IPM) technologies
  - Ensure sufficient availability of inputs (seeds, fertilizer, herbicides and fungicides)
  - Implement systems to coordinate and track timely delivery of inputs
  - Implement Direct Seeds Marketing (DSM)
  - Increase access to finance for the purchase of full package inputs by SHFs
  - Support primary cooperatives and unions financially and technically to improve their input storage capacity
  - Increase public investment on agricultural extension system
  - Create awareness on optimal inputs package
  - Promote Integrated Weed Management (IWM)
  - Promote Integrated Disease Management (IDM)
  - Create awareness on best Integrated Crop Management (ICM) practice
  - Promote awareness on durum wheat production
  - Increase technical support, access to finance and input supply for the private sector (commercial farms)
  - Increase awareness on proper post-harvest handling techniques
  - Increase the role of primary coops and unions in output marketing and value addition
  - Strengthen linkage between producers, traders, aggregators and processors of wheat through Multi-Stakeholder Platforms (MSP)

- **Medium-term**
  - Increase focus in Durum wheat research
  - Strengthen research on Economics of whee production and marketing
  - Promote more crop insurance schemes
  - Promote awareness on farm machinery and implements to farmers
  - Increase access to post-harvest technologies for SHF,
  - Encourage increased commercialization and production of wheat through increased market information and linkages,
  - Gradual withdrawal from distribution of subsidized imported wheat (substitute through local wheat purchase encouraging the local producers)

- **Long-term**
  - Continued investment in the wheat research system
  - Improve human and physical capacity of research centers
  - Increased research focus on agricultural mechanization
  - Increased research focus on wheat irrigation technologies
  - Encourage increased investment to avail farm machineries, implements and spare parts
  - Increase irrigated wheat production
  - Increased access to community-based

**Medium-term interventions to be continued into the long-term**

**Short-term interventions to be continued throughout the intervention timeframe**
CHAPTER 1. INTRODUCTION

1.1. Purpose and scope of the strategy

The Ministry of Agriculture (MoA) in collaboration with Ethiopian Agricultural Transformation Agency (ATA) has been tasked by the Agricultural Transformation Council to develop an integrated national strategy for the wheat sector. This strategy aims at sustainably increasing the productivity of smallholder wheat farmers to improve their food security and incomes, while meeting the overall goals of the Ethiopian Growth Transformation Plan (GTP). The GTP envisions agriculture as the main source of economic growth, and the increase in smallholder farmer productivity as the key driver for agricultural output expansion.

This strategy has been developed in close collaboration with stakeholders across the public and private spheres, and will act as an anchor document to guide activities within the sector over the next 5 years. It provides an inclusive framework for prioritizing and coordinating activities towards the achievement of a common vision for the wheat sector.

It is envisioned that this strategy will remain a living document, whose implementation plan may be updated on annual basis to reflect progresses made, lessons learnt and changing realities. It is also expected that the document will be refined further to reflect upcoming GTP 2 goals.

1.2. Overview of the wheat sector in Ethiopia

Wheat is one of Ethiopia’s most important cereal crops by production. About 4.7 million farmers produce 3.9 million tons of wheat across 1.6 million hectares of land with average productivity of 2.4 ton/ha (CSA, 2014). Smallholder farmers (SHFs) consume nearly 60% of all the wheat they produce, and nationally, wheat contributes an estimated 12% to the daily per capita calorie intake, making it the third most important contributor to national calorie intake, after maize and sorghum (Guush, et al., 2011). Compared to other cereals, farmers sell higher proportion of wheat that they produce, an estimated 20%, which is second only to Teff at around 25%, making it an important cash generation crop for farmers (CSA, 2008-12). The remaining 20% is used for a combination of seed, in-kind payments for labor and animal feed. Wheat is thus one of the most important crops for food security and farmer incomes in Ethiopia.

Both bread and durum wheat widely grow in Ethiopia. As reported by Vavilov (1926), the primary centre of origin for bread wheat was the Central Asia while T. durum, T. turgidum and T. dicoccum were originated in the Abyssinian centre of origin (Singh and Kota, 2007; Dvorak et al., 2011). While there is little systematic data on the contributions of each category to national production, information from regional extension agents, aggregators, and wheat millers indicate that bread wheat still constitutes the vast majority of production, an estimated 60%. Durum wheat, with current estimated share of 40% of production is becoming increasingly more important, especially for processed products such as pasta and macaroni.

Major Wheat production areas

The main wheat growing areas of Ethiopia are the highlands of the central, south-eastern and northwest parts of the country. According to figures from CSA annual reports, (2011-2013), in terms of regional contribution for wheat production, the largest volume of the main season production of wheat originates from Oromia (57.4%), followed by Amhara (27%). Wheat production in SNNP and Tigray also accounts for 8.7% and 6.2% of the national production, respectively. Furthermore, more than 41% of the annual wheat production comes from only three zones in Oromia and one in Amhara regions (Figure 4).

Based on averages of production data of three years- 2010/11-2012/13, twelve zones from Oromia (7) and Amhara (5) regions contribute to about 73.6% of the national wheat production and each zone individually accounts for more than one million quintals (Table 1).
Figure 4: High wheat producing zones in Ethiopia (%)

Source: CSA (2011-2013)

Figure 5: Major wheat producing zones of Ethiopia
Table 1: Major wheat producing zones and their relative contribution to national production

<table>
<thead>
<tr>
<th>Region/Zone</th>
<th>Production (Qt)</th>
<th>Average production (Qt) 2011/11-2013/14</th>
<th>Share of total production (%) 2011/11-2013/14</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010/11</td>
<td>2011/12</td>
<td>2012/13</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>28,556,817</td>
<td>29,163,337</td>
<td>34,347,061</td>
</tr>
<tr>
<td>Oromia Region</td>
<td>15,832,120</td>
<td>16,759,340</td>
<td>20,262,900</td>
</tr>
<tr>
<td>Arsi</td>
<td>4,385,513</td>
<td>4,942,744</td>
<td>5,115,027</td>
</tr>
<tr>
<td>Bale</td>
<td>2,755,766</td>
<td>2,747,382</td>
<td>3,631,342</td>
</tr>
<tr>
<td>West Arsi</td>
<td>2,348,328</td>
<td>2,984,073</td>
<td>3,607,583</td>
</tr>
<tr>
<td>South West Shewa</td>
<td>1,281,821</td>
<td>1,216,540</td>
<td>1,462,553</td>
</tr>
<tr>
<td>East Shewa</td>
<td>978,163</td>
<td>1,340,233</td>
<td>1,563,998</td>
</tr>
<tr>
<td>West Shewa</td>
<td>1,048,757</td>
<td>1,000,143</td>
<td>1,302,040</td>
</tr>
<tr>
<td>North Shewa</td>
<td>997,170</td>
<td>1,044,589</td>
<td>1,277,605</td>
</tr>
<tr>
<td>Amhara Region</td>
<td>8,248,603</td>
<td>7,694,867</td>
<td>8,885,686</td>
</tr>
<tr>
<td>East Gojam</td>
<td>1,939,856</td>
<td>1,677,539</td>
<td>2,017,825</td>
</tr>
<tr>
<td>North Gonder</td>
<td>1,130,253</td>
<td>1,407,546</td>
<td>1,477,421</td>
</tr>
<tr>
<td>South Goonder</td>
<td>1,352,028</td>
<td>1,234,166</td>
<td>1,420,527</td>
</tr>
<tr>
<td>South Wollo</td>
<td>1,148,377</td>
<td>1,125,731</td>
<td>1,305,954</td>
</tr>
<tr>
<td>North Shewa</td>
<td>1,293,666</td>
<td>953,201</td>
<td>1,262,578</td>
</tr>
<tr>
<td>SNNP Region</td>
<td>2,446,020</td>
<td>2,581,403</td>
<td>3,022,337</td>
</tr>
<tr>
<td>Tigray Region</td>
<td>1,633,858</td>
<td>2,001,696</td>
<td>2,052,725</td>
</tr>
</tbody>
</table>

Source: calculated from CSA, Agricultural sample survey (2011-2013)

According to annual CSA figures, between 2006/7 and 2013/14, nationally, the area devoted to wheat production largely remained constant—fluctuating between 1.42 – 1.68 million Ha, with an annual average growth rate of 2.42 % and annual average area of 1.5 million hectares over these years. The trend in the period between 2003 and 2012 is depicted in Figure 6. On a similar note wheat production has experienced significant growth in the past six years. Total wheat production reached 3,925,174 MT in 2013/14 showing a remarkable 55% and 69% growth from what it was in 2008/9 and 2007/8 respectively. Despite this remarkable growth in total production, more recently, starting from 2009, wheat production has experienced lethargic growth relative to other cereals (Figure 7). Furthermore, compared to other countries, yield per hectare in Ethiopia still stands considerably lower. In the period 2010-2013 the wheat yield per hectare in Ethiopia was 20.86 Qt/ha, while in the same period the average yield per hectare in Egypt, South Africa, Kenya and the world were 3.0, 1.6, 1.3 and 1.5, times higher than that of Ethiopia respectively (FAOSTAT).

The relatively high levels of imports of wheat for both food safety net support and for price stabilization could be one of the possible contributors to the relatively lethargic growth in local wheat production. Over the last decade, consumption of wheat in Ethiopia has been consistently above local production, and from 2008, on average about 1.0 million MT of wheat have been annually imported (Figure 1), to meet policy goals of price stabilization in an inflationary environment for commodities, both internationally and locally. These imports have been an important part of marketed wheat, contributing about 12% of the
traded wheat annually, and may have had an unintended side-effect of signaling to local producers that the market for local wheat would not be as large or as lucrative.

**Figure 6: Land area under wheat production, compared to other cereals**

![Graph showing land area under wheat production compared to other cereals from 2003 to 2012.](source)

**Figure 7: Ethiopian wheat production growth relative to all cereals, 2003-2012**

![Graph showing Ethiopian wheat production growth relative to all cereals from 2003 to 2012.](source)
In the last decade, wheat production has generally increased. However, since 2009, wheat production growth has lagged relative to all cereals (Fig 8).

**Figure 8: Wheat Productivity relative to all cereals**

Current Government Policy focuses on increasing local wheat production to replace all current imports and meet the Growth Transformation Plan (GTP) targets. As part of this effort, a National Wheat Productivity Increase Initiative has been launched in 2013 by the Government in close collaboration with partners, to increase the productivity of 1 million WMY wheat farmers by at least 50% by 2015. The initiative plans to increase production and income by increasing farmers’ access to an integrated package of high quality inputs delivered on time, knowledge of agronomy best practices, mechanization, and access to finance and access to markets.

1.3. **Gender roles in wheat production**

While gender roles vary by location and household, a gender division of labor analysis sheds light on the unique and shared contributions of women and men to the production and sale of wheat. Broadly, men are typically responsible for the heavier manual tasks such as land preparation and tillage with oxen. Men play a dominant role in seed selection, reflecting their better access to information. They also perform the skilled jobs of broadcasting of seed and fertilizer. However, once a household adopts row planting, any family member can plant. Men are usually responsible for threshing and winnowing cereal crops. In Bure, Amhara, men control 40-80% of income from wheat sold on market, whereas in Ada’a Liben, Oromia, men control more than 80% of income (Lemlem et al., 2010).
Table 2: Men and women labor division in agricultural activity at Bure, and Ada’a Libon, woredas.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Bure, (Amhara Region)</th>
<th>Ada’a Liben, (Oromia Region)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land clearance</td>
<td>Shared</td>
<td></td>
</tr>
<tr>
<td>Tillage – oxen</td>
<td>Men</td>
<td>Men</td>
</tr>
<tr>
<td>Seed selection</td>
<td>Men</td>
<td>Men</td>
</tr>
<tr>
<td>Sowing</td>
<td>Men</td>
<td>Men</td>
</tr>
<tr>
<td>Fertilizing/manuring</td>
<td>Shared</td>
<td></td>
</tr>
<tr>
<td>Spraying</td>
<td>Shared</td>
<td>Men</td>
</tr>
<tr>
<td>Weeding</td>
<td>Shared</td>
<td>Women</td>
</tr>
<tr>
<td>Harvesting</td>
<td>Men</td>
<td></td>
</tr>
<tr>
<td>Threshing</td>
<td>Shared</td>
<td></td>
</tr>
<tr>
<td>Winnowing</td>
<td>Men</td>
<td></td>
</tr>
<tr>
<td>Processing/value adding</td>
<td>Women</td>
<td>Women</td>
</tr>
<tr>
<td>Storing</td>
<td>Shared</td>
<td>Men</td>
</tr>
<tr>
<td>Marketing</td>
<td>Men</td>
<td></td>
</tr>
<tr>
<td>Day-to-day management</td>
<td>Shared</td>
<td></td>
</tr>
</tbody>
</table>

Source: Lemlem et al. (2010)

In a similar study in Ada, Lume, and Gimbichu Woredas gender difference in gross output was found considerable. With a value of Br 4776, gross output per hectare of female headed households (FHH) was 31% lower than male headed households (MMH). These differences could be explained partly by the lower quantities of inputs used by FHHs. Further analysis showed that no productivity differences would have existed between both households if they had equal access to inputs. The same study has also shown the differences in type of extension service provided to MHH and FHHs.

Source: (A. Tiruneh et al, 2001)
Figure 9: National variety testing sites for wheat

Figure 10: Wheat initiative woredas relative to location of wheat flour mills in the country
1.4. Strategy development approach

The strategy was developed through a participatory and consultative process involving consultations with key stakeholders. Ministry of Agriculture and Ethiopian Agricultural Research Institute played key roles in the process with the Agricultural Transformation Agency coordinating the process. MoT, Farmers, Millers, and other relevant institutions also had played key role in the process. In general, over 100 stakeholders and a number of smallholder farmers were consulted as part of the process at the kebele, woreda, zonal, regional and federal level. Government institutions, Development partners, NGOs, and other actors also provided input and feedback. These discussions culminated in a wide-ranging stakeholder meeting held in mid-December 2012, where the strategy development team’s preliminary findings and recommendations were presented and validated. Development of the strategy document expanded on and further refined the findings and recommendations based on supporting data and analyses as well as key learning from immediate interventions.

In a nutshell, this sector development strategy is a result of rigorous multi-step process, as described below:

- **Extensive review of the relevant literature**: The strategy development team conducted an exhaustive review of existing reports published by local and international institutions, which provided a baseline understanding and starting point for the work. The team also undertook visits to all relevant research institutes to review the most recent research findings.
- **Multi-stakeholder convening**: A convening of stakeholders was held and numerous follow up discussions have been held with stakeholders since then. ATA has continued through 2011, 2012, 2013 and 2014 to engage key stakeholders in refining aspects of the strategy, both through discussions and in practical engagements throughout the season.
- **In-depth discussions with key stakeholders**: Over 100 stakeholders from various institutions, including MoA, RBoA, woreda and kebele-level government staff, development partners, research institutes, traders, cooperatives, unions, smallholder farmers, MFI’s, chemical suppliers, equipment manufacturers and others have been consulted in the strategy development process. The consultations helped to identify and validate the challenges in the system and interventions proposed in this strategy.

1.5. Major stakeholders of the wheat sector

The wheat sector has a range of stakeholders including various government institutions, private sector, NGOs, development partners, trade associations and many more. The detail list of these stakeholders and their roles in the sector are presented in Annex 1.
CHAPTER 2: VISION, GOAL, SYSTEMIC BOTTLENECKS AND INTERVENTIONS

2.1. Overall vision and goal

**Vision:** The Wheat Sector envisions for Ethiopia to attain national wheat self-sufficiency and become a regional wheat exporter

**Overall Goal:** To enhance wheat production, productivity and incomes smallholder wheat farmers

For this vision to be realized, each component of the value chain should attain specific strategic goals as highlighted below:

**Figure 11: Strategic goals of each component of the wheat value chain**

<table>
<thead>
<tr>
<th>Research &amp; Technology Development</th>
<th>Access to Inputs</th>
<th>On-farm Production</th>
<th>Post-harvest Processing and Storage</th>
<th>Trade, Marketing and Demand Sinks</th>
</tr>
</thead>
<tbody>
<tr>
<td>- The research system generates appropriate, productivity and quality enhancing agro-ecology specific wheat technologies through a demand-based approach, including also shopping of ready-to-use technologies from abroad with strong links to the extension service</td>
<td>- Increased knowledge of and sustainable access to quality inputs including high yielding and disease resistant varieties, fertilizers, and pesticides by smallholder wheat farmers</td>
<td>- Increased awareness and adoption of best Integrated Crop and Pest Management practices</td>
<td>- Increased awareness, access and adoption of improved post-harvest technologies and practices by WMY small holder farmers</td>
<td>- An efficient wheat supply chain, linking WMY smallholder farmers, through efficient aggregators, to large, sustainable demand sinks</td>
</tr>
<tr>
<td>- Economics of wheat production and marketing studied and policy recommendations developed and communicated to government</td>
<td>- Increased adoption of improved mechanization technologies by WMY smallholder farmers</td>
<td>- Increased adoption of improved mechanization technologies by WMY smallholder farmers</td>
<td>- Adequate access to improved storage facilities and awareness on appropriate storage techniques by WMY smallholder farmers</td>
<td>- Increased access to finance for wheat market actors including traders, coops and unions</td>
</tr>
</tbody>
</table>

To achieve the stated strategic goals for each component of the value chain, a detailed diagnostic analysis has been conducted to identify systemic bottlenecks and design required interventions to address them. Sub-sections 2.2 through 2.6 provide a summary of the analysis conducted on each component of the value chain.
2.2. Research and technology development

2.2.1. Strategic goal for research and technology development

- The research system generates appropriate, productivity and quality enhancing agro-ecology specific wheat technologies through a demand-based approach, including also shopping of ready-to-use technologies from abroad with strong links to the extension service
- Economics of wheat production and marketing studied and policy recommendations developed and communicated to government

2.2.2. Systemic bottlenecks

Wheat varieties released do not adequately meet the diverse agro-ecologies and needs of farmers

Wheat is known to grow in wide agro-ecologies that have specific growing conditions and production constraints such as diseases, moisture stress, erratic and low rainfall, short or extended rainfall season, waterlogging, acidic soil, frost, high temperature etc. Regardless of the release of a considerable number of wheat varieties, most of the varieties released have not been adopted widely as they do not address the specific constraints of the respective agro-ecology and needs of farmers.

Owing to lack of options, farmers are often forced to grow some of the varieties out of their ecology, leading to low economic returns to farmers from wheat production and breakdown of disease resistance traits of the varieties.

Currently one of the major challenges and threat for wheat production is the recurrent rust incidences. It is becoming more and more devastating and as a result varieties known for their high yield potential and resistances have been attacked leading to significant yield loss both in quantity and quality, and untimely abandonment of varieties. Of all the wheat varieties released in Ethiopia, the top three high yielding varieties (Kubsa, Galema and Simba), with published yield potentials of between 65 to 70 Qt/ha, are all susceptible to rust (Figure 12). Moreover, rust resistance fades with time, making it even more urgent to continually invest in developing varieties that can combine both attractive yields for farmers with robust resistance to rust.

Figure 12: Top yielding wheat varieties in Ethiopia, with their rust resistance properties
According to MoA report, over 400,000 hectares of wheat were infected by stripe rust in 2010, with Oromiya region being the most affected followed by Amhara and SNNP regions. Similarly, in 2013, up to 18,000 - 36,000 hectares of wheat covered with the Digelu variety in 17 woredas in Oromia and SNNPR were affected (Hodson, 2014 unpublished report). At the time, yield losses of 40-92% were recorded at three stem rust epidemic districts of Bale (Table 3). These devastating rust incidences in major wheat growing areas including, Bale and Arsi zones, are also a warning call signifying the urgency required in sustainable development of resistant varieties.

**Table 3: Yield loss levels of bread wheat variety, Digalu, at three stem rust epidemic districts of Bale zone, meher season, 2013.**

<table>
<thead>
<tr>
<th>District</th>
<th>Kebele</th>
<th>Farmers' fields</th>
<th>Lowest</th>
<th>Highest</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gassera</td>
<td>Koloba Sarara</td>
<td>9</td>
<td>54.5</td>
<td>82.6</td>
<td>74.7</td>
</tr>
<tr>
<td></td>
<td>Koloba sa’ada</td>
<td>13</td>
<td>52.4</td>
<td>92.3</td>
<td>83.0</td>
</tr>
<tr>
<td></td>
<td>Denmbel</td>
<td>7</td>
<td>40.0</td>
<td>91.4</td>
<td>64.1</td>
</tr>
<tr>
<td>Agarfa</td>
<td>Ambentu</td>
<td>7</td>
<td>50.0</td>
<td>77.3</td>
<td>59.5</td>
</tr>
<tr>
<td></td>
<td>Ali</td>
<td>3</td>
<td>0.0</td>
<td>33.3</td>
<td>15.9</td>
</tr>
<tr>
<td></td>
<td>Sheneka</td>
<td>6</td>
<td>0.0</td>
<td>71.7</td>
<td>45.1</td>
</tr>
<tr>
<td></td>
<td>Elani</td>
<td>9</td>
<td>16.7</td>
<td>50.0</td>
<td>34.3</td>
</tr>
<tr>
<td>Sinana</td>
<td>Ilu Sanbitu</td>
<td>12</td>
<td>0.0</td>
<td>68.8</td>
<td>40.9</td>
</tr>
<tr>
<td></td>
<td>KolobaTemona Suleman</td>
<td>9</td>
<td>18.8</td>
<td>47.5</td>
<td>43.2</td>
</tr>
</tbody>
</table>

Source: Bekele et al., (2014, unpublished.)

**There is limited focus in durum wheat research, resulting in less competitive varieties**

Compared to bread wheat, there is limited investment in durum wheat research and the number of varieties released is few (Figure 13). The little research carried out on durum wheat was mainly focused on grain yield disregarding grain quality traits (Arega, et al., 2013) with the result that processing factories usually opt to import better quality durum wheat. Although high yielding durum wheat varieties, such as Obsa, Ejersa and Bekelcha, have been developed by the national research system (MoA, 2014) with yield potentials of more than 60 Qt/ha, there is but very limited success so far in multiplying these varieties to higher volumes for a wider access to farmers. Additionally, similar to bread wheat varieties, these higher yielding durum wheat varieties are always under the threat of leaf and stem rust diseases, which is a particular challenge given that the major agro-ecologies for durum wheat production are also hotspots for stem rust development.

Ethiopia, being the center of diversity for durum wheat, has tremendous potential for the development of varieties that meet yield, rust resistance as well as important quality traits (Ayele et al., 2009). However, the potential has not yet been fully exploited.
Figure 13: Proportion of durum wheat varieties released relative to bread wheat from 1970-2012

Source: MoA/ APHR, Crop variety registry (various issues)

Research institutions have human and infrastructure capacity gaps

Human and infrastructure capacity gaps persist at wheat research centers, in both national and regional research institutes. There is significant attrition of staff at the research centers, and new recruits have limited skills and technical capability. In the African context, Ethiopia has one of the fastest-growing, but youngest and least-experienced pools of agricultural researchers. As of 2011, more than half the country’s agricultural researchers held only BSc degrees, and 48 percent were under 31 years old (Nienke, et al., 2014). Although the annual spending on agricultural research showed a modest 8% increase in absolute terms from 2008-2011, spending as a share of agricultural GDP declined by 21% in the same period (Nienke et al., 2014), making this one of the lowest in Africa. Further exacerbating the situation is, in the period 2008-2012 about 640 researchers including wheat researchers with various levels of qualifications left the federal and regional research institutes (ATA, 2013). The centers also lack sufficient physical infrastructure such as ICT facilities, green houses, well equipped laboratories, farm machineries and implements, irrigation facilities, offices, appropriate stores and field vehicles that could facilitate technology generation, variety maintenance and multiplication functions more efficiently.
Table 4: Attrition rate of researchers across the federal and regional research institutes from 2008-2012

<table>
<thead>
<tr>
<th>Educational qualification</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSc/BA</td>
<td>21</td>
<td>39</td>
<td>45</td>
<td>37</td>
<td>37</td>
<td>179</td>
</tr>
<tr>
<td>MSc/MVSc/MA</td>
<td>62</td>
<td>73</td>
<td>76</td>
<td>68</td>
<td>84</td>
<td>363</td>
</tr>
<tr>
<td>DVM</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>PhD</td>
<td>19</td>
<td>20</td>
<td>16</td>
<td>14</td>
<td>16</td>
<td>85</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>103</td>
<td>133</td>
<td>141</td>
<td>122</td>
<td>141</td>
<td>640</td>
</tr>
</tbody>
</table>

Source: ATA (2013), adapted from draft Agricultural Research Strategy

Input and agronomic practices recommendations are not sufficiently tailored by agro-ecology

Current input use and agronomy best practices are not fully tailored by agro-ecology, taking into account soil types, soil nutrient information, weather patterns, planting time, desired yields and pest and disease prevalence. The application rates and types of fertilizer and seeds follow more of blanket recommendation and are not sufficiently targeted to specific soil and agro-ecological variations. Moreover, they are not frequently updated in response to the existing prevailing condition. This prevents farmers from realizing the optimum yield they could otherwise achieve. Although great strides have been made regarding soil test based fertilizer recommendations just recently, there is tremendous work yet to be done to scale out these recommendations to wider geographies.

The extension system relies on research outputs to update recommendations, and without such output, farmers and extension agents cannot receive refreshed, agro-ecology specific recommendations to optimize yields.

Increased pressure of diseases, insect pests and weeds

Diseases especially rust pressure and incidences are increasing at alarming rate and threatening wheat production. The resistance of relatively popular and widely adopted varieties is frequently and quickly broken leading to a situation wheat production in major producing areas becoming nearly impossible without chemical application. Wheat mono-cropping has resulted in shift in the weed flora in high wheat producing areas of the country. Consequently grass weeds are becoming very problematic in these areas. Mono-cropping of wheat causes the crop’s vulnerability not only to weeds but also to insects, fungi, and other pests.

Insufficient research focus on agricultural mechanization

Though there is some attempt to adapt, modify and generate, the research focus and investment on agricultural mechanization is limited. As a result, farm machineries and implements such as broad bed-makers, small and medium-sized tractors, walking-tractors, row planters, cultivators, harvesters, threshers, cleaners, storage and artificial drier etc., that are suitable to different wheat growing conditions and affordable to smallholder farmers are rarely made available. Moreover, there is no strong organized system to multiply, supply and provide maintenance services. Farmers still use traditional pre-harvest and post-harvest agricultural practices which are time consuming and less labor-efficient and cause post-harvest loss (harvesting, threshing, cleaning, transporting and storing) that eventually lead to lower yield and quality.

Limited research focus on irrigated wheat production technologies

Only little focus has been given to irrigated wheat production, despite the huge potential, particularly in low land areas. Moreover, supplemental irrigation that can minimize the yield loss due to terminal stress on the wheat crop in the highlands also has not been widely adopted mainly because of limitations in the expansion farm-level water harvesting systems as well as limitations in irrigation infrastructures in these areas. The development of appropriate technologies, including appropriate
irrigated wheat varieties, and soil fertility management technologies, agronomy packages as well as development of the irrigation infrastructure has been very limited.

**Limited national capacity of research on the economics of wheat production and marketing**

The national wheat research is largely skewed towards breeding and agronomy. Although international knowledge centers such as IFPRI, CIMMYT, ICARDA, and many others are actively engaged in research on economics of wheat production and marketing, the capacity in Ethiopian institutions lags behind, affecting the ease in undertaking high impact researches in a relatively lower cost.

**2.2.3. Strategic interventions**

**Continued investment in the wheat research system to develop higher yielding disease resistant varieties that are suitable to different agro-ecologies, meet farmers’ needs and also international quality standards**

The share of Wheat research enjoys 10% of the research focus in agricultural research in Ethiopia, (Nienke. et al., 2014). Though there is such relative significant level of research focus in wheat through local research institutions in collaboration with international partners such as CIMMYT and ICARDA, this level of focus should be sustained to ensure that new higher yielding, multiple diseases (mainly rust) resistant, suitable to different agro-ecologies and high quality wheat varieties are continuously developed. In this line, the national wheat research strategy needs to be improved:

- Diversify genetic base of germplasm through crossing, collection, introduction and other techniques.
- Shorten the period for new variety development. The existing conventional breeding system should be supplemented by modern techniques such as marker assisted selection (MAS) and tissue culture technology.
- Focus should also be given on introduction and adapting of released varieties available abroad.
- International industrial quality traits also need to be factored in the development and release of new wheat varieties to meet the demands of wheat processors and consumers.
- To expedite the variety release process, existing procedures and criteria need to be revised.
- Procedures and criteria should be developed to withdraw obsolete and undesirable varieties from production.
- Durable rust and other diseases resistant and high yielding varieties should be targeted.
- Varieties tolerant and adaptable to stresses such as frost, moisture shortage, water logging high temperature, salinity, acidity should be targeted.
- The breeding strategy should shift more towards sustainable national capacity from the current extreme reliance on international support. While collaborating with international resource centers is a useful component of wheat research, building the national capacity to raise it to international standards both in terms of human resources and facilities should remain a key strategy.
- Gene/variety deployment strategy should be in place. Agro-ecology based variety recommendation should be strengthened and the use of varieties strictly for the targeted age agro-ecology should be emphasized through awareness creation.
- National disease surveillance system, with special attention to rust disease should be strengthened (the system should be able to generate early warning system (EWS).
Lessons learned: including women in research and technology development

Many constraints exist to adoption of improved wheat varieties by women. A review of improved wheat variety adoption in the developing world found that it takes 5-10 years after breeding to the release and another 5-10 years for full adoption, which can be frustrating for researchers and program developers who know the potential gains in food security and livelihoods. However, this length of time has been found to be reduced with the use of participatory breeding, varietal selection, and gender analysis. By including women in every stage of development and planning of new technologies, programs can become more aware of the needs of targeted women and therefore, increase adoption rates and improve the productivity of men and women in wheat farming. (Klawitter, 2009)

Increase focus in Durum wheat research

The level of focus in durum wheat research should be raised, primarily through resource allocation. These investments should target increasing the number of durum wheat varieties that combine higher yields with rust resistance, while maintaining key quality traits that are demanded by commercial durum wheat processors and consumers.

Variety development is time consuming and requires considerable resources; introduction/technology shopping would help to avail improved varieties within short period of time and relatively with low investment. Hence, while strengthening the existing effort to develop new varieties locally remains important, shopping of useful and adaptable varieties from other countries should also be considered. Private-Public partnerships between research institutions, commercial durum wheat processors, government and bilateral or non-governmental organizations should be in place to increase and sustain the levels of investments in durum wheat research so that the country can exit from importing.

Improve human and physical capacity of research centers

Human resource management at research centers needs to be focused on staff retention and motivation, as well as on quality training for new technical hires and sustainable capacity building for all staff involved in wheat research. This can be done through improving salary and other privileges and benefits to researchers involved in developing projects and securing external research funds and provision of rewards for researchers involved in release of competent commercial wheat technologies. Strengthening the link between research and higher learning institutions would also have a mutual benefit for both. Researchers can involve in teaching and advising students and earn additional pays. On the other hand, universities can involve their students in research that are identified by research system to address wheat-specific problems. They can also use the facilities and experimental plots of the research institutes.

Strategic wheat research centers should be equipped with state of the art physical infrastructures such as green houses, biotech labs, crop protection labs, irrigation facilities, tractors, harvesters, threshers, cleaners, storage facility and other equipment and transport facilities necessary for efficient execution of their role. In addition, ICT facilities should be strengthened to increase researchers’ access to up-to-date information related to wheat research. This should be done by increasing public investment on physical infrastructure and by channeling external research funds to focus on building infrastructures instead of using such funds for routine running costs.

Develop agro-ecologically tailored fertilizer, agronomic practices and variety recommendations

Research on optimal fertilizer levels and suitable varieties should be updated by agro-ecology, and the process to make this a regular output of the research system should be strengthened. Fertilizer application needs to be based primarily on result of soil tests which takes into consideration the available nutrient levels and related properties of the soil. The Ethiopian Soil Information System (EthioSIS) project, which is an ambitious effort to produce soil fertility maps of the country, when completed, would be a big step forward in this regard. Furthermore, in addition to the conventional Urea and DAP fertilizers, the EthioSIS program would also answer important soil micronutrient issues across the country. Although the release of new
crop varieties follows a nationally recognized procedure, varieties are released usually on altitude ranges. This needs to be strengthened and varieties should also be released based on specific cluster of wheat producing agro-ecologies. Furthermore, keeping varieties within the recommended agro-ecologies need to be strictly practiced to help avoid early break of disease resistance particularly of rust. Moreover, current recommendations on plant protection and agronomic management e.g. optimal seed rate, method of sowing and nutrient levels by variety should be frequently updated and sufficiently tailored.

**Develop wheat Integrated Pest Management (IPM) technologies**

Integrated pest management (IPM) is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control methods are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment.

The current wheat pest management’s practices that employ either single or integrated preventive or control methods targeting a specific wheat pest are not usually effective. Moreover, it is a temporary solution that has to be applied year after year due to the build-up of uncontrolled pests, and/or appearance of new detrimental pests. In this regard, the wheat research system should update the existing recommendations or develop the most effective and long-lasting solution that manages pests using a combination of methods that work better together than separately.

**Increased research focus on agricultural mechanization**

The research system should give due attention to agricultural mechanization that increases labor efficiency and minimizes post-harvest loss for SHFs. This includes small and medium sized tractors, walking tractors, row planters, cultivators, harvesters, threshers, cleaner, transport system (animal drawn carts and trailers), improved storage system, drying system, etc. Research on more advanced tilling and harvesting equipment including threshers should also be priority research area to address the needs of areas where mechanized farming is taking hold.

**Increased research focus on wheat irrigation technologies**

Strengthening the research system to develop appropriate irrigation technologies (irrigation agronomy, irrigation frequency and interval, salinity management…) that help promote and expand extensive irrigated wheat production mainly in the low-lying regions of the country like Afar and Somali should be of high priority. These regions have tremendous potential to significantly increase the production of wheat. The research system should also focus on developing appropriate technologies that support production of wheat under moisture-stress conditions in areas of low precipitation.

**Strengthen research on economics of wheat production and marketing**

Ethiopia is importing hundreds of thousands of tons of wheat annually, which is distributed at subsidized prices. The imported volume has shown significant increase over the years and has reached unsustainable levels. Policy level interventions which are advised by high quality research are required to help the country exit from importing wheat. Currently, by far most of the researches in wheat economics and marketing are done by International research organizations. While maintaining the collaboration with such institutions would remain absolutely essential, strengthening national capability in this regard would also be essential to continually advise policies related to wheat.
2.3. Access to inputs

### 2.3.1. Strategic goal for input production and distribution

- Increased knowledge of and sustainable access to quality inputs including high yielding and disease resistant varieties, fertilizers, and pesticides by smallholder wheat farmers
- Sustainable and easily accessible finance made available to smallholder wheat farmers for the purchase of inputs
- Increased access to finance for coops and unions for input delivery and output marketing

### 2.3.2. Systemic bottlenecks

**Limited availability of inputs (seeds, fertilizer, herbicides and fungicides)**

**Seeds:**

Seed is one of the most important inputs for improving productivity of crops, particularly in resource-constrained SHFs. It carries the genetic potential of the crops, determining the upper limit on yield and, therefore, the ultimate productivity of other inputs (Jaffee and Srivastava, 1992). The direct contribution of quality seed alone to the total production is estimated at 15–20% depending upon the crop and it can be further raised up to 45% with efficient management of the other inputs. However, most farmers have little or no access to improved seed (Table 5).

1. **Shortage of early generation seeds**

   There is shortage of breeder and pre-basic seeds of highly demanded varieties at the right time from research centers. There is also insufficient seed multiplication by seed enterprises and inadequate certification services to guarantee quality. In order to produce sufficient certified seed, the availability of a good supply of high quality breeder, pre-basic and basic seeds is crucial. The sources for breeder and pre-basic seeds are the federal and regional research centers and universities while basic seed is produced by seed enterprises and bottlenecks at these institutions create significant shortfalls in the availability of these seeds (Spielman, et al., 2011).

   Research centers lack quality laboratories with required equipment, facilities related to seed production, processing and storage including tractors, combiners, seed processing machines, mechanical post-harvest drying equipment. They also lack adequate trained professionals specialized in seed science and technology, in the absence of whom sustained supply of early generation seeds would remain seriously constrained.

   The research centers also have limited size of land that is used for both research and seed production under rain-fed and irrigated conditions. This couldn’t allow them to follow proper isolation distance and rotation to ensure quality seed production. Besides, existing irrigation facilities are insufficient. As a result, the research centers are not in a position to multiply and supply adequate quantity and quality of early generation seeds of the specific varieties required by seed enterprises for further multiplication.

2. **Insufficient supply of improved (certified) seed to farmers**

   Official estimates from the CSA show that while the total quantity of improved wheat seed supplied nationally has been increasing, improved wheat seed covered only 5.8% percent or 83470.3 hectares of wheat cropped area averaged over six years, from 2006–2012 (Table 5) and the majority of farmers (nearly 95%) have continued to recycle seed that has been exhausted after generations of cultivation. However, since these figures from CSA didn’t take into account, the seed that is safely recycled up to the recommended generation, it might be underestimated and are highly contested by many. The analysis made by ATA seed team raised the wheat area covered by certified and the recommended recycled seed to 31.1% (Figure 14).
Table 5: Estimated number of holders who used improved wheat seed and area covered by improved wheat seed for meher season of private holdings from 2006-2012.

<table>
<thead>
<tr>
<th>Year</th>
<th>Holders Total</th>
<th>Wheat area cultivated (ha)</th>
<th>Improved wheat seed applied</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Holders used improved seed</td>
<td>% used improved seed</td>
<td>Seed (qt)</td>
</tr>
<tr>
<td>2012/13</td>
<td>4,844,368</td>
<td>269893</td>
<td>5.6</td>
</tr>
<tr>
<td>2011/12</td>
<td>4,324,679</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2010/11</td>
<td>4,591,729</td>
<td>340,535</td>
<td>7.4</td>
</tr>
<tr>
<td>2009/10</td>
<td>4,666,194</td>
<td>192,484</td>
<td>4.1</td>
</tr>
<tr>
<td>2008/09</td>
<td>4,205,702</td>
<td>193,030</td>
<td>4.6</td>
</tr>
<tr>
<td>2007/08</td>
<td>4,129,358</td>
<td>141955</td>
<td>3.4</td>
</tr>
<tr>
<td>2006/07</td>
<td>4,115,669</td>
<td>155,138</td>
<td>3.8</td>
</tr>
<tr>
<td>Average</td>
<td>4,411,099.9</td>
<td>215505.8</td>
<td>4.8</td>
</tr>
</tbody>
</table>

- Data not available


Figure 14: Cultivated area coverage of top cereals by certified and informal seed, ‘000s of hectares in 2010.

Source: ATA, seed team
3. Lack of proper demand estimation mechanism

Estimates of market demand for improved seed in Ethiopia are based entirely on official projections that are developed at the local (*kebele*) level and then transmitted through official channels to zonal and regional levels, after which they are aggregated nationally to produce estimates of the type and quantity (but not preferences for specific varieties or traits) of seed that needs to be supplied in the coming season (Dawit *et al.*, 2007). The result is a rough estimate of the types and quantities of seed that farmers want to purchase the following year in each region. The government allocates supply proportionally through the cooperatives based on the original demand, without considering shifts in demand due to changes in rainfall pattern and market situation. The seed producers also lack adequate investment on market intelligence to understand the shift in demand. In many years, seed supply is well below demand, because of either variation in the original estimates or supply bottlenecks.

4. Inefficient seed distribution system, and lack of seed movement regulation and enforcement mechanism

The current seed distribution system relies heavily on cooperative unions as the main distribution points between public seed enterprises and primary cooperatives that interact directly with farmers. Seed that is produced through the formal system is reported to the Federal Ministry of Agriculture and Regional Bureaus of Agriculture and based on the demand planning process, MoA and RBoA allocate the type and quantity of seed to be delivered to cooperative unions, which in turn provide the seed to the primary cooperatives and farmers operating under these unions.

This situation has limitation and cannot guarantee farmers’ access to improved varieties, in the right quantity, of the right quality, and in a timely manner, mainly because of the highly centralized seed distribution system and virtual absence of seed marketing conducted by the seed producing enterprises and companies.

As seed production, allocation, dissemination and price setting remain centralized and managed by the government and does not yet follow market principles, seed carry-over occurs, despite seed shortage in many regions of the country (ISSD, 2012). Cooperatives often are burdened by seeds they cannot sell, are unable to act as independent businesses serving the needs and interests of their farmer members, and cannot take advantage of high demand for certain seeds in the formal market that do not fit with centralized seed planning.

The current centralized distribution model does not provide choice or information to farmers, who receive seed from the cooperatives that may or may not be what they requested from the system. Since the government is the only distribution channel, this eliminates the incentives for cooperatives to play a commercial role on behalf of farmers, such as sourcing competitively priced seeds and varieties that farmers need (IFPRI, 2011).

Further exacerbating the situation is the total absence of regulation that guides and controls the movement of improved seeds within the country. Unregulated movement of improved varieties out of the agro-ecology they were developed for is a common practice across the country. This leads to the loss of resistance of varieties to important wheat pests, including rust.

5. Poor quality of distributed seeds

Shortcomings in seed quality and timeliness of delivery have been longstanding issues in Ethiopia. Poor cleaning, broken seeds, low germination rates, and the presence of mixed seeds have been reported in ESE-supplied seed (DSA, 2006).

Most of the regional seed enterprises have yet to strengthen their internal quality control and assurance systems. They lack lab facilities, trained and experienced experts and vehicles for transportation. Furthermore, seed enterprises also lack infrastructural capacity in terms of farm machineries and implements, seed processing and storage facilities (cold rooms). The combinations of these factors have resulted in low quality seeds reaching farmers.
6. Insufficient transport and logistics services for the timely delivery of seeds

Annually, the delivery of seed produced mainly by regional seed enterprises is seriously constrained by inadequate transport facility and logistics. The time between harvest and next planting seasons is too short for most of the regional enterprises to complete the process of harvesting, threshing, cleaning, packing, and transporting of the seeds in time. Improper handling during transporting, mainly from seed enterprises to cooperative/unions, may affect seed quality.

Fertilizer:

1. Insufficient supply of proportional quantity of DAP and Urea

There is a misconception by farmers as well as agricultural experts tending to use more DAP than Urea regardless of the soil fertility status and the crop requirements. On the farmers’ side, they are not using the fertilizer as per recommended levels. They use only one of the two, mainly DAP.

The study made by Kefyalew (2011) revealed that, at the household level the average number of farmers that apply fertilizer is high especially in Tef and wheat; however, the percentage of farmers who apply Urea in particular is low as it does not exceed 36% in any of the five major crops including wheat. Farmers usually give priority to purchase DAP and apply relatively higher rate than Urea. In relation to this, the demand for Urea is lower than DAP and relatively lower amount is imported.

2. Lack of new types of fertilizers

Although the situation is improving just recently, for the past several decades it was only DAP and Urea that are widely used in Ethiopia. These fertilizers contain only nitrogen and phosphorous and lack other nutrients, while Ethiopian soils are known to be deficient in several nutrients such as sulfur, boron, zinc and in some areas potassium, that are essential for increasing crop productivity and production. The lack of new types of fertilizers for the past several decades has been largely due to limited studies and mapping of Ethiopian soils for their fertility status.

3. Inefficient demand estimation mechanisms

Due to lack of analytical and scientific demand estimation models to advise the process of demand forecasting, estimation of demand is made just through aggregating figures suggested as demand by woredas. The process is unscientific and subject to considerable errors, as reflected by the considerable carry-over stocks every year.

AISE is currently the sole importer of fertilizer in Ethiopia. An important decision that AISE must make every year is how much fertilizer to import in order to meet the anticipated demand from farmers. These estimates begin at the kebele level by MoA agents, then aggregated to woreda, zonal, regional and national levels in order for AISE to initiate procurement in line with national GTP targets.

According to IFDC (2012) assessment report, total fertilizer imports have increased by more than 50 percent, from less than 370,000 MT in 2002 to almost 570,000 MT in 2011, with a spike of 627,000 MT in 2009. The same report indicates fertilizer carryover stocks averaged 33 percent of imports between 2002 and 2011, with a high of 61 percent in 2002 and a low of 12 percent in 2007. These stocks, resulted from the mismatch between actual fertilizer demand and imports, exacerbate the year-to-year variability in fertilizer import levels.

Larger than anticipated carry-over stocks could also in part be a result of dis-adoptions of fertilizer by farmers because of higher prices or unfavorable weather conditions (IFPRI, 2012). Farmers can decline to buy what they initially expected to buy because of a higher increase than they anticipated in the price of fertilizer or adverse weather patterns.
Herbicide and fungicide:

1. Scarcity both in type and quantity of the pesticides

   While Pesticide use is growing over time, there is limited option both in type and quantity, probably due to high prices as most are imported, and also due to limitations in distribution systems. As a result, farmers are sometimes forced to use the same type of pesticide for extended period that usually leads to development of resistance to the pesticide by the pest. For instances, the herbicide 2-4-D has been banned in many countries but its continued use in Ethiopia has produced a new generation of 2-4-D-tolerant broad-leaf weeds (National Tef Strategy, 2013).

2. Lack of quality control system

   Effective national pesticide quality control is not in place. It is not uncommon to find farmers using expired and obsolete pesticides -- 38% of interviewed farmers have reported continually using obsolete pesticides (Tadesse and Asferachew, 2008). Unregistered and ineffective pesticides are also under circulation. All these contribute to crop loss both in quantity and quality.

3. Lengthy process to approve new types of pesticides

   The process of registration and approval of new entrant pesticides is long and time taking. Efficacy testing can take from 6 months to 3 years and the dossier review can take up to an additional 2 years. This lengthy process discourages chemical suppliers and delays the substitution of obsolete pesticides.

4. In-sufficient contingency stock of pesticides

   Except for migratory pests, contingency stocks are not usually maintained for other pests including wheat rust, which is currently becoming devastating. New rust races are appearing more frequently than ever to the detriment of wheat varieties that are known to be resistant.

5. Insufficient domestic capacity to produce essential pesticides:

   The domestic capacity to produce essential pesticides is very limited. The present capacity of the Adami Tulu pesticide manufacturing complex, unless expanded considerably, would not be sufficient to meet the ever growing demand for pesticides in cereal production of the country. The expected high growth rate in production and productivity of wheat and other cereals in the coming years demand a commensurate growth in capacity to manufacture essential pesticides locally.

Untimely delivery of inputs (seeds, fertilizer, herbicides and fungicides)

Due to lack of efficient coordination among actors involved in input delivery, inputs tends to reach farmers late -- usually too late for planting. Fertilizer delivery has relatively been improved over the past few years and farmers have less problems accessing Urea and DAP from the primary cooperatives. The availability of inputs, especially seeds and chemicals, at the primary cooperatives level before the planting season continue to be a major bottleneck, especially on situations of early onset of rainfall.

A study conducted by Fikre et al. (2010) in Arsi zone, identified inefficiency in seed delivery system as a major problem. It usually arrives late after the farmers gave up and made alternative decisions on planting. Responsibility for this lies on the highly centralized system, characterized by a long chain in demand estimation, allocation and delivery of improved seeds.

Lack of finance for full package inputs purchase

Lack of access to financial services inhibits a large section of WMY smallholder farmers to purchase and apply the full recommended inputs package in time. Farming inputs are just a subset of all items that a household needs to make purchase decisions on. According to the 2011 Household Consumption and Expenditure Survey, the average rural household expenditure
is 20,354 ETB per year (CSA, 2011). Of this, 50 % is spent on non-food items. The typical full inputs package for 0.5 ha, on the other hand, represents approximately 21% of the household’s non-food expenditure, which is a significant investment decision.

The typical inputs needed such as seeds, fertilizer and chemicals need to be purchased at once, and in cash, which makes this investment decision even harder to make at the household level. An additional complicating factor is the inherent risks in rain-fed agriculture, which means returns to these investments, may not be guaranteed. As a result of these factors, farmers minimize on their use of inputs, by picking parts of the inputs package that they can afford in cash, even if these inputs combinations do not result in optimal yields. Access to financing, especially at planting, could play a pivotal role in increasing full inputs use for the segment of farmers already convinced of the returns on investment on the package and are willing to take the risk, but who do not have sufficient cash flow at planting to support their decision.

**Lack of input warehouse at primary cooperative and union level**

While storage conditions are generally good at the union level, both the quality and capacity of storage at the primary cooperative level generally is poor. Most of the storage facilities at the primary cooperatives are small in size and poor in quality (IFPRI, 2012). The storage facilities in most cooperatives are multi-purpose. They serve as storage for various agricultural inputs and outputs, which results in fast deterioration of quality of inputs, which is more pronounced on seeds. Having very limited seed storage capacity, rented stores that were built for grain, or worse, for chemicals, which can damage to the germination process are commonly used. Moreover, carry-over fertilizer stocks frequently deteriorate due to poor storage facilities and poor management. The additional cost for renting also has implication on selling price of input to farmers. Furthermore, cooperatives lack knowledge on best practices of input storage management, which contributes to product losses. Primary cooperatives, as the principal outlets for the last mile distribution are largely staffed by relatively unskilled manpower; who have no training either on input storage or management. In some cases, if the unions do not have storage capacity or are not ready to receive the shipments directly from the port, AISE stocks the fertilizer in its central warehouses until the cooperative unions can collect the stocks, which usually causes delay in fertilizer distribution.

**Limited availability of farm machineries, implements, spare parts and after sale services**

Despite the remarkable benefit and the topographic suitability of most of the wheat farms in Ethiopia, mechanized farming is just at a rudimentary stage. In one national study it was found that only about 1% of smallholder wheat farmers use tractors for land preparation (Mesay, 2012). Nationally only about 5,090 tractors were in use in 2010, accounting to only 4 tractors per 100 Sq. Km (World Bank, 2012). This situation may not be different in other components of wheat production processes including harvesting, threshing.

The key constraint for limited agricultural mechanization is lack of farm machineries and implements that are suitable to different agro-ecologies. The number of local manufacturers and suppliers are very limited. There is also lack of spare parts and after sales services. The repair and maintenance services are still at an infant stage and those already providing these services are not readily accessible to the users. There is also lack of skilled operators of the machineries.

The focus and support given by the extension service to farmers to raise their awareness on the benefits of agricultural mechanization has also been very limited.

**Lack of crop insurance**

As crop productions are constrained by several biotic and abiotic factors, partial or total crop losses are real possibilities. The losses could be due to shortage of rainfall, windstorm, frost, excessive rainfall, uncontrollable plant diseases and insect pests, excessive heat waves and hail damage. In such incidences there are no well-developed insurance schemes that aim to compensate farmers for the loss. In areas where crop losses have occurred, capacity of most farmers’ to invest in inputs in the next season diminishes which negatively impacts their productivity.
2.3.3. Strategic interventions

Ensure sufficient availability of inputs (seeds, fertilizer, herbicides and fungicides)

Seed: Effective and efficient input supply and distribution system is essential to increase wheat production. While improved seeds have high contribution to wheat yield, availability at closer proximity to farmers is also an important element.

By adopting commercial seeds in combination with best practice techniques on a quarter of the current crop area, farmers could increase maize production by over 60 percent and self-pollinated crop production (such as wheat) by over 30 percent (IFPRI, 2010). The following interventions are therefore important to address the challenges related to improved wheat seed supply:

1. **Increase the capacity of EIAR and RARIs to produce sufficient amount of early generation seeds** for wider multiplication by seed growers. EIAR and RARIs are continuously developing new varieties; in spite of which, however, the demand for seed of farmers has never been sufficiently met. For instance, in 2012/13 season the amount of pre-basic seed that was made available across the nation was about 871 Qts which is about 52 % of the demanded 1668 Qts.

   Research therefore needs to expand its early generation seed farms used for wheat to meet the ever increasing demand from seed growers. This may be achieved through expanding off-season production by irrigation and strengthening research centers with necessary facilities including laboratories, field equipment and machineries (tractors, threshers, seed cleaning and grading machines...) and storage facilities. The human capacity should also be strengthened with trained professionals specialized in seed science and technology.

   Wheat, being self-pollinated and as such being unattractive to private seed producers to make profit, research centers can extend production of early generation seed in partnership with selected CBSPs on contract basis with close monitoring and technical backstopping. The successful experiences of Edget Seed Multipliers and Marketing Union, the Southern Agricultural Research institute (SARI) and Self Help Africa partnership in wheat basic seed production could be scaled-up in this regard.

2. **Put in place Proper seed demand assessment system.** Real demand in terms of specific variety and quantity of seed should be known to the system well ahead of planting time. There should be accountability associated with implementation of registered demand both from the seed supplier and farmers side. However, there can be some degree of flexibility in implementation of registered demand from farmers’ side when there is unforeseen weather change (e.g. late on-set of rainfall). Developing a seed demand forecasting model may also be considered where demands can be effectively forecasted with certain level of certainty. Such models may consider trends in weather, disease occurrence, market factors, seed companies’ capacity etc.

3. **Enact laws to enforce contractual agreements between actors in the seed business:** There should be binding rules and regulations to enforce proper contractual agreement between seed suppliers and out growers to minimize side selling. Enforceable contractual agreements between certified seed growers and early generation seed producers, such as research centers, are also essential to ensure access to adequate quantity of early generation seed of the right variety.

4. **Strengthen the informal seed sector:** Since 90% of the seed that farmers use comes from the informal sector (CSA, 2012), in addition to supporting the formal sector, strengthening the informal system will ramp-up the availability of improved seeds. The focus should be more on ensuring quality through a quality declaration system. Seed multiplying primary cooperatives and unions should be provided with technical support (from research institutes and seed companies) and access to finance for infrastructural (storage and cleaning facility) development to ensure production of quality-declared seed. Farmers having their plots in a contiguous location may be encouraged to establish seed-production clusters, similar to the ISSD initiative. The logistical and storage capability of CBSPs should be strengthened to enable them effectively collect, transport and store the seed they collect from out-grower farmers.
5. **Encourage private sector investment in wheat seed multiplication and marketing.** Creating conducive policy environment for the private seed sector, including increased access to finance and other resources; liberalized pricing; liberalized seed distribution models, and seed branding are some of the essential elements for a sustainable vibrant seed system to flourish in the country. While implementing this, check and balance mechanisms to protect the interests of the WMY small holder farmers may be instituted through the public seed system.

6. **Address the problem of transport and logistics** that is seriously constraining timely delivery of seeds, through providing improved access to finance for public and private seed growers. Encouraging the private sector to play more significant role in seed production and delivery would also provide an opportunity to resolve the chronic problem of transport and logistics that has been a serious challenge to the seed sector so far.

7. **Strengthen Independent seed regulatory bodies at federal and regional levels** in terms of man power, laboratory and transport facilities to ensure the quality of the seed produced and distributed in the formal and informal systems is of acceptable standard. These regulatory bodies should also be empowered to control illegal movement of seeds out of their designated agro-ecology.

8. **Enforce compliance by all seed producers to establish a robust internal quality control system.** In addition to the quality control measures provided by independent regulatory bodies, all seed producers should also have their own standard internal quality control systems that are both field and laboratory based.

9. **Enact strict seed transportation rules and regulations.** A system with well-defined responsibility and accountability mechanism should be established to ensure safe transportation of seed and avoid potential quality loss due to improper handling and adulteration during transportation.

10. **Encourage the Ethiopian Seed Growers and Processors Association (ESGPA) to play an active role** to improve the wheat seed industry of the country.

11. **Encourage seed growers to use optimum Seed packaging size** to accommodate the needs of small holder farmers with low plot sizes (as low as 0.25ha).

12. **Expand seed access channels for small holder farmers.** Seed should be accessed by SHFs through multiple channels like market centers, village shops, etc. provided that stringent quality control system is in place. This can also be done through licensed retailers.

**Fertilizer:**

Research has shown that the widely accepted notion that at least 30 to 50% of crop yield is attributable to commercial fertilizer nutrient inputs is a reasonable, if not conservative estimate (Stewart et al., 2005). Increasing the wider adoption of fertilizers, including the newly introduced blended and NPS fertilizers, by farmers is therefore a critical intervention to increase wheat yield. Fertilizer utilization needs to be considered in the context of soil fertility management, rather than in the narrow sense of adding inorganic nutrients. In this regard, soil amelioration practices such as composting, proper stubble management, liming, crop rotation, etc need to be part of any intervention to improve soil productivity in wheat production. The following interventions are therefore recommended:

1. **Introduce effective fertilizer demand assessment system.** The existing demand estimation method that heavily relies on qualitative information gathered from local, kebele, woreda, zonal, and regional levels is not effective and tends to increase the likelihood of demand-supply mismatch. Demand for fertilizer should be determined by the profitability conditions of fertilizer use. The effective demand will be influenced by prevailing input and output prices (IFPRI, 2012). Climate is also a significant determinant of fertilizer demand. Studies reveals that fertilizer use is significantly influenced by rainfall variability in a given area and the intensity of fertilizer use is positively associated with higher rainfall (Alemu, et al., 2009; Gebregziabher and Holden, 2011).

2. **Introduce smaller fertilizer packaging size** to accommodate farmers with small plot of land (as low as 0.25ha).
3. **Expand fertilizer access channels for small holder farmers.** Fertilizers should be accessed by SHFs through multiple channels like market centers, village shops, etc. provided that stringent quality control system is in place. This can also be done through licensed retailers.

4. **Strengthen wider adoption of the emerging soil test based specific fertilizer recommendations** developed by EthioSIS.

5. **Promote wider adoption of new types of fertilizers including blended fertilizers and NPS.**

**Pesticides (herbicides and fungicides)**

1. **Strengthen the technical knowledge of farmers and extension agents about specific pesticides.** The research system, extension system, chemical companies, and dealers should provide adequate and timely information on the different types, efficacy and availability of registered chemicals to users. In addition, the information about registered vs. unregistered chemicals should be made clearly available to the public through formal communication channels, including posting in FTCs.

2. **Introduce early-warning-system based fungicide demand forecasting mechanism.** Associating fungicide demand forecasting with early warning system is essential. Information from such early warning system would advise decisions on when and how much of fungicides to stock for emergency.

3. **Introduce smaller Chemical packaging size to accommodate the needs of farmers with small plot of land (as low as 0.25ha).**

4. **Expand Chemical access channels for small holder farmers** Chemicals should be accessed by SHFs through multiple channels like market centers, village shops, etc. provided that stringent quality control system should be in place to prevent circulation of unregistered chemicals.

5. **Improve the registration process required to get new chemicals into the country.**

6. **Strengthen domestic capacity to produce essential agrochemicals.** Government should support investors to produce these agrochemicals locally. While this should be the direction, until the private sector becomes capable in this regard, government should also strengthen its own capacity to fill the gap and develop its own capacity to produce the pesticides locally.

7. **Strengthen the early warning system to ensure optimum amount of chemicals are availed timely.**

**Implement systems to coordinate and track timely delivery of inputs**

On-time delivery of high quality inputs to farmers requires more than physical transport -- additional safeguards for quality, traceability, documentation and monitoring are necessary. These requirements in turn necessitate the need for a more robust logistical solution. This includes delivering inputs directly from the suppliers (Seeds enterprises & AiSE) to primary cooperatives with quality and quantity maintained with a well-functioning input delivery tracking system in place.

Such a tracking system will help monitor the movement of inputs from the supplier to the primary cooperative. It provides timely updates on the status of the delivery and reports delays or issues regarding quality, quantity and variety.
Implement Direct Seeds Marketing (DSM)

DSM is an alternative seed marketing model in which producers take an active role in the distribution of seed through multiple channels including the current retailers, the primary coops, producer outlets, and independent seed stores. It allows increased access and timely availability of certified seed to farmers. The main advantages include:

1. Shortened seed supply chain from producer to user as minimal actors would be involved in the process, improving timeliness and convenience to the farmer.
2. No seed allocation restrictions on the selected woredas. Carryover seed is minimized, as the retail outlets would be able to return unsold seed back to seed enterprises.

A theory of change for the direct seed marketing program in Ethiopia

| Permitting seed producers to directly compete for customers (individual farmers, cooperatives, or other farmer groups) will result in sufficient quantities of improved, certified seed of desired qualities being provided to farmers at prices that allow them to profitably produce their crop at higher levels of productivity. Competition between seed producers for market share can occur along several dimensions, including varietal characteristics, price, seed quality guarantees, quality and quantity of information on seed performance and use, the spatial density of seed selling points, timeliness of provision of seed, and payment modalities. If successful, direct seed marketing will offer a complementary channel to the primary means used to distribute improved seed in Ethiopia, which involves government agencies’ assessing farmer seed demand, obtaining the seed required, and then supplying that seed to farmers through agricultural cooperatives and Bureaus of Agriculture. Source: Benson, T., et al., (2014) |

A full-fledged logistics provider should be tasked with the delivery of seeds and fertilizers directly from seed enterprises and AISE to primary cooperatives who supply inputs to farmers. Such a logistics provider would be managed via the Regional Inputs
Directorate and tasked to ensure that seeds are delivered within a contracted timeframe to all designated primary cooperatives with the required seed quantity and quality maintained.

Infrastructure should be established for direct seed marketing (DSM), in which different actors including regional seed enterprises, the Ethiopian Seed Enterprise, private sector seed producers, and entrepreneurs are permitted and encouraged to establish separate end distribution points for the sale of improved seed (both publicly and privately produced) directly to farmers. Such a distribution method would incentivize timely distribution of seed in the quantity demanded by farmers, and would bring to bear the collective resources of different actors to address it.

**Increase access to finance for the purchase of full package inputs by SHFs**

Farmers need access to financial services, either savings, credit or other financial instruments to purchase full package inputs. Savings and credit are important financial tools that help maximize household level investments.

Input credit used to be provided to farmers through public channels with regional governments providing guarantees. However this system has had significant challenges due to significant defaults. Therefore, supporting and providing incentives for farmers to form savings groups, such as Rural Savings and Credit Cooperatives (RUSACCOs), can assist them in saving post-harvest income for use in purchasing inputs the following season.

The scope of currently existing MFI’s and RUSACCOs should be extended to involve more farmers in the system. Such schemes can fill gaps in especially poor areas where there is limited access to financial institutions. However, the MFI and RUSACCOs should be supported to strengthen their human and financial capacity as they have financial limitation and low management capacity.

Alternative options for input financing to farmers through MFI’s and banks should be extended to reach more farmers in an efficient manner. One alternative to improve the efficiency of the input credit system is the use of vouchers, which minimizes diversion of credit to other uses rather than inputs purchase. This also helps with recollection as coops do not handle cash from farmers, but rather vouchers which are reconciled at the union and MFI levels.
Figure 16: Alternative Inputs Credit Delivery System

1. After farmer applies for a loan, MFI appraises the farmer’s credit worthiness and issues a voucher (giving two copies of the voucher) and loan passbook.

2. Primary cooperative (PC) sells inputs to farmers in exchange for the two copy voucher voucher*

3. PC passes a voucher copy on to Coop Union together with a cover letter stating the serial number and amount of inputs sold.

4. Coop union consolidates vouchers from PCs and passes on to MFI; coop union maintains its record in a register.

5. MFI sends cash in amount of commission for inputs sold by union and PC.

6. Union sends cash in amount of commission for inputs sold by PC.

*Farmer keeps one voucher copy, gives one voucher copy to primary cooperative.
Support primary cooperatives and unions financially and technically to improve their input storage capacity

Adequate storage capacity is required at union and primary cooperative level to improve the storage capacity to maintain the quality of stored input. Community-based and cooperative producers will need support in securing the required investment capital to build sufficient storages.

Given their limited capacity to raise enough collateral and risky seasonal revenue streams, agricultural cooperatives require a dedicated source of financing capital. A dedicated revolving cooperative fund should be developed, such as the Oromia Cooperative Bank (OCB) and Addis international Bank (AIB) which were established by cooperatives to serve the cooperatives. Microfinance Institutions (MFIs) and Rural Savings and Credit Cooperatives (RUSACCOs) should be strengthened and their mandates expanded to serve the role of semi-dedicated financing institutions for the cooperatives sector, and to draw on the dedicated Cooperative Fund to lend to cooperatives at low interest rates. The Commercial Bank of Ethiopia’s roles should also be considered for credit guarantees so that cooperatives can access financing from a semi-dedicated institution with sufficient reach, capitalization, and mandate to reliably serve their financial needs.

The cooperatives and unions need to have properly trained staff to manage the input stock and for the proper storage of input.

Encourage increased investment to avail farm machineries, implements and spare parts

Despite the remarkable benefit and the topographic suitability of most of the wheat farms in Ethiopia, mechanized farming is just at a rudimentary stage. In one national study it was found that only about 1% of smallholder wheat farmers use tractors for land preparation (Mesay, 2012). Nationally only about 5,090 tractors were in use in 2010, accounting to only 4 tractors per 100 Sq. Km (World Bank, 2012). This situation may not be different in other components of wheat production processes including harvesting, threshing...

Addressing this huge gap in mechanization is imperative. Improving the availability of farm implements and spare parts and strengthening mechanization service providers through incentives is an important intervention. The following interventions are therefore proposed:

1. Link the agricultural mechanization research centers with local government and private manufacturing companies including small and medium enterprises.
2. Capacitate these manufactures through provision of technical support and access to finance to enable them produce suitable farm machineries, implements and spare parts.
3. Strengthen and facilitate credit services to primary coops and unions to enable them provide mechanization service to farmers and ensure continuous technical support and maintenance services.
4. Support private investors to provide mechanization service to farmers. The recently established Capital Goods Business Financing SCs could be of quite significance in this regard.
5. Strengthen the quality assurance system administered by government to ensure the quality of the farm machineries and implements.
6. Provide training and empower local technicians to provide repair and maintenance services.

Promote crop insurance schemes

Crop insurance scheme is one of the mechanisms that enable farmers overcome risks due to crop loss as a result of natural hazards. It encourages farmers to take risks to adopt new technologies. Experiences from other crops like coffee, where Nyala insurance company is providing such services, can be scaled-out to also cover wheat.
2.4. On-farm production

2.4.1. Strategic goal for on-farm production

- Increased awareness and adoption of best Integrated Crop and Pest Management practices
- Increased adoption of improved mechanization technologies by WMY smallholder farmers

2.4.2. Systemic bottlenecks

Inadequacies in the agricultural extension services

Despite the remarkable positive and sustained developments in the agricultural extension service in the recent past, there are still key gaps yet to be addressed to impact more positive changes on overall agricultural productivity. Inadequate basic infrastructure and resources at the FTC and woreda levels; major practical skill gaps of DAs and subject matter specialists (SMSs) in woredas; limited success of ATVETs in delivering effective skill upgrading trainings to DAs due to mainly a general lack of resources are among the key gaps in the extension service (Davis, et al., 2010).

Insufficient means of mobility (motorbikes, bi-cycles, horses/mules, etc.) of DAs and supervisors; high turnover of DAs due to various reasons; the weak linkage between the research and extension systems are also other important issues affecting the effectiveness of extension service delivery. Extension communication mechanisms remain largely traditional where latest technologies which are widely adopted in other countries have not yet made their way into Ethiopian farming communities. Farmers’ accesses to market information, as well as agronomic and weather information are largely based on traditional mechanisms, negatively affecting farmers’ production efficiency.

Low level of appropriate input utilization

Evidences show sustained growth in total fertilizer imports into the country as well as in utilization of same by farmers over the recent past. However, the rates still remain low at 29 kg per hectare for arable and permanent cropland and 37 kg per ha for grain production compared to 200 kg per ha that is generally recommended as optimal for crop production in the country (World Bank, 2012). Analysis of ten years (2000-2011) fertilizer use in wheat production has also shown that only about 35% of the area has been fertilized (IFPRI, 2012, unpublished).

Increased price, shortage of supply and late arrival have been reported as major complaints by 47.6%, 15.18% and 9.61% farmers respectively, negatively affecting farmers from widely using fertilizers (Kefyalew, 2011)

Annual supply of improved wheat seed, including certified (C1) and other recycled seeds, is enough to cover only about a third of the total wheat area (various reports of ESE, MoA and RSEs). This insufficiency in volume of improved seed supply coupled with inefficient use of fertilizers, high weed infestations, and incidence of diseases undermine the potential of wheat production in Ethiopia.

Farmers’ limited awareness about the net benefit of applying pesticides has also resulted in low level of pesticide utilization. Farmers usually complain that price of pesticides is unaffordable.

Limited control of weeds (especially grass weeds)

Grass weeds are problematic in the wheat growing regions of Ethiopia for several reasons. Removal of grass weeds by hand weeding in a broadcasted wheat field is practically impossible during early growth stages (i.e., when yield losses occur) due to the similar morphology between the grass weeds and the wheat plants. Thus, farmers in Ethiopia tend to delay hand weeding until the weeds are visually distinct from crop plants, exposing the crop to weed competition for an extended period (Taye and Tanner, 1997).
Generally, farmers’ weed management practices are very poor. Particularly, in major wheat growing areas of Arsi, West Arsi, Bale and Central Shewa the damage of weed in general and grass weed in particular is aggravated because of mono-cropping of the crop and inappropriate use of herbicides, which resulted in build-up of most noxious grass weeds such as Bromus, Avena, Lolium and Snowdenia spp., which are very difficult to control with conventional herbicides. The combined effect of such weeds has resulted in yield loss ranging from 48 – 86%, in a controlled experiment, depending on the type of weed (Taye et al., 1996). The improper use of combiners in harvesting wheat exacerbates the dispersal of weed seeds from one field to another.

Information on availability of alternative effective herbicides for grass weeds is very limited. Moreover, the most effective herbicides recently registered in Ethiopia, Pallas® and Atlantis® have limited availability and relatively higher price. Farmers’ awareness on the calibration and application techniques on agro-chemicals is also very limited.

**Limited control of diseases (especially rusts)**

Incidence of the three types of the rust diseases has been on the rise in the past few years in Ethiopia. In 2010 yellow rust has seriously affected more than 400,000 Ha of wheat. Incidence of stem rust has also affected wheat fields in 2013 (Rust tracker reports of CIMMYT). The reports have also shown that the rusts significantly reduce crop yields by up to 40% across an area of impact, and up to 100% yield loss on an individual farmer’s field.

There is big knowledge gap in the extension system with respect to wheat rust management. Most of the DAs, supervisors and experts have very limited knowledge on proper identification of wheat rusts. In addition, availability of appropriate fungicides is highly constrained and there is low awareness on calibration and application methods of fungicides. Farmers are usually reserved in diversifying varieties – they mostly use few most popular varieties whose resistances are ultimately broken.

**Limited awareness on best Integrated Crop Management (ICM) practices by farmers and extension Personnel**

There is limited awareness by farmers of best wheat management practices such as land preparation, row planting, reduced seed rate, crop rotation, and water and soil management. Within wheat growing areas, broadcasting and mono cropping are currently the most common practices. In water-logged vertisol areas production of wheat is seriously constrained by poor drainage, while considerable proportion of other wheat producing areas suffer from moisture stress that limits productivity of wheat. Appropriate soil and water conservation measures are also not widely practiced by wheat farmers leading to the loss of nutrient-rich top soil and hence reduced wheat yield.

**Limited awareness on and low production of durum wheat**

Ethiopia is believed to have suitable agro-ecologies and capacity to produce durum wheat to meet domestic and regional demands. However, the production is still low because of biotic, abiotic and socio-economic factors.

About 85% of durum wheat cultivars grown in Ethiopia are not improved. Inadequate inputs use (improved seed, fertilizer) and biotic constraints, such as rusts and weeds, account for a larger amount of the yield gap in durum wheat production. In addition to yield constraints, the protein quality is also affected by improper fertilizer use, excessive rainfall, and cool temperatures. As such, the supply of durum wheat with the right quality remains far below the demands of the processors, impelling them to depend on imported durum wheat. Besides, the local durum wheat processors have undue perception that locally grown durum wheat is of sub-standard quality. Ineffective mechanism for the aggregation of the durum wheat also negatively impacts the ability of processors to readily secure their demand for sustainable supply of large quantity.

As such, despite the huge domestic potential to produce durum wheat in sufficient quantity and quality, the country has spent tens of millions of hard currency to import an average of 66,000 MT of durum wheat annually since 2008 (ERCA annual reports).
Limited use of farm machineries and implements

The majority of farmers use conventional method of farming which is labor intensive and inefficient. There is only little promotional activity to encourage farmers to adopt improved farm machineries and implements such as medium and small size tractors with accessories, moldboard plough, row planters, cultivators and harvesters. In addition, these implements are neither sufficiently available nor affordable.

Limited awareness on practices of irrigation

Moisture deficiency is one of the major constraints in several wheat growing areas and results in low production and productivity. Successful wheat production in such areas requires effective adoption of supplemental irrigation. However, there is limitation in awareness and practical knowledge by farmers and the extension service on application of supplemental irrigation for wheat production. Moreover, the huge irrigation potential that is found in the lowland regions of the country, particularly Afar and Somali, has not been exploited.

Insufficient support for private sector

According to the medium and large scale commercial farms sample survey report of CSA (2010/11), the total area covered by wheat in 2010 was only 45,543.87 hectares, from which a total of 1,504,485.73 quintals with a productivity of 33.03 qt/ha was obtained. In the same year, the total wheat area cultivated by smallholder farmers was 1,555,239.89 hectares with a total production of 28,556,817.43 quintals. The commercial wheat sector accounted only for 2.9 and 5% of total wheat area and production, respectively.

Regardless of the potential to contribute to wheat self-sufficiency, the focus given to strengthen the private sector has been limited. The extension and research system hardly support the experts working in the private sector to acquaint them with latest improved wheat production technologies. Furthermore, limited technical capacity of experts; limited access to improved wheat varieties; limited access to finance that leads to limited mechanization and use of other productivity enhancing inputs; and limited access to physical infrastructure (power, water, communications, transport, etc) are all important constraints that have negatively impacted the private wheat sector.

2.4.3. Strategic interventions

Increase public investment on agricultural extension system

While the recent efforts by regional bureaus of agriculture to improve the working conditions of the field level extension personnel is commendable, there is still a lot more to do in this regard. Government budget allocation for the agricultural extension system should be commensurate with the relative contribution of the agricultural sector to the national economy. Sufficient budget should be allocated to have well-functioning FTCs with proper facilities for demonstration and training of farmers. Modest means of transportation and communication also need to be in place for DAs, supervisors and woreda experts. In all FTCs, housing should be made available for DAs to help them carry out their field assignments with more ease. There should be also retention system for DAs, and supervisors. In addition, there should be a formal performance evaluation and reward system for DAs, supervisors and woreda experts based on their contribution to the increase in the productivity of the farmers they are serving. In-service training and educational opportunities for DAs and SMSs should be strengthened to increase their technical competence.

Agricultural Development Partners Linkage Advisory Council (ADPLAC) also needs to be institutionalized in order to strengthen the linkage between the different actors in the agricultural development sector particularly between the research and extension systems. The council needs to have regular budget from the government to keep it running efficiently. There also needs to be accountability associated with the roles and responsibilities of each partner in the linkage.
Create awareness on optimal inputs package

Despite the progress made in the recent past in availability and usage of technologies in wheat production, there are still rooms for tremendous improvement, even with existing technologies. The efficiency of present technologies as applied by farmers has only 75% efficiency, indicating that with proper interventions average wheat yield can increase by as much as 25% without bringing in new types of technologies including varieties, fertilizers... (Leulsegged, 2014, unpublished). In addition to increasing efficiency in the use of available technologies, expanding the type of new technologies as well as increasing volume of inputs used are important interventions. Ethiopia, to meet its GTP production targets, must essentially double its consumption to 1.2 million metric tons (MT) of fertilizer products (IFDC, 2012).

Farmers need to be made aware of the high rate of return to their investment when they use full package of inputs. Effective demonstrations would help farmers understand that using full recommended input packages would result in increased productivity and production thereby improve their livelihood. Particular attention may be given to raise the awareness of farmers about the economic benefit of using critical components of the package like fertilizer (particularly balancing N and P), seeds and various pesticides. Farmers’ awareness also needs to be raised on identification and management of diseases (especially rusts), as well as on handling and application of chemicals.

Promote Integrated Weed Management (IWM)

All weed management options including, cultural, mechanical and chemical methods should be combined. Crop rotation should be promoted in the traditionally wheat dominated farming systems to minimize build-up of grass weed species due to mono-cropping. The use of crop rotation with pulses not only minimizes the weed population in the subsequent crop but also adds to the soil fertility thereby reducing the requirement of Urea (Amanuel et al, 1991). An average of 8-14% increase in grain yield has been recorded when bread wheat is grown after pulses (Tilahun et al., 2000).

Proper land preparation, use of clean seed, stubble management, field sanitation, sanitation of farm implements, etc. should be considered. Hand weeding should also be practiced timely where applicable (depending on plot size and availability of labor). Farmers can also control weeds by using different mechanical implements such as cultivators.

Information on effective herbicides for grass weeds need to be available for farmers. Properly registered and effective herbicides such as Pallas® and Atlantis® and those that will be identified and recommended by research in the future should be made timely available in sufficient amount, affordable price and suitable package. Farmers need to be aware of the type of herbicide, time of application, method of application and safety precautions.

Promote Integrated Disease Management (IDM)

Use of resistant varieties should be top priority amongst wheat disease management options. Use of clean seeds, stable management, field sanitation and crop rotation are also recommended cultural practices for disease management. Effective chemicals can be used as a last resort. In case of chemical control particularly for rust diseases, experts, supervisors, DAs and farmers should be updated on field identification of the disease, type of fungicide to be used, time, method and frequency of application and associated safety procedures. One can integrate use of two or more of the above mentioned disease management options.

In case of wide disease outbreak timely use of chemicals (fungicides) is mandatory. Therefore, there should be advance preparedness by having emergency stock. Nationally, there should be early warning system in place to minimize risk of total yield loss during such outbreaks.

Create awareness on best Integrated Crop Management (ICM) practices

Improved practices of proper land preparation, row planting, optimum seed rate, crop rotation, water and soil management are key interventions to maximize wheat yield.
To encourage wheat growing farmers to adopt crop rotation (mainly pulses) the productivity of the rotational crops need to be enhanced. Currently, the use of bio-fertilizers (selected strains of nitrogen fixing bacteria) on pulses is proved to have a substantial increase in productivity.

Soil and water management practices should be intensified to promote water (in case of moisture deficiency) and soil conservations so as to increase wheat productivity. On the other hand, drainage of excess water should be ensured in water-logged vertisol areas by promoting use of BBM. Where there is shortage of moisture, farmers should be encouraged to use soil moisture conserving practices such as tie-ridging. In areas of acidic soils, the existing scheme of soil treatment with lime should be intensified.

Supplementary irrigation is necessary in areas where there is terminal moisture stress. In this case, there may be government intervention needed to establish irrigation infrastructure. Moreover, farmers are encouraged to have water harvesting structures around their fields to use for supplementary irrigation.

Farmers’ awareness of these best practices should be increased through mass media channels such as radio, TV, brochures and manuals, as well as through more intensive practical media such as trainings and demonstrations in close proximity to farmers’ fields. Improving access of farmers to market, agronomic, weather, disease and other essential information should be facilitated by introducing creative technologies. These may include interactive voice messaging; live dialogues between farmers and experts through personalized phone calls or live radio programs, internet based information portals for frontline extension workers. All such interventions need to adequately integrate a session on the importance of addressing gender inequality and on how to approach and better support female farmers to adopt improved wheat integrated management practices. Female farmers need to be purposively targeted in demonstrations, interactive radio programs and other channels to disseminate information.

**Promote awareness on durum wheat production**

Industrial manufacturing of pasta products (macaroni, spaghetti, and noodles) requires durum wheat which meets industrial quality standard. The important quality parameters of durum wheat are protein content, gluten strength, vitreousness, test weight, kernel size, grain colour (Amber colour) and absence of black point on the grains. Although, the quality parameters are affected by genetic and environmental factors, most of them can be improved by management during the production process and storage. Among the quality parameters, gluten strength is controlled more genetically and improved by breeding. The most important practice for the production of quality durum wheat is the management of nitrogen fertilizer, which is difficult due to its relation with a number of factors including soil properties and availability of water (rainfall). Moreover, proper weeding and disease management (preferably the use of resistant varieties) are also important to produce quality durum wheat. The management of nitrogen fertilizer includes both the rate and timing of application. In water logged areas the loss of nitrogen fertilizer is very high which greatly affects the uptake by the crop. Therefore, in such areas draining of the soil and fertilization of nitrogen (at increased rate) is important to produce quality durum wheat. Harvesting and threshing at right maturity time with mechanical implements and storing the grain in modern storage are also crucial to maintain the quality.

The extension system should make aggressive promotion and regular trainings to increase awareness and skill of farmers on pre- and post-harvest improved durum wheat production management practices. Since quality durum wheat production has its own specific management needs, separate improved production packages should be developed and made available to DAs, SMS as well as to farmers. Moreover, the research and extension systems should identify areas that are suitable for durum wheat production. Farmers have to be technically supported to use the full technological packages of durum wheat production. They have to also be encouraged to establish groups and produce in cluster to produce large volume of high quality durum wheat which facilitates the process of aggregation for the wholesalers and their forward supply to processors.
Promote awareness on farm machinery and implements to farmers

It would be increasingly difficult to meet the stringent quality requirements of domestic and international wheat processors and consumers through the traditional ways of producing wheat. Farmers should be supported with farm implements that enhance their labor efficiency as well as productivity of the farm land. Awareness on the use of affordable farm machineries and implements should be raised through demonstrations and trainings. Mechanized wheat production technology package also should be developed and integrated into the extension service.

Row planters and cultivators -- both oxen-drawn and tractor mounted-- increase labor efficiency and save time. The extension system at all levels should give due attention to enhance the availability of these implements to farmers at an affordable price. Medium and small scale harvesters, thresher, transportation facilities are all necessary and should also be made available to farmers.

Furthermore, considering the remarkable growth attained in the past few years in wheat production, and the potential upward trajectory anticipated, the role of the private sector in providing agricultural mechanization services cannot be overemphasized. Land preparation, row planting, cultivation, chemical spraying, laying communal drainage canals in vertisol areas, harvesting, threshing, packing and transporting produce, are all potential areas for agricultural mechanization service providers to work on to improve wheat production and productivity.

Such service providers may take the form of: entrepreneurial youths organized in a properly designed business model; Unions expanding their services to include agricultural mechanization; and any other interested company to provide the services. Creating an enabling environment for such service providers may include extensive training on business model development, provision of access to finance, and linking them with existing extension services.

Increase irrigated wheat production

Expanding wheat production to the lowlands where vast expanses of irrigable land is available is one potential intervention to achieve the vision for the wheat sector. With the government leading the development of irrigation infrastructure in these areas, commercial irrigated wheat production can be further expanded.

Increase technical support, access to finance and input supply for the private sector (commercial farmers)

It may be true that the private sector engaged in wheat production should develop its own capacity, while the role of government remains providing the enabling environment for the private sector to function well. Under the current circumstances, however, the capacity of the private sector engaged in wheat production is seriously constrained and its productivity is not much better than the small holder farmers. Government may need to strategically intervene to enhance the capacity of this sector so that a self-sustaining and robust private sector would gradually emerge and significantly contributes to the attainment of the national vision of the wheat sector. More importantly, access to finance should be facilitated by government and private financial service providers to this sector to help them expand their investment and improve their productivity. Government may also take the development of the infrastructure (road, power, and communications) in the remote areas where the private sector is operating in its priorities. The public extension service may also support the private sector through providing information on best practices and training their technical staff.
2.5. Post-harvest processing and storage

2.5.1. Strategic goal for post-harvest processing and storage

- Increased awareness, access and adoption of improved post-harvest processing machineries and implements by WMY small holder farmers
- Adequate access to improved storage facilities and awareness on appropriate storage techniques by WMY smallholder farmers

2.5.2. Systemic bottlenecks

Lack of awareness on proper post-harvest handling

Post-harvest loss can be reduced by appropriate post-harvest handling. However, most SHFs lack information and knowledge on improved post-harvest handling technologies and practices. As a result, farmers tend to sell their produce immediately after harvest, in an effort to avoid losses both in quantity and quality of their produce. Providing farmers with relevant information on post-harvest practices is very important.

Lack of access to post-harvest technologies for wheat

Postharvest activities include: harvesting, storing, processing, packaging, transporting and marketing. Crop losses occur at each of these stages. In a wider sense, post-harvest grain loss is the loss of grains (quality and/or quantity) between the moments of harvest and consumption.

Estimates suggest that the magnitude of post-harvest loss in Ethiopia is significant ranging from 5% to 26% and the average losses for tef, sorghum, wheat and maize being 12.9%, 14.8%, 13.6% and 10.9%, respectively (Dereje et al., 1989; Dereje, 2000). This loss occurs mainly due to traditional post-harvest practices. In addition to this loss, manual operation during harvesting, threshing, and transporting of threshed grain is highly labor intensive and time consuming to the farmer. Especially during unexpected rainfall towards harvesting season, delays in the harvest and threshing process result in damage and loss. During storage, the grain is often damaged by storage pests exacerbating the loss of quality of grain.

In the process of traditional harvesting, transporting, threshing and cleaning farmers usually lose significant amount of grain. At present, most of the improved post-harvest technologies such as harvesters, threshers and cleaners are not only scarce but also unaffordable and unsuitable to most conditions.

Community level storage facilities that provide affordable storage service to farmers are not available. Primary cooperatives, which could provide this service, as a whole have sub-standard storage facilities and limited personnel with knowledge of proper storage management. As a result, farmers are denied the opportunity of making selling decisions when prices are right and have to either store their grain on farm or sell immediately after harvest.

2.5.3. Strategic interventions

Increase awareness on proper post-harvest handling techniques

The extension system should aggressively promote post-harvest handling technologies. Farmers’ awareness of proper post-harvest handling techniques should be significantly increased. Such awareness can be achieved through practical demonstrations at farm levels and at FTCs, complemented by broader messaging through different communication media. Well organized and updated post-harvest wheat technology packages and manuals should be developed. Training on post-harvest handling techniques should be included in the regular trainings within the extension system targeting agricultural experts, DAs and both women and men small holder farmers. In addition, farmers should have access to meteorological information to enable them take timely decisions especially during unexpected rainfall at time of harvest.
Considering the significant role of female farmers in post-harvest activities, purposively targeting them during technical trainings can help improve community practices. These can be done through targeting women development groups and networks.

**Increase access to post-harvest technologies for SHF**

Small-scale post-harvest machineries and implements should be made available to farmers at an affordable price. Farmers may organize themselves to own medium scale harvesters, threshers, cleaners and processing implements, which should be complemented by improved accesses to spare parts and repair and maintenance services.

Enabling small and medium-scale enterprises to mass-produce post-harvest implements and spare parts needs to be a priority intervention. Agricultural mechanization research centers found in the regions can play a critical role in this regard. Both men and women farmers should be consulted through this process given their unique preferences and roles. For the women who are greatly involved in wheat processing, access to individual or village grain processing facilities is both an incentive to increase wheat production and a way to decrease workloads for women who have additional home and farm responsibilities (Klawitter, 2009). In addition to what can be achieved through interventions at the level of individual and groups of farmers, the expanded introduction of agricultural mechanization service providers in major wheat producing areas is also an essential intervention.

Access to finance is also a key enabling factor in expanding mechanization. For larger equipment, access to credit facilities for both capital purchases and operating costs is essential, if equipment leasing service providers are to extend their reach to other small holder farmers. For smaller equipment, which can be owned at the individual farmer level or at a small group level, access to finance through Micro Finance Institutions are essential to enable larger numbers of farmers to access and maintain their equipment.

**Increased access to community-based storage facilities for farmers through cooperatives and unions**

The extension system, through engaging the private sector and farmer organizations (coops and unions...), as may be appropriate, should strongly promote modern storage facilities such as metal silo (hermetic,), insect proof bags as well as community level improved storage facilities. Storage can have significant economies of scale. Therefore, it is unlikely that on-farm storage alone will fully meet farmer’s storage needs in the most cost-optimal manner. Introducing community level improved storage facilities could be an important intervention to shift the way farmers store produce for market. Such an approach would also enhance the aggregation of produce - greatly increasing efficiency of the market. Warehouse receipt systems could also be introduced in areas where community level storage facilities are operating.

## 2.6. Trade, marketing, and demand sinks

### 2.6.1 Strategic goal for trade, marketing and demand sinks

- An efficient wheat supply chain, linking WMY smallholder farmers, through efficient aggregators, to large, sustainable demand sinks
- Increased access to finance for wheat market actors including traders, coops and unions

### 2.6.2 Systemic bottlenecks

**Limited commercialization of local wheat and the influence of the large sales of subsidized imported wheat**

CSA crop utilization reports (2008-2012) indicate that the average annual marketed wheat remained almost constant over the years ranging between 18% and 20% of total production and the larger volume of wheat produced (~58%) is used for home consumption. The marketed volume of wheat covers only about 30% of the
annual demand of the more than 200 flour mills found dispersed in the country, whose combined annual capacity exceeds 2.3 million tons (EGTE Reports); some studies put this figure as high as 3.2 million tons (Abu, 2012).

**Figure 17: Local Wheat Production and Marketable surplus Vs. Millers Demand for Wheat**

Despite the recent significant growth of 55% in wheat grain production between 2008 and 2013 (CSA annual production figures), Ethiopia remains net importer of wheat. Excluding the import through food aid, the country imported on average 1,100K tons of wheat grain annually between 2008 and 2013 (ERCA data). The imported wheat is sold to urban consumers at a subsidized price. This has a direct impact on producers as it lowers market prices (Demeke, Di Marcantonio, 2013; Paul and Hashim, 2009).

Between 2008 and 2012, the average annual volume of imported wheat was equivalent to 38% of the average total wheat production and 188% of the average marketed wheat in the period (Calculated using CSA annual production reports and ERCA Data). This large volume of imported wheat sends negative signal to producers affecting their decision to invest more in wheat production.

Furthermore, targeting of the imported wheat to reach the intended urban poor didn’t appear to have met its goal. Everybody in the urban areas has equal access to the imported wheat, leading to heavy burden on the government in terms of forex.

In addition to these, wheat marketing is limited by various other constraints including lack of market information, lack of access to appropriate storage; lack of access to credit; inadequate road infrastructure and high cost of transferring wheat from rural market place (USAID, 2010).

**Limited involvement of primary cooperatives and unions in output marketing**

Out of the commercialized wheat, only a relatively small share goes through primary cooperatives and unions. This is due to a number of reasons: cooperative unions are mainly focused on input distribution and less on output marketing; they have limited access to finance to aggregate wheat from farmers; and they also have operational and management capacity gaps.
Limited availability of durum wheat that meets processors needs

Lack of linkage between processors and durum wheat producers hinders the farmers from producing the durum wheat in the required quantity and quality. On the other hand, since different varieties of durum wheat are produced in scattered pieces of land, it is costly for durum wheat processors to aggregate sufficient quantity of durum wheat with desired quality.

The actual yield of durum wheat is lower than that of bread wheat. In addition, the price of durum in the market does not compensate for the yield difference and the intensive management requirements to produce durum wheat compared to bread wheat. Hence, farmers are discouraged from producing durum wheat in the desired quantity.

Weak Multi-Stakeholder Platforms (MSP) at the federal and regional levels

Although some MSPs have been established in some regions (Oromiya), there is insufficient medium for all stakeholders in the wheat value chain to facilitate linkages. At the federal level much of the linkage between stakeholders remains uncoordinated, unsustainable and therefore largely ineffective.

2.6.3. Strategic interventions

Encourage increased commercialization and production of local wheat through increased market information and linkages

Farmers need to feel secure in their access to a stable and lucrative wheat market, if they are to continue investing and increase the size of their investment in wheat production. Efforts to increase local production of wheat should therefore be complemented by links to stable and sustainable demand sinks for increased output. Ethiopian Grain Trade Enterprise (EGTE) could play a pivotal role in both signaling to producers that their production would have a market, and in providing an actual institutional demand outlet for increased wheat production. Other sources of wheat market can be processors and wholesale markets such as Oromia Agricultural Products Marketing Enterprise (OAPME), Ethiopian Trading Enterprise (ETE), and potentially Ethiopian Commodity Exchange (ECX).

Improving access to market information across the value chain is also an important intervention. Timely market information including prices, standards, time and volume may reach farmers through various mechanisms including radio messages from dedicated institutions such as trade bureaus, cooperative offices, NGOs, trade associations as well as the formal extension system through announcements in FTCs and during farmer-visits by extension agents. Similar market information should also be accessible to other actors in the value chain like traders, aggregators, whole sellers and processors through additional mechanisms such as SMS messages, and web-based information systems.

Gradual withdrawal from distribution of subsidized imported wheat (substitute through local wheat purchase encouraging the local producers)

As indicated in the previous section, Ethiopia is losing significant amount of hard currency in importing and subsidizing wheat. Even if it is understood that the government’s intention is to stabilize market price and ensure sufficient local supply through imports, strategic policy shift towards substituting imports with local production should be gradually in place. Proper targeting of the imported wheat to reach the urban poor should also be made. These interventions would have double advantages: first they will encourage farmers to invest in increasing their production knowing that there will be reliable local market; second, Government will save hard currency which can be invested in infrastructure development related to the wheat sector. With improved domestic production also comes improved reliability of supply to the domestic buyers at competitive prices.

The current durum wheat import by processors is not only affecting local farmers, but also draining foreign currency of the country. To address this, there is a need to encourage the processors to focus on local production by linking them to the SHFs through aggregators. Moreover, the local production system should target meeting the desired end quality by processors and consumers.
Increase the role of primary coops and cooperative unions in output marketing and value addition

The role of unions in wheat output marketing and value addition can be increased through providing greater access to finance. Financial access may be secured for output marketing through special arrangement by linking the coops/unions to reliable buyers like EGTE and banks (CBE and cooperative banks). In this arrangement the Federal and Regional Cooperative Agencies should play vital role in following up the implementation of the tripartite agreement (the buyer, the union and the banks) to increase confidence of the banks to provide loan to unions. In addition, Governmental or Non-governmental development partners (e.g. Technoserve, ACDI-VOCA, SG-2000, etc...) may be involved to technically support (developing business plan, etc...) unions in the process of securing the loan.

Additionally, technical and financial capacity enhancing support should be provided to the unions to enable them increase their role in value addition (produce flour, other processed products and animal feed). Smallholder farmers, especially women who are currently underrepresented in cooperatives, should be included to benefit from the favorable output marketing opportunities. This can be done by targeting women development groups. The cooperatives and unions should develop trust from their members by improving transparency and flexibility (in pricing system) in their business operation

Support should also be provided to the primary cooperatives in areas of business skill development and storage infrastructure management. Similar support should be extended also to other large scale aggregators without compromising the efficiency of the value chain.

Strengthen linkage between producers, traders, aggregators and processors of wheat through Multi-Stakeholder Platforms (MSP)

- Organizing wheat farmers in groups to enable them to produce uniform quality product in clusters
- Support institutionalizing contract farming through linking producers and relevant users in the value chain.
- Identification of specific niches that suit production of desired quality durum that makes it competitive with other crops in the farming system.
- Creating linkage between durum wheat processors and farmer groups. The Ethio-Italian project on Agricultural Value Chains in Oromia may serve as a good model to link all the stakeholders along the durum wheat value chain.
- Establish grading and quality standard and pricing system based on quality (premium)
- Technical support should be given to wheat farmers to ensure they applied all improved wheat production technologies that enable production of quality wheat that meets market’s requirement.
- Strengthen wheat Multi-Stakeholder Platforms (MSP). Strengthening existing wheat MSPs in some regions (Oromiya) and establishing new ones at the federal and regional levels is of paramount importance to tackle the problems associated with linkages along the value chain.
- Strengthen the capacity of institutions such as trade bureaus and cooperative offices for them to be able to proactively assess and take actions to improve the overall business environment
### 2.7. Summary of bottlenecks and interventions

Table 6: Summary of goals, bottlenecks and interventions along the value chain components

<table>
<thead>
<tr>
<th>Value Chain Area</th>
<th>Goal</th>
<th>Systematic Bottlenecks</th>
<th>Strategic Interventions</th>
</tr>
</thead>
</table>
| **Research & Technology Development** | The research system generates appropriate, productivity and quality enhancing agro-ecology specific wheat technologies through a demand-based approach, including also shopping of ready-to-use technologies from abroad with strong links to the extension service Economics of wheat production and marketing studied and policy recommendations developed and communicated to government | • Wheat varieties released do not adequately meet the diverse agro-ecologies and needs of farmers  
  • limited focus in Durum wheat research, resulting in less competitive varieties  
  • Human and infrastructure capacity gaps at Research institutions  
  • Input and agronomic practices recommendations are not sufficiently tailored by agro-ecology  
  • Increased pressure of diseases, insect pests and weeds  
  • Insufficient research focus on agricultural mechanization  
  • Limited research focus on irrigated wheat production technologies  
  • Limited national capacity of research on the economics of wheat production and marketing | • Continued investment in the wheat research system to develop higher yielding disease resistant varieties that are suitable to different agro-ecologies, meet farmers’ needs and also international quality standards  
  • Increase focus in Durum wheat research  
  • Improve human and physical capacity of research centers  
  • Develop agro-ecologically tailored fertilizer, agronomic practices and variety recommendations  
  • Develop wheat Integrated Pest Management (IPM) technologies  
  • Increased research focus on agricultural mechanization  
  • Increased research focus on wheat irrigation technologies  
  • Strengthen research on Economics of wheat production and marketing |
| **Access to Inputs**       | • Increased knowledge of and sustainable access to quality inputs including high yielding and disease resistant varieties, fertilizers, and pesticides by smallholder wheat farmers  
  • Sustainable and easily accessible finance made available to smallholder wheat farmers for the purchase of inputs  
  • Increased access to finance for, coops and unions for input delivery and output marketing | • Limited availability of inputs (seeds, fertilizer, herbicides and fungicides)  
  • Untimely delivery of inputs (seeds, fertilizer, herbicides and fungicides)  
  • Lack of finance for full package inputs purchase  
  • Lack of input warehouse at primary cooperative and union level  
  • Limited availability of farm machineries, implements, spare parts and after sale services  
  • Lack of crop insurance | • Ensure sufficient availability of inputs (seeds, fertilizer, herbicides and fungicides)  
  • Implement systems to coordinate and track timely delivery of inputs  
  • Implement Direct Seeds Marketing (DSM)  
  • Increase access to finance for the purchase of full package inputs by SHFs  
  • Support primary cooperatives and unions financially and technically to improve their input storage capacity  
  • Encourage increased investment to avail farm machineries, implements and spare parts  
  • Promote more crop insurance schemes |
| **On farm Production**     | • Increased awareness and adoption of best Integrated Crop and Pest Management practices | • Inadequacies in the agricultural extension service  
  • Low level of appropriate input utilization  
  • Limited control of weeds | • Increase public investment on agricultural extension system  
  • Create awareness on optimal inputs package  
  • Promote Integrated Weed |
<table>
<thead>
<tr>
<th>Value Chain Area</th>
<th>Goal</th>
<th>Systematic Bottlenecks</th>
<th>Strategic Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Increased adoption of improved mechanization technologies by WMY</td>
<td>(especially grass weeds) • Limited control of diseases (specially rusts) • Limited</td>
<td>Management (IWM) • Promote Integrated Disease Management (IDM) • Create awareness on</td>
</tr>
<tr>
<td></td>
<td>smallholder farmers</td>
<td>awareness on best Integrated Crop Management (ICM) practices by farmers and extension</td>
<td>best Integrated Crop Management (ICM) practice • Promote awareness on durum wheat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>personnel • Limited awareness on and low production of durum wheat • Limited use of</td>
<td>production • Promote awareness on farm machinery and implements to farmers • Increase</td>
</tr>
<tr>
<td></td>
<td></td>
<td>farm machineries and implements • Limited awareness on practices of irrigation •</td>
<td>irrigated wheat production • Increase technical support, access to finance and input</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Insufficient support for private sector</td>
<td>supply for the private sector (commercial farms)</td>
</tr>
<tr>
<td>Post-harvest</td>
<td>• Increased awareness, access and adoption of improved post-harvest</td>
<td>• Lack of awareness on proper post-harvest handling • Lack of access to post-harvest</td>
<td>• Increase awareness on proper post-harvest handling techniques • Increase access to</td>
</tr>
<tr>
<td>Processing &amp; storage</td>
<td>technologies and practices by WMY smallholder farmers</td>
<td>technologies for wheat</td>
<td>post-harvest technologies for SHF • Increased access to community-based storage</td>
</tr>
<tr>
<td></td>
<td>• Adequate access to improved storage facilities and awareness on</td>
<td></td>
<td>facilities for farmers through cooperatives and unions</td>
</tr>
<tr>
<td></td>
<td>appropriate storage techniques by WMY smallholder farmers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trade, Marketing</td>
<td>• An efficient wheat supply chain, linking WMY smallholder farmers,</td>
<td>• Limited commercialization of local wheat and the influence of the large sales of</td>
<td>• Encourage increased commercialization and production of wheat through increased</td>
</tr>
<tr>
<td>and Demand Sinks</td>
<td>through efficient aggregators, to large, sustainable demand sinks</td>
<td>subsidized imported wheat • Limited involvement of primary cooperatives and unions in</td>
<td>market information and linkages, • Gradual withdrawal from distribution of subsidized</td>
</tr>
<tr>
<td></td>
<td>• Increased access to finance for wheat market actors including</td>
<td>output marketing • Limited availability of durum wheat that meets processors needs</td>
<td>imported wheat (substitute through local wheat purchase encouraging the local</td>
</tr>
<tr>
<td></td>
<td>traders, coops and unions</td>
<td>• Weak Multi-Stakeholder Platforms (MSP) at the federal and regional levels</td>
<td>producers) • Increase the role of primary coops and unions in output marketing and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>value addition • Strengthen linkage between producers, traders, aggregators and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>processors of wheat through Multi-Stakeholder Platforms (MSP)</td>
</tr>
</tbody>
</table>
CHAPTER 3: IMPLEMENTATION

3.1. Implementation framework

This strategy identifies the major interventions that need to be implemented to achieve the key goals of increasing productivity, overall production, marketing efficiency and incomes within the wheat sector, while saving the country foreign exchange through a complete substitution of imports. To ensure that the set goals are achieved in the set time, it is essential to categorize and prioritize the strategic interventions. Accordingly, based on the potential to result in high impact towards achieving the overall goal of the wheat sector, interventions are categorized as “core” “and non-core”. The same interventions are also categorized as short, medium and long-term based on the duration of time it requires for the intervention to produce results.

3.2. Sequencing of Interventions

Table 7: Prioritization and sequencing of strategic interventions

<table>
<thead>
<tr>
<th>Value Chain component</th>
<th>Strategic Interventions</th>
<th>Prioritization</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Short-term (1-2 years)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Medium-term (2-3 years)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Long-term (more than 3 years)</td>
</tr>
<tr>
<td>Research &amp; Technology Development</td>
<td>• Continued investment in the wheat research system to develop higher yielding disease resistant varieties that are suitable to different agro-ecologies, meet farmers’ needs and also international quality standards</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Increased focus in Durum wheat research</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Improve human and physical capacity of research centers</td>
<td>Non-core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Develop agro-ecologically tailored fertilizer, agronomic practices and variety recommendations</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Develop wheat Integrated Pest Management (IPM) technologies</td>
<td>Non-core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Increased research focus on agricultural mechanization</td>
<td>Non-core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Increased research focus on wheat irrigation technologies</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Strengthen research on Economics of wheat production and marketing</td>
<td>Non-core</td>
<td></td>
</tr>
<tr>
<td>Access to Inputs</td>
<td>• Ensure sufficient availability of inputs (seeds, fertilizer, herbicides and fungicides)</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Implement systems to coordinate and track timely delivery of inputs</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Implement Direct Seeds Marketing (DSM)</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Increase access to finance for the purchase of full package inputs by SHFs</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td>Value Chain component</td>
<td>Strategic Interventions</td>
<td>Prioritization</td>
<td>Timeline</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>----------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Short-term (1-2 years)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Medium-term (2-3 years)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Long-term (more than 3 years)</td>
</tr>
<tr>
<td>On farm Production</td>
<td>• Support primary cooperatives and unions financially and technically to improve their input storage capacity</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Encourage increased investment to avail farm machineries, implements and spare parts</td>
<td>Non-core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Promote more crop insurance schemes</td>
<td>Non-core</td>
<td></td>
</tr>
<tr>
<td>Post-harvest Processing &amp; storage</td>
<td>• Increase public investment on agricultural extension system</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Create awareness on optimal inputs package</td>
<td>core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Promote Integrated Weed Management (IWM)</td>
<td>Non-core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Promote Integrated Disease Management (IDM)</td>
<td>Non-core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Create awareness on best Integrated Crop Management (ICM) practice</td>
<td>Non-core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Promote awareness on durum wheat production</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Promote awareness on farm machinery and implements to farmers</td>
<td>Non-core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Increase irrigated wheat production</td>
<td>Non-core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Increase technical support, access to finance and input supply for the private sector (commercial farms)</td>
<td>Non-core</td>
<td></td>
</tr>
<tr>
<td>Trade, Marketing and Demand Sinks</td>
<td>• Increase awareness on proper post-harvest handling techniques</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Increase access to post-harvest technologies for SHF</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Increased access to community-based storage facilities for farmers through cooperatives and unions</td>
<td>Non-core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Encourage increased commercialization and production of wheat through increased market information and linkages,</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Gradual withdrawal from distribution of subsidized imported wheat (substitute through local wheat purchase encouraging the local producers)</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Increase the role of primary coops and unions in output marketing and value addition</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Strengthen linkage between producers, traders, aggregators and processors of wheat through Multi-Stakeholder Platforms (MSP)</td>
<td>Core</td>
<td></td>
</tr>
</tbody>
</table>
### 3.3 Partner institutions

The key institutions along the wheat value chain are diverse with a very complex interconnectedness. Table 8 presents the key institutions in each of the components of the chain and categorizes them as lead and supporting institutions.

**Table 8: Key actors in the wheat value chain**

<table>
<thead>
<tr>
<th>Value Chain Component</th>
<th>Lead institutions</th>
<th>Supporting institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research &amp; development</td>
<td>• EIAR&lt;br&gt;• Universities&lt;br&gt;• RARIs</td>
<td>• MoA&lt;br&gt;• RBoAs&lt;br&gt;• International Development Partners&lt;br&gt;• Private companies&lt;br&gt;• Universities&lt;br&gt;• CGIAR centers&lt;br&gt;• MOFED&lt;br&gt;• RBOFED&lt;br&gt;• NGOs</td>
</tr>
<tr>
<td>Input production</td>
<td>• MoA&lt;br&gt;• RBoAs&lt;br&gt;• ESE&lt;br&gt;• RSEs&lt;br&gt;• Research and rural technology centers&lt;br&gt;• Universities&lt;br&gt;• ESA</td>
<td>• Private Companies&lt;br&gt;• FCA (Federal Cooperative Agency)&lt;br&gt;• SMEs, Cooperatives, Unions&lt;br&gt;• NGOs&lt;br&gt;• International Development Partners&lt;br&gt;• CGIAR centers&lt;br&gt;• MOFED&lt;br&gt;• RBOFED</td>
</tr>
<tr>
<td>Input supply and distribution</td>
<td>• ESE&lt;br&gt;• RSEs&lt;br&gt;• MoA&lt;br&gt;• RBoAs&lt;br&gt;• Private companies&lt;br&gt;• Research&lt;br&gt;• Cooperatives and Unions</td>
<td>• EIAR and RARIs&lt;br&gt;• RSEs&lt;br&gt;• FCA&lt;br&gt;• Private companies&lt;br&gt;• Cooperatives and Unions&lt;br&gt;• NGOs&lt;br&gt;• International Development Partners&lt;br&gt;• Financial institutions&lt;br&gt;• Local administration&lt;br&gt;• Agro-dealers&lt;br&gt;• MOT&lt;br&gt;• MOFED&lt;br&gt;• RBOFED&lt;br&gt;• Transport associations</td>
</tr>
<tr>
<td>On-farm production</td>
<td>• MoA&lt;br&gt;• RBoAs&lt;br&gt;• EIAR and RARIs&lt;br&gt;• Cooperatives &amp; unions&lt;br&gt;• Local administration</td>
<td>• EIAR and RARIs&lt;br&gt;• NGOs&lt;br&gt;• Financial institutions&lt;br&gt;• International Development Partners&lt;br&gt;• MOFED&lt;br&gt;• RBOFED&lt;br&gt;• National Meteorology Agency</td>
</tr>
<tr>
<td>Post-harvest processing and utilization</td>
<td>• MoA&lt;br&gt;• RBoAs&lt;br&gt;• EIAR and RARIs</td>
<td>• NGOs&lt;br&gt;• ENHI&lt;br&gt;• Universities (Food Science Units)</td>
</tr>
</tbody>
</table>

---

52
<table>
<thead>
<tr>
<th>Value Chain Component</th>
<th>Lead institutions</th>
<th>Supporting institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>▪ Unions and cooperatives</td>
<td>▪ International Development Partners</td>
</tr>
<tr>
<td></td>
<td>▪ Private enterprises</td>
<td>▪ Financial institutions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ MOFED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ RBOFED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ CGIAR centers</td>
</tr>
<tr>
<td>Market access and growth</td>
<td>▪ Ministry of Trade</td>
<td>▪ CSA</td>
</tr>
<tr>
<td></td>
<td>▪ Ministry of Industry</td>
<td>▪ ENHI</td>
</tr>
<tr>
<td></td>
<td>▪ Ethiopian Standards Agency (ESA)</td>
<td>▪ International Development Partners</td>
</tr>
<tr>
<td></td>
<td>▪ MoA</td>
<td>▪ NGOs</td>
</tr>
<tr>
<td></td>
<td>▪ FCA/RCA</td>
<td>▪ ECPA (Ethiopian Consumer Protection</td>
</tr>
<tr>
<td></td>
<td>▪ ECX</td>
<td>Agency)</td>
</tr>
</tbody>
</table>
CHAPTER 4: MONITORING, LEARNING, AND EVALUATION (MLE)

4.1. Impact and outcome indicators

An effective monitoring, learning and evaluation system will be put in place to track progress and challenges during implementation and take corrective measures proactively when need arises. Especially, timely review of performance and resource utilization will be conducted based on agreed up on performance indicators and targets. Monitoring, Learning, and Evaluation rely on a results framework, initially articulated below, to track progress against goals. The results framework consists of indicators at the output, outcome, and impact levels. These results are expected to be achieved by 2017 and should directly result from interventions discussed in this document.

Table 9: Performance indicators

<table>
<thead>
<tr>
<th>Impact</th>
<th>Impact indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Increased women, men and youth smallholder farmers’ productivity</td>
<td>▪ At least 65 % increase in average Wheat yield (quintal/hectare) productivity by 2017 (from current 24 Qts / Ha to at least 40 Qts/Ha)</td>
</tr>
<tr>
<td>▪ Increased WMY smallholder income</td>
<td>▪ At least 70 % increase in total Wheat production by 2017 from 4million tons in 2013 to 6.8 million tons , and replacement of all current imports with locally produced wheat</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Outcome indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Increase adoption of improved seed varieties, appropriate fertilizer and best agronomic practices by SHFs</td>
<td>▪ At least 90 % of all Wheat SHFs used high quality improved seed varieties and appropriate fertilizers by 2017</td>
</tr>
<tr>
<td>▪ Increased adoption of improved post-harvest handling techniques and practices</td>
<td>▪ At least 90% of SHF (including at least 50% Female-headed households) wheat farmers used best agronomic practices (including crop rotation) by 2017</td>
</tr>
<tr>
<td>▪ Decrease in post-harvest losses for Wheat</td>
<td>▪ The current post harvest loss of 30% reduced to 15% in wheat producing areas</td>
</tr>
<tr>
<td>▪ Increase in proportion of marketed volume of locally produced wheat</td>
<td>▪ The proportion of marketed volume of locally produced wheat increased from the current 20 % to 48% by 2017</td>
</tr>
<tr>
<td>▪ Share of wholesale price captured by Wheat farmers</td>
<td>▪ The share of wholesale wheat price captured by farmers preserved at a minimum of 60% by 2017</td>
</tr>
<tr>
<td>Output</td>
<td>Output Indicators</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------</td>
</tr>
</tbody>
</table>
| **Research and technology development**: Performance of wheat research centers enhanced as a result of alleviating capacity limitations | ▪ Wheat research centers capacitated  
▪ Technology output of Wheat research centers improved by 25% (number of released varieties, agro-ecology-specific recommendations, and mechanized technologies) |
| **Inputs production and distribution**: WMY Smallholder wheat farmers have increased knowledge of and access to affordable, reliable and sustainable sources of high quality improved Wheat seed varieties, appropriate fertilizers, chemicals, farm implements and equipment tailored to specific agro ecologies | ▪ Increase in amount of high quality seeds and fertilizers packaged and distributed to farmers on time  
▪ Over 90% of wheat seed delivered to target woredas meets established quality standards by 2017  
▪ Over 95% of fertilizers delivered to target woredas meets established quality standards by 2017  
▪ At least 90% of improved wheat seed delivered in time to farmers by 2017  
▪ Volume of improved wheat seed supplied to farmers reached at least 80% of demand by 2017  
▪ Increase in availability of input finance to smallholder farmers  
▪ at least 60% of WMY smallholder wheat farmers in target woredas have access to at least 75% of their demand for input finance by 2017 |
| **On-farm production**: Smallholder WMY wheat farmers have increased knowledge on and access to agronomic best practices (including row planting, soil and fertility management, crop protection, crop rotation) | ▪ Increase in number of farmers exposed to agronomic best practices through training, on-farm demonstrations, experience-sharing learning  
▪ At least 90% of wheat farmers in target woredas (including 90% of FHHs) receive training, experience sharing learning and demonstration on benefits of use of best agronomic practices in major activities from land preparation to harvesting and storage by 2017 |
| **Post-harvest processing**: Increased knowledge of and access to post harvest processing facilities and practices by WMY smallholder Wheat farmers | ▪ Number of farmers with access to adequate storage facilities and practices  
▪ At least 65 % of WMY small holder Wheat farmers in high potential areas have access to adequate on-farm and off-farm storage facilities and improved postharvest handling practices by 2017 |
| **Trade, marketing, and demand sinks**: Increased access to sufficient and reliable markets for WMY Wheat SHF outputs | ▪ Cooperatives and other output aggregators have increased access to Wheat output financing  
▪ 80% of wheat aggregators have access to at least 50% of their output financing needs by 2017  
▪ Increased linkages to demand sinks such as millers, EGTE  
▪ At least 75 % of wheat traded flows in a structured manner from producers to large millers, and other demand sinks with enforceable contracts in place by 2017 |
CHAPTER 5. POTENTIAL CHALLENGES IN THE IMPLEMENTATION OF THE STRATEGY AND MITIGATING MEASURES

Institutional challenges: As discussed in the strategy, the wheat value chain is so complex and involves different institutions, often with competing interests. Even within government institutions bringing every stakeholder to a common and concerted action towards achieving the goal would remain one challenge.

This challenge needs to be tackled through institutionalizing platforms where all stakeholders can have a say in planning and implementation. Diligence in implementing the monitoring and learning aspects as outlined in the strategy would also be an additional tool in mitigating the potential impacts that may arise from this challenge. The overall GTP goal is also one powerful tool to guide the actions of key stakeholders.

Availability and allocation of required resources: Most of the interventions suggested to address the systemic bottlenecks along the components of the wheat value chain require considerable financial and human resources. Research institutions need massive resources to undertake complex researches to address issues like developing durable resistance for the rust disease in wheat varieties. This would require massive investment in infrastructure development. The extension service as well requires similar massive resources to proactively support the wheat sector.

The private sector would also require massive resources for various activities including among others, finance for output aggregation and processing, as well as for infrastructure development (storage, transport...).

Mitigation of these challenges, in addition to what the government can and should do, may also require involving active engagements with donors and development partners.

Climate related challenges may impede the achievement of set goals: The unpredictability of the rains with the resultant undesired effects would remain a serious challenge in the achievement of the set goals. Mitigating these challenges rests on careful planning and mainstreaming climate issues in the planned interventions by all concerned.

Effective gender mainstreaming may remain a serious challenge: While the significance of liberating the tied power and resources that exists with women and youth is discussed at length in the strategy. Translating this into effective results may still remain a serious constraint towards achieving the set goals of the strategy. Though the roots of this challenge remains deeply rooted in the society at all levels, sustained efforts to institutionalize gender mainstreaming in all plans and interventions should be the way forward.
CHAPTER 6. WHEAT SECTOR STRATEGY REVIEW

Wheat Sector Strategy Review Committee
This sector strategy is envisioned as a living document that provides meaningful and impactful guidance to sector participants to realize the vision for the sector as a whole, and for each of the identified components. For this goal to be achieved there needs to be a structured way to review this strategy on a periodic basis, and improve on it based on lessons learnt and changing realities within the sector.

It is therefore envisioned that a Wheat Sector Strategy Review Committee will be constituted to update this strategy on an annual basis, and convene other sector participants to discuss progress made; lessons learnt and planned activities in the following years.

The members of the Wheat Sector Strategy Review Committee would be from the following institutions:

1) Ministry of Agriculture
2) The Ethiopian Agricultural Transformation Agency
3) The Ethiopian Institute of Agricultural Research
4) Ministry of Trade
5) A representative from the Public Seeds Enterprises
6) A representative from the Private Seeds Enterprises
7) A representative from the Federal Cooperatives Agency
8) A representative from the Private Wheat Sector
9) Two representatives from Multilateral and Donor Organizations with significant activities in the Wheat Sector

The Wheat Sector Strategy Review committee would meet at least once annually, and will have the responsibility to update the sector strategy on an annual basis. They would also organize an annual Wheat Sector Review Meeting.
Annex 1: Major Stakeholders of the Wheat Sector

Ministry of Agriculture

The Ministry of Agriculture (MoA) is responsible for developing and coordinating the implementation of the overall national agricultural development policies and strategies, with input and support from the regions and other stakeholders. The ministry is also responsible for developing extension packages for newly developed technologies and disseminating those through its extensive extension networks.

Regional Bureaus of Agriculture

The Regional Bureaus of Agriculture (RBoAs) are responsible for coordinating and leading agricultural development in their respective regions. RBoAs develop extension packages and provide support to zonal and woreda offices of agriculture in delivering extension services. They also facilitate coordination and alignment across development partners to ensure coordinated agricultural development services are delivered at the zonal and woreda level.

Research Institutions

EIAR and RARIs

The Ethiopian Institute of Agricultural Research (EIAR) and the Regional Agricultural Research Institutes (RARIs) have the mandate to generate, adapt and promote agricultural technologies that are required to enhance agricultural productivity. These institutes play key roles in the development, release and promotion of improved technologies (including improved varieties, recommended agronomic practices and farm implements) and up-to-date information. They are also responsible for multiplication and supply of early generation seed (breeder and pre basic seeds). In addition, EIAR is responsible for the coordination of nationwide research, while the RARIs have the responsibility to conduct targeted research and develop mainly region-specific technologies and recommendations.

EIAR manages a number of federal research centers, each mandated to work on a specialized set of agricultural research subjects. The national wheat research is coordinated from Kulumsa agricultural research center (under EIAR). Other research centers involved in wheat research include, Sinana, Debre Zeit, Areka, Hawassa, Mekele, Debre-berhan, Sirinka, Adet, Holetta, Ambo and higher learning institutes including Haramaya, Ambo and Hawassa universities amongst others.

In addition to the crop research centers, there are agricultural mechanization research centers such as Asella, Bako, Melkasa, and Bahirdar which focus on the production of agricultural machinery prototypes and testing imported machineries.

Ethiopian Agricultural Transformation Agency (ATA)

The ATA is an initiative by the Government of Ethiopia (GoE) with the primary aim of promoting agricultural sector transformation by supporting existing structures of government, private-sector and other non-governmental partners to address systemic bottlenecks and deliver on a priority national agenda to achieve growth and food security. ATA’s overall mandate is to address systemic bottlenecks in the agricultural sector by supporting and enhancing the capability of the MOA and other public, private, and non-governmental implementing partners, with the ultimate objective of improving the livelihoods of smallholder farmers.

The ATA, with its partners, is currently working in systemic bottlenecks identification and formulating solutions; implementation support to provide project management, technical assistance, and knowledge sharing; capacity building to strengthen key public, private, and civil society partners to ensure sustainability of interventions; and coordination to enhance linkages and coordination among stakeholders in high priority areas to reach agreed-upon milestones and objectives.

Ministry of Finance and Economic Development (MoFED)
Formulates development policies, plan and budget; mobilize and administer external resources; and institutes efficient and effective accountable public finance and property administration and controlling system. It has a major stake in wheat production through its influence in policy making and resource allocations.

Federal Cooperative Agency
The Federal Cooperative Agency develops and enforces federal cooperative regulations. It works towards creating enabling environment for various types of cooperatives in the country. It plays key role in the wheat sector through its influence in providing the enabling environment for the development of effective and competitive cooperatives and unions involved in the wheat sector.

Higher Learning Institutions (HLIs)
There are over 30 universities and colleges currently in operation in the country. Many of the older ones such as Haromaya University, Mekele University, Hawassa University, Bahir Dar University, Ambo University and Jimma University have agricultural colleges engaged in agricultural research and extension, mainly addressing priority constraints in the regions where they are located.

Institute of Biodiversity Conservation (IBC)
IBC is a federal government institute with mandates to ensure: (1) conservation of biodiversity, (2) sustainable utilization of resources, and (3) access to and sharing of benefits of biological resources. In the case of crops, IBC maintains a gene bank for the preservation of indigenous crop races. IBC is a close ally of the research system in the identification, development and maintenance of improved varieties. It is also a key partner in the identification and management of risks associated with widespread technology adoption.

Seed Enterprises
The Public Seed Enterprises (PSEs) include the Ethiopian Seed Enterprise (ESE) and Regional Seed Enterprises (RSEs) in Amhara, Oromia, SNNP, and most recently, Somali regions. In general, PSEs exercise the dual mandate of implementing the government’s target of producing sufficient quantities of improved seed for key crops including cereals like wheat, while functioning as independent profit making businesses.

Most wheat seeds are produced by PSE’s, with very limited involvement from Private Seed Producers. It is a goal of this strategy to encourage private wheat seed growers, and community based seed producers, including unions and cooperatives, to work in the production and dissemination of improved wheat varieties.

Ethiopian Seed Growers and Processors Association
Strives to strengthen the seed system in the country by playing a coordination role in the formal seed sector (Private, public...), and plays advocacy roles in policy formulation (seed law) based on ISTA (International Seed Testing Agency) models.

Ethiopian Grain Trade Enterprise
Ethiopian Grain Trade Enterprise (EGTE) plays a major role in cereal marketing in Ethiopia. More specifically, EGTE is the primary public enterprise that purchases grain from farmers to sell in local and export markets, contributing towards stabilization of cereal markets in Ethiopia. EGTE has played an active role in the marketing of wheat - purchasing both locally and internationally, and supplying to millers and consumer associations.

Agricultural Input Supply Enterprise (AISE)
The Agricultural Input Supply Enterprise has the primary responsibility of importing and distributing critical agricultural inputs including fertilizers.
National and Regional Soil Testing Laboratories
They support the extension service through undertaking various soil analysis works. They also provide service to the private sector. There are 18 laboratories including the National Soil Testing Laboratory located in Addis Ababa, and the remaining 17 spread in 7 regions.

Farmers
Farmers, particularly the 4.0 million wheat smallholder farmers, are the ultimate owners of and beneficiaries from this sector strategy.

Commercial and state farms
In realizing the overall vision for the wheat sector, these farms would have significant contributions. These farms also play major roles in expanding mechanized wheat production.

Primary Cooperatives (PC) and Cooperative Unions (CU)
Agricultural cooperatives have an important role to play in addressing the needs of smallholder farmers, including providing inputs and output marketing services. There are about 10,000 primary agricultural cooperatives, 160 unions, and 3 federations in Ethiopia. The GTP envisions an increase in the number of cooperatives in Ethiopia to over 56,000 by 2015.¹

The Ethiopian Commodity Exchange (ECX)
ECX is an organized marketplace, where buyers and sellers come together to trade - assured of quality, quantity, payment, and delivery. ECX at the moment trades mostly coffee, sesame and pulses; however its founding objectives include the trade of cereals including Wheat.

Private sector
The wheat value chain can benefit from private sector investment and participation. The sector can play lead role in the production and distribution agricultural inputs; in the import, export, production, and distribution of post-harvest machinery; mechanization service delivery, and agro-processing and marketing. Such participation can be achieved through a variety of business models, including Public-Private Partnerships (PPP).

Other relevant ministries
The Ministry of Trade (MoT): Is a key stakeholder in the import and domestic marketing of wheat. As the country is striving to exit from wheat import, the ministry plays key role in developing and implementing policy interventions that facilitate the production and marketing of wheat.

The Ministry of Industry (MoI): Has a mandate to support the development of agro-processing industries, through providing enabling policy environment.

The Ministry of Foreign Affairs (MoFA): Contributes towards the promotion of the country’s agricultural potential in international platforms to attract more Foreign Direct Investment (FDI).

The Ministry of Women, Children and Youth Affairs (MoWCY): Has a mandate to promote gender mainstreaming to improve women’s participation in overall national development. It can play key roles in addressing gender issues in the agriculture sector, including in wheat production and marketing.

Consultative Groups for International Agricultural Research Centers (CGIAR)

¹Ministry of Finance and Economic Development (MoFED); Growth and Transformation Plan (GTP), 2010/11-2014/15, September 2010 -Addis Ababa
CIMMYT (International Center for Maize and Wheat Improvement) and ICARDA (International Center for Agricultural Research in the Dry Areas): Support in terms of provision of germplasm for breeding programs as well as financial and technical capacity building for research and extension service providers in the country.

ASARECA (Association for Strengthening Agricultural Research in Eastern and Central Africa): Works on Coordination and harmonization of regional agricultural research in Eastern and Central Africa; it can support the wheat sector through providing technical capacity building for the national research system.

National and regional Projects working on wheat

AGP (Agricultural Growth Program): The Agriculture Growth Program (AGP) is a multi-donor funded comprehensive program anchored in the Ethiopian government’s focus on increasing sustainable agriculture growth. As a major component of the government’s five-year Growth and Transformation Plan (GTP) and a potential extension well into next GTP, AGP complements existing programs, and promotes agricultural growth in targeted, potentially rich, but underdeveloped woredas of the country.

EAAPP (Eastern Africa Agricultural Productivity Program): This program is owned by MoA and EIAR and mainly works on wheat. The major focus of the program is to establish Regional Center of Excellence (RWCoE) for research on wheat. It is expected that over five years, the Wheat Centre of Excellence in Ethiopia will have attained those qualities that will enable the country and the region to sustainably increase wheat productivity.

SARD-SC (Support to Agricultural Research for Development of Strategic Crops in Africa): Is a multinational, CGIAR led project, whose objective is to enhance food and nutrition security and contribute to poverty reduction. Wheat is one of the six commodities that African Heads of State have, via the Comprehensive African Agricultural Development Program (CAADP), defined as strategic crops for Africa. The specific objective of the project is to enhance the productivity and income of the four CAADP’s priority value chains on a sustainable basis. The project has four components: Agricultural Technologies and Innovations Generation; Agricultural Technologies and Innovations Dissemination; Capacity Building; and Project Management. Its approach works across the full value chain of each crop addressing both food costs and employment creation.

The Ethio-Italian Cooperation Project “Agricultural Value Chains in Oromia”: Aims at developing two traditional crops of Ethiopia through a rigorous market-oriented approach: durum wheat and wild coffee. The overall goal of the project is to switch on a self-sustained durum wheat value chain for production of pasta. The expected impacts are to strengthen farmer cooperatives and unions, improve quality (of grain and pasta) and ultimately to substitute the importation of hard wheat.

Sasakawa Global 2000 (SG 2000) /Sasakawa Africa Association (SAA): SG-2000 is an international NGO which works in close collaboration with national agricultural extension services across sub-Saharan Africa to transform African extension advisory services in partner countries to assure greater household food security. It has been working in agricultural extension in Ethiopia since 1993, in collaboration with the Ministry of Agriculture.

Non-government, multilateral, and bilateral organizations
Non-government, multilateral, and bilateral organizations are major players in agricultural and rural development, many of which implement programs in food security and natural resource management. In particular, USAID has scaled up its agriculture development investments in Ethiopia, focusing around the AGP. In support of Market and Agribusiness Development sub-component, USAID launched the US$50 million Agribusiness and Market Development (AMDe) project in AGP woredas, led by implementation partner ACDI/VOCA, focusing on six agricultural value chains including wheat.
Financial Institutions

Commercial Bank of Ethiopia

The Commercial Bank of Ethiopia (CBE) is the largest commercial bank in Ethiopia with assets of 158.11 billion Birr as on June 30th 2013. With its extensive network and huge resources, the bank can play indispensable role in addressing the financial needs along the wheat value chain.

Other Financial Institutions

Other financial institutions including banks, credit and savings institutions, other MFI’s and Rural Savings and Credit Organizations, etc. all have a significant role to play in enabling financial access to sector players for inputs, output financing and equipment purchases. Major institutions in this regard include, Amhara Credit and Savings Institution (ACSI), Oromia Credit and Savings Share Company (OCSSCO), Omo Micro Finance (OMO). Nyala Insurance Share Company (NISCO) has been involved in promoting crop insurance schemes.
REFERENCES


ATA/ MOA/EARI, 2013. Five Year National Strategy for the Tef Value Chain in Ethiopia


Dereje Ashagari, Getachew Mamecha, May 1989. Postharvest losses assessment in


Fikre Mulugeta, Jemberu Eshetu, Olani Nikus, 2010. Seed Value Chain Analysis as a Means for Sustainable Seed System: A case of farmers based seed production and marketing in Arsi Zone, Oromia Region. ©FAO-CDMDP.


Singh S.S., and S. Kota., 2007: GENETICS AND PLANT BREEDING. Division of Genetics, Indian Agricultural Research Institute, New Delhi-110012.


Tadesse Anera and Asferachew Abate, 2008. An Assessment of the Pesticide Use, Practice and Hazards in the Ethiopian Rift Valley. Africa Stockpiles Programme. 003


