REPORT ON THE ETHIOPIAN ECONOMY

2016

Agricultural Transformation in Ethiopia: Prospects and Challenges

Ethiopian Economics Association (EEA)

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Foreword

Following the tradition of past years, the Ethiopian Economic Association is pleased to present the 2016 report on the Ethiopian Economy, which has been written on the theme of **"*Agricultural Transformation in Ethiopia: Prospects and Challenges*".** The Report has usual two parts: Part one focuses on a broader review of the macroeconomic situation and the performance of the economy at the sectoral levels for the period 2014/15 and attempted to provide professional assessment of the existing policies and strategies and recommends new policy directions wherever appropriate. Part two of the Report discusses some of the issues related to the selected thematic focus area of the year titled "***Agricultural Transformation in Ethiopia: Prospects and Challenges***" which will have significant implications to the efforts of bringing the country into the club of middle income countries by 2025. As before, the publication of this report comes at timely moment and provides a valuable contribution to the understanding of Ethiopia's recent transformation efforts particularly within the agricultural sector.

Economic transformation is a dynamic process through which a country's economy, society and institutions modernize and move to more developed levels. Economic transformation involves moving labour from low to higher productive activities. This includes between sectors to higher value activities (for example, from agriculture to manufacturing) and within sectors (for example, from subsistence farming to high-value crops).

Through this process, economic structure changes significantly in which industrialization triggers a rapid increase in the share of manufacturing in the economy, and a concomitant decline in agriculture's share. In addition the share of the total labor force employed in the agricultural sector falls, while that in other economic sectors rises. In addition, the center of the country's economy shifts from rural areas to cities, and the degree of urbanization significantly increases. However, in order all this to happen there needs to be strong structural transformation within the sectors themselves. Since agriculture is the main economic sector in Ethiopia it is extremely important to take appropriate steps to ensure that the sector responds to the new dynamics and expectations. This report therefore, has attempted to assess the progress made in terms of transforming the agricultural sector from its low base and moving it to a new trajectory level.

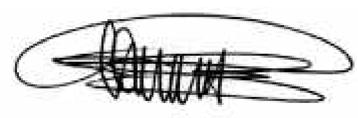
On the good side, the impressive economic growth witnessed over the last one decade provides a solid foundation for transforming the economy for better jobs and shared prosperity. An essential part of economic transformation is acquiring the capability to produce a widening array of goods and services and then choosing which ones to specialize in based on international relative prices. It is widely accepted that poverty reduction and economic growth cannot be sustained without economic transformation and productivity change.

Over the last several years, the economy grew by nearly 10 per cent per annum according to official government data putting it as one of the fastest growing economies in the word. The recent economic growth in Ethiopia has been the consequence of political and macroeconomic stability, improved domestic policies, and favorable terms of trade for a number of export commodities. The global environment has also been conducive for growth, and the emergence of several large developing countries (e.g. China and India) has significantly changed the international landscape. Globalization has begun to link growth in these and other developing countries with further development in Ethiopia, with the result that Ethiopia is now experiencing both new opportunities and new challenges. The Ethiopian government has been engaged in a major effort to transform the economy as reflected in the Growth and Transformation Plan (GTPI and II) and place the country on a trajectory to become a middle income economy by the year 2025.

However, moving from a low- to a middle-income status requires more than an increase in per capita income; it involves transformation as an important part of development process. Transformation involves the modernization of a country's economy, society and institutions. Understanding how to accelerate and support the transformation efforts in Ethiopia both at the sectoral and aggregate levels poses an important challenge to policy makers and economists. In view of this, the Association has embarked on the timely issue of transforming the Ethiopian Agricultural sector in this year's Report with the aim of providing lessons that can be tailored to the country's endowments, constraints and opportunities and promote the future success of the transformation process. To better understand alternative paths of Agricultural transformation for the Ethiopian economy, the Report examines the experience of some developing countries that have already reached or are on track to reach middle income status.

I hope that the Report would be useful to all readers including policy makers, private business people, civil society organizations, the academia, the media, the international communities and the general public.

Finally, I would like to express my appreciation to all those people whose contribution has made this Report possible.



Alemayehu Seyoum Taffesse (DPhil)
President
Ethiopian Economics Association

Acknowledgement

The production of this report is the result of a genuinely collaborative effort of many people. The Ethiopian Economics Association wishes to gratefully acknowledge the valuable contributions made by everyone who was involved in this team effort. The overall work has been led by Dr. Assefa Admassie, who is the Principal Research Fellow at the Ethiopian Economic Policy Research Institute. The chapter on the Macroeconomic Developments is written by Dr. Seid Nuru Senior Research Fellow and Mr. Gashaw Desalegn while and the different chapters on the thematic issues "*Agricultural Transformation in Ethiopia*" were written by a team of researchers led by Dr. Seid Nuru Senior Research Fellow and Dr. Samuel G. Selassie. They deserve great appreciation and special recognition for their immense intellectual contribution and hard work.

The chapter on the Brief Assessment of the Performance of the Ethiopian Agriculture has been written by Dr. Samuel Gebre-Selassie. Amin Abdella prepared the chapter on the Large and Medium Scale Manufacturing Industries: Performance over the GTP I period and Prospects during GTP II. Finally the Chapter on Rural Non-Farm Enterprise Engagement and Gender in Ethiopia is written by Dr. Degnet Abebaw and Fitsum Zewdu. Their dedication and hard work made this report possible and their contribution is highly appreciated and recognized.

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Many other people have also made very valuable contributions to this report, and we are grateful to them. A special thank goes to Ato Daniel Desta who served as the language editor. W/O Rahel Yilma also deserves special thanks for preparing and formatting the manuscript before it is sent to the publisher. The staffs of the Finance and the Administration Divisions as well as the documentation centre provided valuable administrative and logistic support during the preparation of the report. Other EEA staffs have also contributed to the successful completion of this project. Their contribution is also highly appreciated.

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Macroeconomic Performance

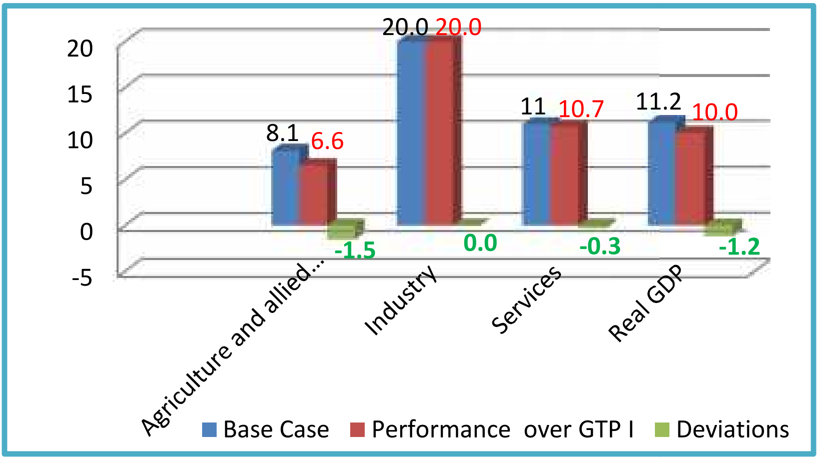
1.1 Growth

The fiscal year 2014/15 marks the final year of the first phase of the Growth and Transformation Plan (GTP I) of Ethiopia. In the fiscal year, nominal GDP stood at 1.24trillion Birr. This translates into a per capita GDP of 13,883.5Birr which is equivalent to 690.9 USD at the current official exchange rate. The Ethiopian economy continued to expand during the fiscal year as real GDP grew at 10.2 percent.

Value-added in the service, agriculture, and industry sectors grew at 10.2 per cent, 21.7 per cent, and 6.4 per cent, respectively. The high rate of expansion of the industrial sector during the fiscal year is explained by the 3 percentage points contribution to the 10.2 per cent GDP growth. This resulted in an improvement in the contribution of the industrial sector to the overall growth from 21.3 per cent in 2013/14 to 29 per cent in 2014/15. The service and agricultural sectors had 4.7 and 2.6 percentage points contribution to the GDP growth, respectively.

Overall, the four major sectors that have been driving economic growth in Ethiopia are construction, crop production, wholesale and retail trade, and hotels and restaurants subsectors. The high growth rate observed in the manufacturing sector (20.3 per cent) is consistent with the aims of the GTP I. The sustainability of this growth and whether it is a sign of structural transformation is yet to be seen in the second phase of GTP.

Figure 1.1: GTP Targets Vs Performance

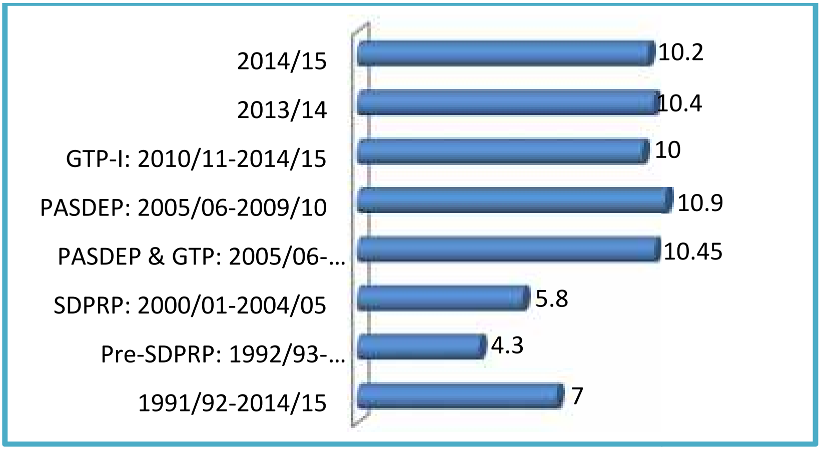


Source: EEA staff computations based on data from National Planning Commission

During the fiscal year 2014/15, which is the final year of the first phase of the Growth and Transformation Plan (GTP) of Ethiopia, the volume of the Ethiopian economy measured by nominal GDP reached 1.237 trillion Birr. This translates into a per capita income of 13,884 Birr or 690.9 USD at the current official exchange rate. In the review period real GDP grew by 10.2 percent relative to fiscal year 2013/14. Though this rate is one percentage point lower than the plan, the growth performance is robust. The GTP targets of growth for the fiscal year were 11.2 percent and 14.9 in base case and high case scenarios, respectively. The performance of the industry and the service sectors was close to the base case scenario. However, the performance of the agricultural sector falls short of the GTP target as value added in the sector grew by 6.4 per cent against the GTP target of 8.1 per cent.

Value added in the industry sector has grown by 21.7 percent well above the GTP I target of 20 per cent. Similarly value added in the service sector grew at 13 percent and this rate of growth is higher than the GTP targets by 2.3 percentage point.

Figure 1.2: GDP Growth Rate (%)



Source: Staff computations using data from MOFEC

In the fiscal year 2014/15 the service sector continues to be the highest contributor to GDP growth. Out of the 10.2 percent growth rate, the services sector contributed 4.7 percentage points which is 46.1 percent from the total growth. The industry sector has also improved its contribution to growth in GDP as it contributed 3.0 percentage points (which is 29 percent). The agricultural sector contributed to a quarter of the GDP growth.

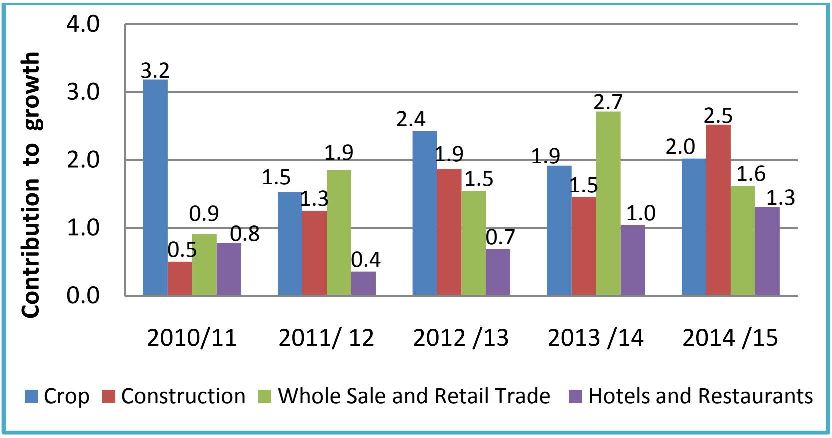
Table 1.1: Growth Decomposition by Sector

	Agriculture			Industry			Services		
	Contribution to Growth	Growth rate	Share in GDP Growth	Contribution to Growth	Growth rate	Share in GDP Growth	Contribution to Growth	Growth rate	Share in GDP Growth
1991/92-2014/15	2.4	4.9	35.5	1	0.9	14.1	3.4	1.5	50.4
Pre-SDPRP: 1992/93-1999/00	1.4	1.9	31.8	0.5	3.6	11.9	2.4	5.8	56.3
SDPRP: 2000/01-2004/05	2.8	5.6	47.1	0.8	7.9	13.3	2.3	5.9	39.6
PASDEP & GTP: 2005/06-2014/15	3.5	7.4	32.9	1.7	15	16.2	5.3	12.4	50.9
PASDEP: 2005/06-2009/10	4.1	8.3	37.7	1	10.1	9.1	5.8	14.1	53.2
GTP-I: 2010/11-2014/15	2.8	6.6	28.1	2.3	20	23.3	4.9	10.7	48.5
2013/14	2.3	5.4	22	2.2	17	21.3	5.9	13	56.8
2014/15	2.6	6.4	24.9	3	21.7	29	4.7	10.2	46.1

Source: EEA staff computation using data from National Planning Commission

The first phase of the GTP was aimed at laying the foundations for structural transformation in the Ethiopian economy. Along with efforts of investing in infrastructural capabilities, the Plan envisaged a shift of economic activities from agriculture to industry. It was targeted to reduce the share of agriculture from 45.2 percent to 37.8 percent. At the same time the GTP planned to increase the share of industry from a very low share of 9.8 percent to 16.9 percent. While the increase in the share of the industrial sector in the economy is not significantly divergent from the GTP target, the dominance of the construction sub sector instead of the manufacturing sector need to be revisited during the second phase of GTP. In general the major subsectors that have been driving economic growth in Ethiopia are construction, crop production, whole sale and retail trade, and hotels and restaurants. As it is shown in Figure 1.4, the dominance of crop production in the overall growth of GDP has recently been overtaken by the construction subsector. In general, the high contribution of the construction subsector to growth is expected for a country that puts much of its efforts in infrastructural investments as a basis for further economic takeoff. However, the investment in the big infrastructure projects so far needs to be accompanied by expansions in the productive sectors such as manufacturing and agriculture. Within the service sector, the high growth episodes in the wholesale and retail trade, as well as the hotels and restaurants subsectors need to be overtaken by subsectors such as transport and communication, and financial industries which are believed to have a significant positive effect on the productivity of other sectors.

Figure 1.3: Major Subsectors Driving the Ethiopian Economy



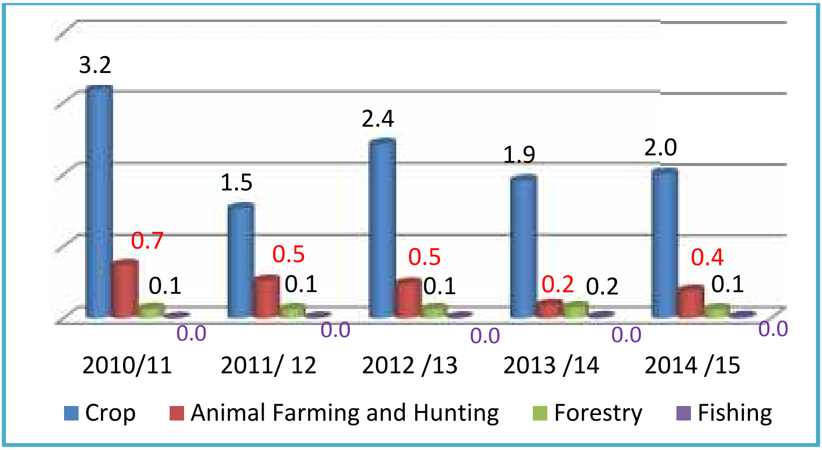
Source: MoFED and Staff Computation

1.1.1 Agriculture

Agriculture is still a major source of employment, income and livelihood for most of the society. The capability of the country to address poverty, food insecurity and various socio-economic problems is highly dependent on the performance of the sector.

Value added in the agriculture sector grew by 6.4 in the fiscal year under review. On average agriculture grew by 6.6 percent over the GTP period. This figure contrasts with even the higher growth rate of 8.3 percent during PASDEP (2006-20010). Taking notice of the role of urban demand for agricultural output in triggering high growth in the agricultural sector, the deceleration in growth rate in the sector during the GTP period may signal the need to increase demand from the formal sector this time through accelerating the growth in the manufacturing sector.

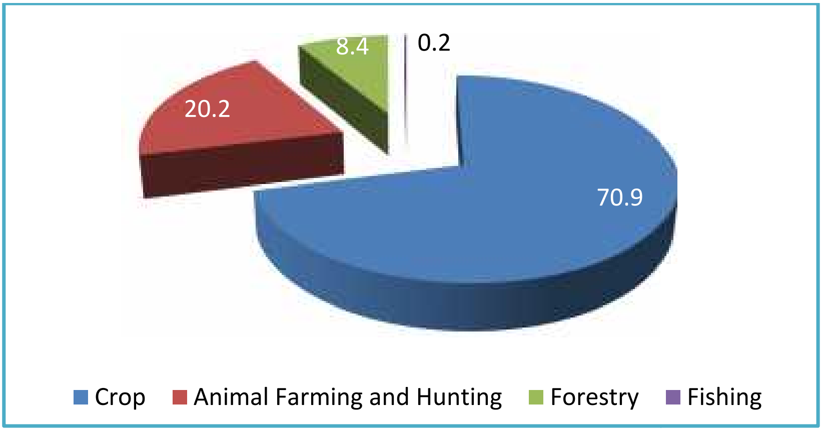
Figure 1.4: Contribution of Agricultural Subsectors to Growth



Source: MoFED and Staff Computation

Crop production alone contributed 2 percentage points to the overall growth in GDP. This is equivalent to a 19.6 percent increase in the GDP growth. However the dominance of crop production in leading the spur in the GDP growth has been overtaken by the construction sector in recent years. The agricultural sector is a crop dominant sector. From the total output in the sector a 71 percent share is accounted for by crop production in the year under review. The picture is not different from the previous GTP years. The lowest share of crop production in agricultural was observed in the first two GTP years which was 69 percent. This shows how the sector is dominated and less diversified. In the year under review animal farming and hunting accounted for20.2 percent of the total value addition in the sector. Forestry accounted for 8.2 percent and fishing for a negligible 0.2 percent.

Figure 1.5: Share of Subsectors of Agriculture in 2014/15



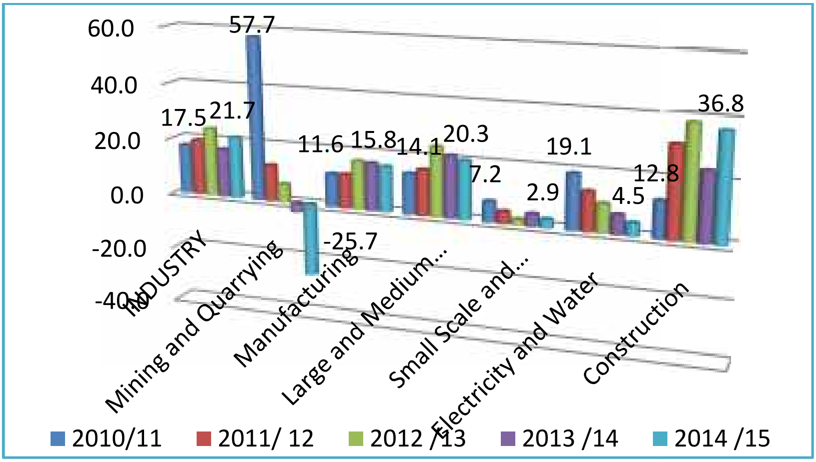
Source: MoFED and Staff Computation

While agriculture is recognized as the backbone of the Ethiopian economy in many ways, the low capabilities in the sector and the heavy dependence of export earnings on the sector has made the economy susceptible to external shocks. The poor performance of the export sector was mainly a result of the decline in commodity prices. The unfavorable prospects of the next harvest due to a threatening drought are expected to drag growth significantly and challenge livelihoods. This calls for agricultural transformation.

1.1.2 Industry

The 2014/15 fiscal year exhibited the challenges towards structural transformation as the manufacturing sector had little or no appreciable change in its share in the economy. While there has been an increasing trend in the industrial sector in terms of its static and dynamic contributions to GDP, the spur in growth in the sector was largely dominated by the expansion of the construction subsector. The industrial sector was targeted to grow, on average, by 20 percent over the GTP-I period in the base case scenario. That rate was expected to raise the share of the sector in GDP to reach 16.9 percent at the end of the plan period (2014/15). The 20 percent growth rate in the industrial sector drove the share of the value-added in the sector from the total GDP up to 15.1 percent in 2014/15, which was 9.8 in the fiscal year 2009/10.

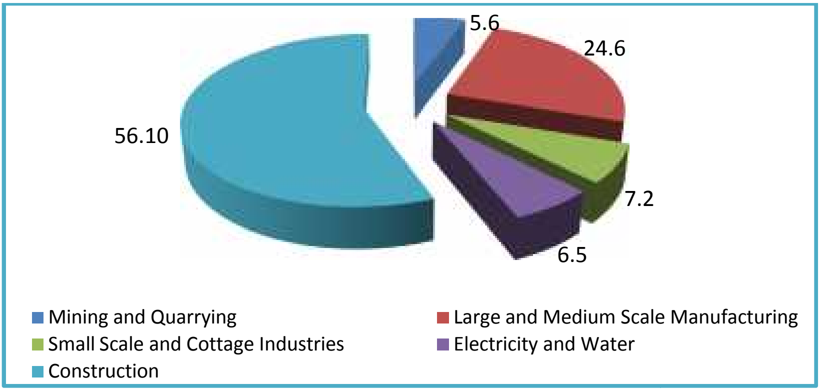
Figure 1.6: Growth Rate of the Industry Subsectors



Source: MoFED and Staff Computation

The construction subsector takes the lion's share of the value added in the industrial sector. In the review period, value-added in the construction subsector alone accounted for a 56.1 percent of the total industrial output. The manufacturing sector had a share of 31.8 percent of the total industrial output. The large and medium scale manufacturing sector accounted for24.6 percent. The mining and quarrying as well as the small scale and cottage industries had decelerating trends in their growth.

Figure 1.7: Growth Rate of the Industry Subsectors 2014/15



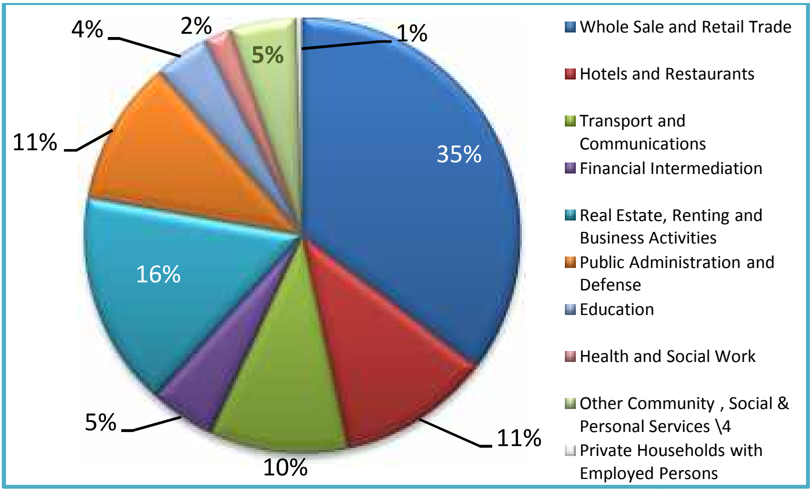
Source: MoFED and Staff Computation

Developments in the construction subsector are in general positive. Private sector development, in particular, in the manufacturing sector presupposes good infrastructure. Efforts to lay the foundations for the structural transformation through expansion of infrastructure generate high growth in the subsector. Nevertheless, this is high time for the already acquired infrastructure to pay off by attracting investments in the manufacturing sector and commercial agriculture.

1.1.3 Services

The services sector contributed 5.8 percentage points to the 10.9 growth rate in GDP during PASDEP which is equivalent to a share of 53.2 percent in the growth of the GDP. It was planned in the GTP that productive sectors, most importantly industry and agriculture, would take the lead in the economy. Though the plan has managed to slowdown the growth and share of the services sector, the sector still continues to dominate the structure of the economy. Under the GTP period the service sector grew on average by 10.7 and it contributed 48.5 percent to the overall GDP growth which that means for a growth of GDP by 10 percent the sector contributed 4.9 percentage points.

Figure 1.8: Share of Sub Sectors in Services in 2014/15



Source: MoFED and Staff Computation

In the year under review the service sector grew by 10.2 percent. It shows a slowdown relative to the 13 percent growth in the previous year. The deceleration translates into a 4.7 percentage point reduction in the dynamic contribution to growth over the fiscal year 2013/14. Among the sub sector the hotels and restaurants registered the highest growth (29.2 percent). This is followed by transport and communications (13.3%), wholesale and retail trade (9.9), and public administration and defense (8.8) subsectors, among others. Wholesale and retail trade took the highest share in the service sector in the review period. It accounted for 35.2 percent and it is the third biggest contributor to total GDP next to construction and crop sub sectors.

1.2 Saving and Investment

Ethiopia has made significant achievements in terms of savings mobilization and capital accumulation over the GTP period. . Gross domestic saving and gross fixed investment rates reached 21.8 percent, and 36.1 percent of GDP, respectively, in 2014/15. The Government took different measures and mechanisms to mobilize resources to finance investment demand. While social mobilization, such as the selling of the Grand Renaissance Dam Bond and the housing scheme, are believed to have contributed to the overall increase in the saving rate. A sustainable rise in saving rate based on changes in the behavior of economic agents is yet to be seen. According to Ethiopian Investment Agency (EIA) data, a total of 407 investment projects with a total capital of 4.1 billion Birr have gone operational during the fiscal year. Among the projects a majority of the investment is owned by domestic private investors (89 percent) and the remained 11 percent by foreigners. The investment projects have created job opportunities for about 11,227 permanent and 10,505 casual workers.

According to growth theories, economic growth can be achieved in two ways. These are increase in factors of production such as labor and capital and increasing factor productivity. Capital is among the factors of production that mainly determine the long run performance of a given economy. Therefore capital formation is a necessary activity for an economy to grow.

Investment contributes to growth in aggregate wealth. However, investment cannot increase without increasing the level of saving. Thus, savings perform a major role in providing the national capacity for investment and production, which will affect the potential of economic growth. A serious constraint to sustainable economic growth is a low rate of saving. This is the experience of developing counties including Ethiopia.

Ethiopia's case is a bit confusing. Despite its growth trajectory in the last decade and beyond, it is among countries with the lowest saving rate in the world. In the newly revised National Income Accounts, despite the fact that the economy on average grew by 10.9 percent in the PASDEP period, the saving rate for the same period was a meager 6 percent of GDP. Cognizant of this fact the government planned to increase saving in the GTP I period to 15 percent of GDP.

Saving mobilization was one of the major achievements of GTP I. The Government took different measures and mechanisms to mobilize resources to finance investment demand. The New Private Organization Employees' Pension Reforms (2011) that obliged private organization employees to make a monthly mandatory contribution, and the housing scheme of Addis Ababa (2013) are major policy measures that may significantly change the behavior of economic agents. Other mechanisms of the government include issuing and selling Grand Renaissance Dam Bond and issuing Diaspora Bond, the combined effect of which resulted in the overall performance of a 15 percent saving rate from national income.

Table 1.2: Expenditure on GDP (as a percentage of GDP)

	Absorption					Current Account Balance			
		Consumption Expenditure							
Year	Total	Total	Govt.	Pvt.	Gross Capital Formation	Gross Domestic Savings	Resource Balance	Exports of	Imports of Goods & Services
2005/6-9/10	120.9	94.1	11.2	83.0	26.7	5.9	-20.9	13.1	34.0
2010/11	114.9	82.8	10.3	72.4	32.1	17.2	-14.9	16.7	31.5
2011/ 12	117.9	80.8	8.3	72.5	37.1	19.2	-17.9	13.8	31.6
2012 /13	116.5	82.4	9.0	73.5	34.1	17.6	-16.5	12.5	29.0
2013 /14	117.5	79.5	9.2	70.2	38.0	20.5	-17.5	11.6	29.1
2014 /15	117.5	78.2	9.0	69.2	39.3	21.8	-17.5	9.8	27.3
2010/11-14/15	116.8	80.7	9.2	71.6	36.1	19.3	-16.8	12.9	29.7

Source: MoFED and Staff Computation.

The government met its targets just in the first GTP execution year. On average the share of Domestic saving was19.3 during the first GTP year and grew by 67.5 percent and reached 22 percent of GDP in the year under review.

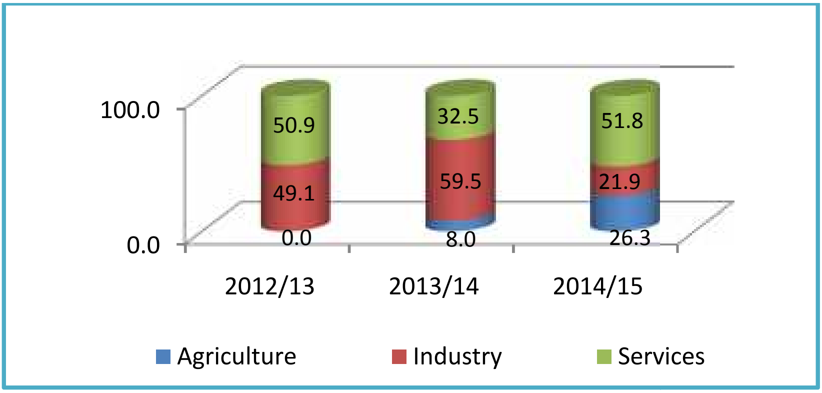
The increase in saving was often accompanied by a parallel increase in Gross capital formation. Gross capital formation also increased beyond the GTP targets and its share reached 39.3 percent while it was targeted to reach 30 percent of GDP. This has clearly made apparent the fact that despite the government's excellent move in increasing Domestic Saving, the gap between domestic saving and investment is very wide. This in turn shows how much the country is dependent on foreign savings. The gross national saving has a share of 30 percent of GDP.

In the current account part the Resource gap; on average it is 17 percent higher than both the Base and High case scenarios which are 14.5 and 12.5 percent, respectively. This below target achievement can be best explained by the low share of export from total GDP. Exports of the country for the last five years on average stood at 12.5 percent of GDP a bit higher than a half of the Base case scenario (31.2 percent) in contrast to import of the country which, on average, for the last five GTP years stood at 30 percent of GDP even though it is lower than the GTP targets.

According to the Ethiopian Investment Agency (EIA) data, the Agency and regional Investment Offices has gave licenses to a total of 407 operational investments with a total capital of 4.1 billion Birr. Among the projects a majority of the investment is owned by domestic private investors (89 percent) and the remaining 11 percent by foreigners. In the year under review there was no new operational government project. There is a significant percentage growth of investments compared to the previous fiscal year's number of projects which shows a 150 increase and 26.6 percent capital decline. The investment projects have created job opportunities for about 11,227 permanent and 10,505 casual workers.

In terms of sectorial distribution the number of projects on the service sector account for more than half (51.8 percent) of the total projects, unusual in the previous years, since agricultural projects took the second place a bit more than the share of the Industrial sector. In the year under review agriculture took a share of 26.3 percent and Industry 21.9, percent respectively.

Figure 1.9: Sectorial Distribution of Investment



Source: EIA and Staff Computation

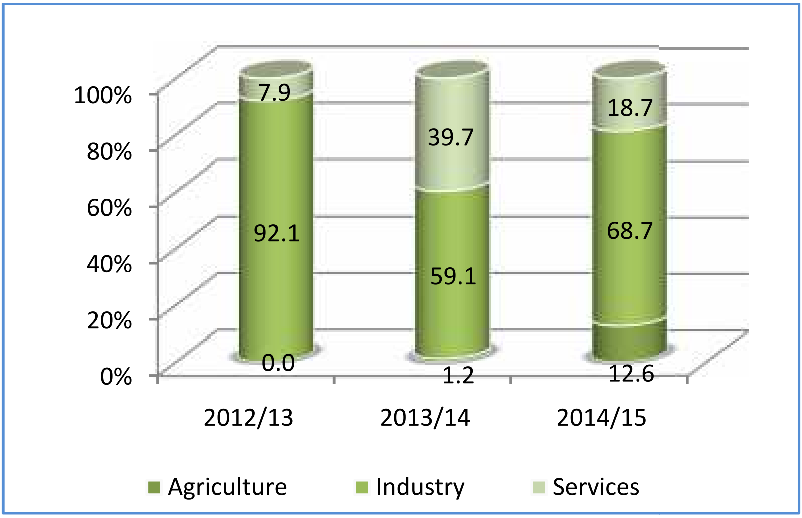
Regarding the capital distribution to sectors, the situation is reversed the industrial sector took the lion's share (68.7) of total capital, followed by services with 18.7 percent and agriculture with 12.6 percent.

Regarding domestic saving and capital formation the following should be noted. Although the shift from foreign financing to domestic financing is crucial and the government has made a significant change, it is however important to make sure that policies should change the behavior of fundamental economic agents. This is to indicate that saving policies should not always depend on a mob like movement because it is not important for long run economic growth of the country.

A higher capital formation should transform the country and result in a higher per capital income. However a close to 40 percent of gross capital formation did not achieve transformation in Ethiopia.

This may tell two things: first pulling resources domestic or external, is not enough. Transforming resources into investment and using them efficiently is crucial for sustainable economic growth. Changing resources into productive activities in turn depends on the quality of the macroeconomic fundamentals, including fiscal/monetary prudence, the structure of the financial market, including the regulatory and supervisory framework of the banking sector and the size and quality of the securities and bond markets, and the continuity of a consistent investment policy. Second, the high amount of gross capital formation in Ethiopia needs a critical assessment.

Figure 1.10: Distribution of Capital by Sector



Source: EIA and Staff Computation

1.3 Price Developments

A month-to-month annualized general inflation increased to 10.40 percent in June 2014/15. Food price levels soared at about 13.96 percent. Non-food inflation rate averaged 8.25 percent during the period. Expansion of monetary aggregates, in particular domestic credit, in the face of a relatively slower growth of the agricultural output is believed to be among the causes for the high inflation rate.

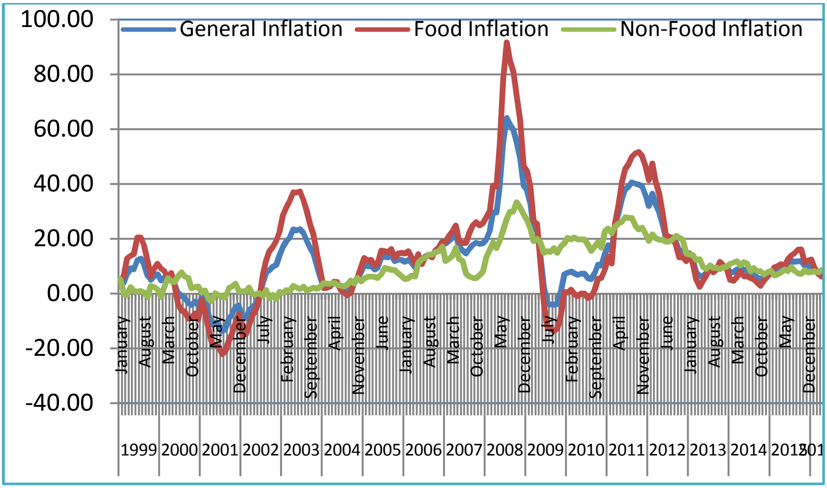
Inflation had been a major macroeconomic problem in Ethiopia before 2013 when the rates persistently and significantly remained outside the single digit policy target. The monetary authorities have also implemented several policies since 2012 in a bid to put inflation under a single digit rate. One of the major targets that have been successfully achieved by the NBE Ethiopia is its single digit inflation targets.

Inflation has been a major macroeconomic problem in Ethiopia before 2013 when the rates persistently and significantly remained outside the single digit policy target. In early 2013, several factors including government and monetary authorities policy maneuvers combined together to bring the rates down to the target level. In particular, government and monetary authorities have implemented various stabilization policies to contain inflation. The government used to subsidize the price of petroleum products until late 2008 when it switched to import food items and subsidize food prices. When all these efforts failed to bear fruit, the government then placed price caps on the retail prices of several commodities in January 2011.

The monetary authorities have also implemented several policies since 2012in a bid for the same target. In 2012 the National Bank of Ethiopia introduced a directive that required commercial banks to hold 27 percent new loan disbursement in low-yield National Bank of Ethiopia's five-year T-Bills. The National Bank of Ethiopia also implemented a directive that restricted government borrowing through direct lending from the National Bank of Ethiopia. It appears that these measures finally succeeded to control the inflationary pressures in mid-2013 within the target level. Although this provided a respite for policy makers and the general public for some time, it seemed that inflation had been relapsing and it had been rising since June 2015 once again to stay above single digit level. However it has slowed down to policy targets since February 2016. The main driver of general inflation is food inflation; price of food items has risen again following the drought the country has been experiencing.

Apart from the tendency to rise above target levels, recent trends in inflation mimic the branded trend of inflation in Ethiopia. First, as it has always been, inflationary rates in Ethiopia are led by food inflation. On average, food prices have increased relatively faster than non-food prices since early 2015. Furthermore, food inflation is generally more volatile than the non-food inflation. This, along with the relatively higher share of food items in the general CPI, makes the recent inflationary pressures predominantly food price inflation. In addition, food inflation has a tendency to be persistent and seasonally oriented. On the other hand, non-food inflation is stable and mostly below policy target levels. In particular, non-food inflation has been within single digit levels since July 2014.

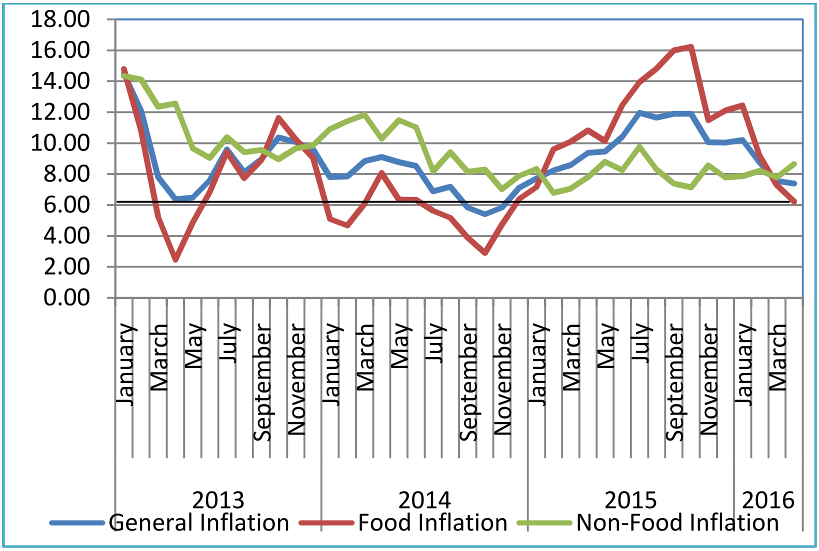
Figure 1.11: General, food and non-food inflation [1999-2016]



Source: CSA and staff Computation

General inflation has been on the rise since September 2014. It rose from 8.5 percent in June 2014 to 10.4 in October 2015. Furthermore, the rise in inflation rate was persistent rarely showing a sign of coming back after the rate bounced back to a rising trend in June 2015 except in early 2016. The figure is even more pronounced for food inflation. Food inflation increased from 6.33 percent in June 2015 to 12.45 percent in 2015. The highest figure in three years since September 2012 (17.58 percent) was recorded in October 2016 (16.2). CSA data indicates that the rise in the prices of meat, milk, cheese and eggs, oils and fats, pulses, fruits and spices account for the majority of this rise in food prices. On the other hand, non-food inflation has been stable and decreasing since July 2015. In particular, the prices of clothing and footwear, construction materials, firewood and household goods and furnishings account for the majority of the recent developments in non-food inflation.

Figure 1.12: General, Food and Non-food Inflation [1999-2016]



Source: CSA and staff Computation

In general, although the current level of inflation is hardly a cause for concern for policy makers and the general public alike, the trend reminds us that there is a need for cautious policy response. In particular, food inflation and hence general inflation had been slowly rising over the last three quarters. This implies that policy makers need to act proactively before the rate gathers momentum. Prior experience tells us that in Ethiopia it is usually difficult to control inflation once it gains momentum, and if policy responses were successful in such cases, it usually comes at cost.

1.4 Development in Monetary Aggregates

In the review year liquidity in the economy reached Birr 371.2 billion reflecting a 24.7 percent annual growth mainly due to the expansion of net domestic assets by 32.6 percent relative to the previous year (2013/14). Net domestic assets contributed 27.5 percent and net foreign assets contributed negative 2.3 percent for the growth of broad money. Component wise narrow money increased by 15.3, percent due to an increase in currency outside banks and demand deposits by 13.8 and 32.3, respectively.

In the last decade or so the growth rate of the money supply was associated with inflationary episode in Ethiopia. In a nutshell the expansionary monetary policy pursued by the National Bank of Ethiopia (NBE) was the cause for the growth of the money supply and the main reason behind the inflationary episode in Ethiopia.

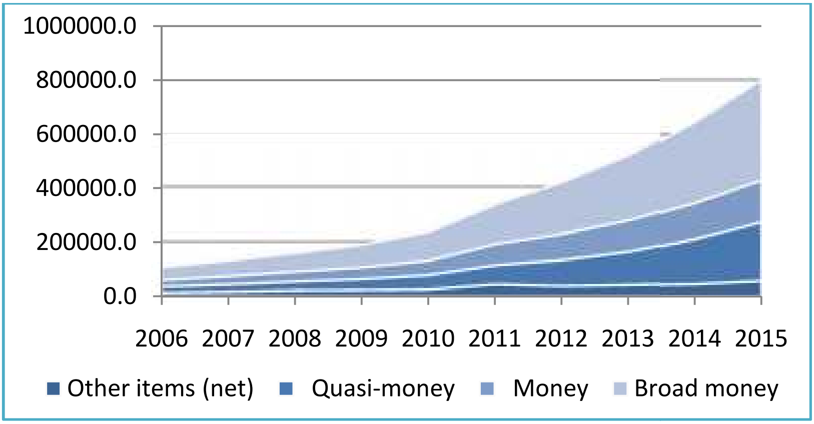
The average growth of reserve money was 20.48 percent from 2001-2005, 16.74 percent during PASDEP and almost similar during GTP I to that of PASDEP (16.55 percent). However the growth of broad money had been rising; it grew at 12.67, 21.08 and 28.98 percent for the periods of SDPRP, PASDEP, and GTP I, respectively. Albeit the high rate of monetary expansion, inflation had been under NBE target (single digit) during the GTP period. This contrasts with rampant inflation during the PASDEP and before.

GTP I witnessed a slowdown in the growth of reserve money, fast growth of money multiplier and rapid bank branch expansion. This may indicate that the recent growth of money stock might not be associated with inflation during GTP I. That means that the causes of the growth of the *money supply is dominated by growth in the money multiplier due to credit expansion of the commercial banks.*

Monetary policy in Ethiopia plays a vital role in maintaining macroeconomic stability. This was so particularly during GTP I. Inflation has been a pressing phenomenon in past decade in Ethiopian. The expansion of the money supply was one of the main factors that fueled inflation.

The National Bank of Ethiopia (NBE) uses reserve money as a nominal anchor in its monetary policy. One of the main objectives of NBE is to maintain price and exchange rates stability. However the price stability objective was challenged in the last decade. The years since 2007/08 have experienced an upsurge in general and food prices. In the year 2014/15, liquidity in the economy as measured by broad money supply reached Birr 371.2 billion reflecting a 24.7 percent annual growth mainly due to the expansion of net domestic asset by 32.6 percent relative to the previous year (2013/14). Considering factors that influence broad money to grow, net domestic asset contributed 27.5 percent and net foreign asset contributed negative 2.3 percent. Component wise Narrow money increased by 15.3 percent, due to an increase in currency outside banks and demand deposit by 13.8 and 32.3 respectively. Quasi-money is also consistently increasing over time. Though the share of time deposit is low it is increasing at a significant rate. In the year under review time deposit surged by 134.3 percent and saving deposit by 19.8. Saving is continually increasing mainly due to social mobilization under the housing scheme and the Great Ethiopian Renaissance Dam Bond. Expansion of bank branches by the commercial banks is also believed to have contributed to the growth of saving deposits. This is consistent with the nation's plan of mobilizing domestic resources to finance its ambitious plan of structural transformation.

Figure 1.13: Trends in Monetary Aggregates



Source: NBE and Staff Computation

Foreign asset (net) was eroded by 18.6 percent in the review period. It is recognized that there is a high volatility in foreign assets of the NBE due to volatility of exports of primary products as the country's main export items are agricultural products. Currently the prices of primary agricultural products are decreasing due to partly slow recovery of demand after the financial crises in advanced countries and importer of Ethiopia's exports.

Domestic credit consistently expanded; in the year under review and reached Birr 393.5 billion. The share of claims on other sectors had shares of 92.2 percent from total domestic credit and increased by 32.8 percent in the fiscal year. Claims on the government also showed an increase relative to the previous year by 15.6 percent.

Table 1.3: Growth Rates of Monetary Aggregates

Particulars	2006	2007	2008	2009	2010	2006-2010	2011-2015	2011	2012	2013	2014	2015
Foreign assets (net)	-12.7	10.2	-12.6	54.1	51.2	18.1	14.6	104.2	-28.4	14.7	0.9	-18.5
National Bank	-25.4	8.8	-23.7	99.2	30.0	17.8	25.8	113.6	-35.3	16.0	8.8	
Commercial Banks	15.7	12.1	3.1	7.3	92.2	26.1	19.7	92.1	-18.3	13.3	-8.3	
Domestic credit	22.3	25.5	29.3	11.5	17.1	21.1	30.5	29.8	39.5	23.4	28.4	31.3
Claims on Government	16.6	20.1	9.0	-0.9	0.7	9.1	0.1	-13.2	-24.8	1.9	21.2	15.4
National Bank	-2.3	30.2	42.4	6.8	4.0	16.2	13.3	15.2	0.0	22.1	16.0	
Commercial Banks	190.5	-11.2	-142.5	116.3	25.5	35.7	64.8	163.5	42.7	40.5	12.5	
Claims on other sectors	28.9	31.1	48.8	20.3	26.6	31.1	38.9	49.7	56.7	26.2	29.2	32.8
Broad money	15.3	22.2	20.4	21.0	26.6	21.1	29.0	39.2	30.3	24.2	26.5	24.7
Money	11.8	24.4	19.4	19.1	24.5	19.8	24.6	45.3	24.5	21.0	16.8	15.3
Currency outside banks	14.0	20.0	28.8	11.7	22.8	19.4	20.3	34.6	18.3	18.5	16.4	13.8
Demand deposits	9.9	28.4	11.2	26.6	26.0	20.4	27.9	54.4	29.2	22.7	17.1	16.3
Quasi-money	19.3	19.8	21.4	23.0	28.7	22.5	33.1	33.1	36.6	27.5	35.8	32.3
Savings deposits	18.3	15.8	24.3	26.0	29.3	22.8	29.6	34.3	27.8	28.8	37.2	19.8
Time deposits	29.1	59.6	1.1	-3.2	21.8	21.7	70.8	18.0	158.5	18.5	25.1	134.3
Other items (net)	7.6	23.3	26.5	5.2	10.1	14.6	20.0	68.2	-13.7	10.8	9.9	24.5

Source: NBE and Staff Computation

A Note on: Reserve Money, Money Stock, Money Multiplier and Inflation

There has been a debate on whether the growth rate of the money supply was associated with the inflationary episodes in Ethiopia since 2008. Indeed, the high inflation was accompanied by a high rate of expansion of the money supply. Nevertheless, there were only few attempts to support the high expectation with rigorous statistical evidence. Cognizant of the highly likely association between the monetary expansion and the high rise in inflation, monetary authorities in Ethiopia have been pursuing a prudent monetary policy since the later years of GTP I. The average growth of reserve money was 20.48 percent from 2001-2005, 16.74 percent during PASDEP and almost similar during GTP I to that of PASDEP (16.55 percent). However the growth of the money supply M2 had been rising: it was 12.67, 21.08 and 28.98 percent for the same period, respectively. On the contrary inflation was under NBEs target (single digit) during the GTP period, unlike the rampant inflation during the PASDEP and before.

An important development during GTP I was that, unlike in the period of PASDEP, the high rate of expansion of money supply was not accompanied by an upsurge in prices except during the second year of the implementation period of GTP I. The National Bank of Ethiopia (the central bank) claims that the money stock increases not due to advances and loans to the government but due to the expansion of financial institutions particularly that of commercial banks in the country. Hence, according to the government the causes for the expansion of monetary stock was the rise in the money multiplier due to expansion of credit by the commercial banks. This justification alludes that such expansion of the money supply is neutral to prices and hence the low rate of inflation observed during GRP I.

Table 1.4: Average Annual Growth Rate[1]

Particulars	H	M1	M2	m1	m2
1995-00	8.32	5.78	9.07	-1.06	2.25
2000-05	20.48	10.34	12.67	-4.05	-1.92
2006-10	16.74	19.84	21.08	4.51	5.78
20011-15	16.55	24.58	28.98	7.88	12.05

Source: NBE and Staff computation

As described in Table 1.5 the average growth rate of reserve money during 1995 -00 was 8.32 percent. Reserve money accelerated to a rate of 20.48 percent in 2000-05. It decelerated to 16.74 percent during 2006-10 (this is a period of PASDEP). This rate continued to persist during the period of GTP I. The average growth rate in both M1 and M2 accelerated from one period to the other. The average growth rate of M2 during 1995-00 was 9.1percent before it's accelerated to 12.67 percent in 2001-2005 and to 21.08 percent during 2005-10. The average growth of M2 depicted a similar increasing trend and on average grew by 28.98 percent during GTP I.

Two components of the money supply (M) are worth investigating to attribute inflation to monetary expansion; high powered money (H) and money multiplier (m). A percentage change in broad money is the sum of the percentage change in the money multiplier, a

[1] Where: **H** is High powered, reserve money or equivalently called central bank money

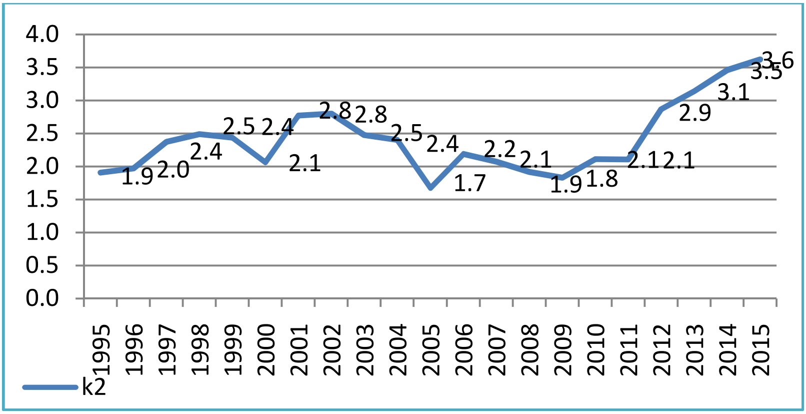
M1 is Narrow Money

M2 is Broad Money while **m1 and m2** is both narrow and broad money multiplier respectively.

percentage change in high powered or base money (and the interaction of the latter two in the case of discrete time). (See Box I)

For the first time the money multiplier jumped to more than 3.0 during 2013. Afterwards, it has been rising and never been less than 3. The average money multiplier ratio during GTP I was 3.04 and that of PASDEP 2. That is, the financial institutions created more than 3 Birr for each one Birr additional deposit made.

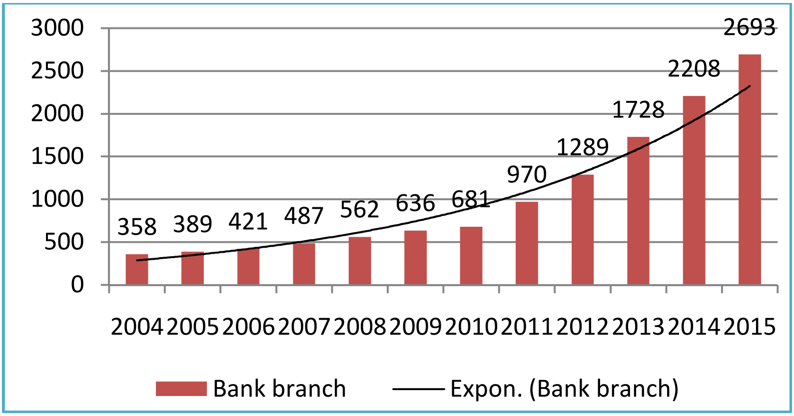
Figure 1.14: Trends of Broad Money Multiplier from 1995-2015



Source: NBE and Staff computation

The expansion of financial institutions also played a crucial role in the creation of money. During the GTP years the expansion of banks in outreach was very significant. Access to banks has been improved both for public and private banks, and their outreach has increased. The number of bank branch in 2015 was more than 7 times higher than it was in 2004 (see Figure 1.15). The growth of bank branches over the GTP I was 31.82. In fact branches grew by more than 48 percent at the beginning of the GTP period in 2011.

Figure 1.15: Trends of Bank Branch Expansion from 2004-2015



Source: NBE and Staff computation.

Box 1.1: Deriving growth of money supply

The role of reserve money and money multiplier in determining the money stock variation has been assessed in the following manner:

$$M = mH \qquad \textbf{(1)}$$

In logarithmic form this could be transformed as

$$\ln M = \ln m + \ln H \qquad \textbf{(2)}$$

The absolute contribution of H and M has been computed by the following formula:

$$\frac{dM}{M} = \frac{dH}{H} + \frac{dm}{m} + \left(\frac{dH}{H}\frac{dm}{m}\right) \qquad \textbf{(3)}$$

The relative contribution of H and m is estimated by dividing natural logarithm value of H and m with the natural logarithm of M1 and M2 differentiated with respect to time. Given as follows:

$$\frac{d\ln H}{d\ln M} + \frac{d\ln m}{d\ln M} = \frac{d\ln M}{d\ln M} \qquad \textbf{(4)}$$

Table 1.5: Absolute Contribution of H and m to Money Supply Rate Growth[2]

Particulars	M	H	m*H	M2
1996-00	2.3	8.3	-1.5	9.1
2001-05	-1.9	20.5	-5.9	12.7
PASDEP	5.8	16.7	-1.4	21.1
GTP I	12.0	16.5	0.4	29.0

Source: NBE and Staff Computation

Decomposition of the growth in money supply using the formulas under Box 1 shows that the average growth of broad money in 1996-00 was 9.1 percent. Reserve money and money multiplier contributed 8.3 and 2.3 percent, respectively, and their interaction reduced the growth of broad money by 1.5 percentage points in the same period. In the subsequent period 2001-05, broad money grew by 12.7 percent. Reserve money and money multiplier contributed 20.5 and -1.9 percent (the interaction effect was -5.9 percent). Therefore the ultimate source of broad money expansion was reserve money in this given period. This was the period when inflation began to rise in Ethiopia because the source of the growth of the money supply was the central bank money which is inflationary in effect. This period coincided with the beginning of the rise of inflation though it was moderate.

[2] Table 1.7 is computed on the bases of equation 3

Table 1.6: Relative Contribution of High Powered Money and Money Multiplier to Increase in Broad Money[3]

Particulars	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	H	M2	m1	m2	H/M1	m1/M1	H/M2	m2/M2
1995-00	8.93	9.73	0.32	0.80	96.72	3.28	91.81	8.19
2000-05	9.00	9.82	0.31	0.81	96.27	3.73	91.56	8.44
2006-10	9.02	9.91	0.35	0.88	96.14	3.86	93.68	6.32
2011-15	9.09	10.01	0.37	0.92	96.36	3.64	91.18	8.82

Source: NBE and Staff computation

During PASDEP (2006-10) the growth of reserve money slowed on average to 16.7 percent. However the growth of broad money supply tended to accelerate to a rate of 21.1percent. Despite the fact that the growth of reserve money slowed, broad money supply increased. This is mainly due to the money multiplier that increased by 5.8 percent.

General inflation grew year on year to a record high of 64.1 percent in July 2008. This high record was largely dictated by food inflation. During the same year of high episode of inflation, food inflation increased to 92 percent. While this was high compared to the same month a year ago, non-food inflation grew by only 27 percent. It was during this inflationary time that GTP was announced with a promise of arresting inflation to a single digit in 2010/11.

At the beginning of GTP I, the Ethiopian economy was struggling with rampant inflation unlike the promise set by the National Bank

[3] Table 1.7 is reproduced based on equation 4

of Ethiopia (NBE) to arrest it to single digit. The objective was materialized only after early March 2013. Despite the control of inflation to a single digit, in the last five years of the plan period broad money stock accelerated to a rate of 29 percent. Reserve money contributed 16.7 percent and money multiplier 12 percent to the overall growth of broad money. The contribution of the money multiplier was very high and covered a significant portion of the growth of the money supply. This had a clear indication for inflationary situation in the period.

From Table 1.7, in the period 1995-00, reserve money accounted for 91.81 percent and money multiplier for 8.19 percent of the total monetary expansion. In the following five years, the relative contribution of reserve money and multiplier remained almost the same. In the subsequent period, PASDEP (2006-10), there was a significant improvement in relative contribution of reserve money. It went up to 93.68 percent and the money multiplier was reduced significantly to 6.32 percent.

This was the period when inflation rose in the Ethiopian economy. However in the last five years of GTP I the relative contribution of reserve money almost went back to the historical magnitude of relative contribution. It accounted for 91.18 percent and that of the money multiplier held a marginally higher relative contribution than its historical magnitude (8.82 percent). With respect to the relative contribution of reserve money and money multiplier to narrow money (M1), they were stable for almost the whole sub periods (as can be read from Table 1.7 in columns 5 and 6).

Therefore, given the facts and figures discussed above regarding the growth of reserve money, money stock and money multiplier and substantiated by rapid bank branches expansion, the recent growth of money stock might not be attached to inflation during GTP I. To sum up, the cause of the growth of the money supply is dominantly money creation of the commercial banks rather than that of base money during GTP I.

1.5 External Sector Developments

The fiscal year 2014/15 was not in particular a good year for Ethiopia's export. Export earnings decreased by 7.2 percent relative to fiscal year 2013/14. Export proceeds from most of the export commodities such as gold, oilseeds, and pulses decreased due to high price reduction in the international market. Export from coffee showed a slight rise in price compensating for the decline in quantity.

On the other hand, imports of the country continued to expand at a high rate. In the year under review, import bills increased by20 percent and stood at 16.5 billion USD. Ethiopia's import share from total GDP reached 26.3 percent. Consistent with the tenets of GTP, capital goods continued to dominate the value of imports accounting for a third of the total imports and expanding at a rate of 53percent in the fiscal year2014/15.

The decline in export earnings and the significant increase in import bills were translated to deterioration in the balance of payments. Balance of payment in the fiscal year 2014/15 widened by 8 times the previous year and it stood at a deficit of 521.4 millions of USD. The import bills *were more than five times higher than the export earnings of the country. The deficit is also attributed to the deficit in the service sector. The private transfer account had a robust growth in the fiscal year 2014/15. It increased by 20.8 relative to the previous fiscal year.*

1.5.1 Balance of Payments

In the review year (2014/15) the balance of payments deteriorated significantly compared to the previous year. The deficit widened by about 8 times and stood at a deficit of USD 521.4 million. The deficit in the previous fiscal year (2013/14) was USD 91.4 million. The major contributor to the overall deterioration of the balance of payments was the current account which deteriorated by 121.5 percent relative to previous fiscal year (2013/14). The drop in current account balance was mainly attributed to the trade balance due to a large imbalance between import and export of the country. Import bills of the country were 5.45 times higher than the export earnings. Unusually the service sector showed a negative balance (341.4 Millions of USD) in the review period.

Table 1.7: Balance of Payments in (Millions of USD)

S/N	Particulars	2011/12 B	2012/13 C	2013/14 D	2014/5 E	C/B	D/C	C/B
1	Exports, f.o.b.	3,152.7	3,081.2	3,254.8	3,019.30	-2.3	5.6	-7.2
	Coffee	833.0	746.6	714.4	780.5	-10.4	-4.3	9.3
	Other	2,319.7	2,334.6	2,540.4	2,238.80	0.6	8.8	-11.9
2	Imports	11,061.2	11,467.3	13,721.9	16,458.60	3.7	19.7	19.9
	Fuel	2,124.7	2,163.8	2,543.2	2,040.90	1.8	17.5	-19.8
	Cereals	652.5	560.8	351.7	601.6	-14.1	-37.3	71.1
	Aircraft	42.1	7.7	35.4	190.6	-81.7	359.7	438.4
	Imports excl. fuel, cereals, aircraft	8,241.8	8,735.1	10,791.6	13,625.50	6.0	23.5	26.3
3	Trade Balance (1-2)	-7,908.5	-8,386.1	-10,467.2	-13,439.30	6.0	24.8	28.4
4	Services, net	74.9	459.1	559.5	-341.4	513.0	21.9	-161.0
	Non-Factor services, net	171.1	571.7	712.2	-78.9	234.1	24.6	-111.1
	Exports of non-factor services	2,810.5	2,852.9	3,174.2	3,028.40	1.5	11.3	-4.6
	Imports of non-factor services	2,639.4	2,281.2	2,461.9	3,107.30	-13.6	7.9	26.2
	Income, net	-96.2	-112.6	-152.8	-262.5	17.1	35.6	71.8
	O/w Gross office. int. payment	89.1	120.7	143.5	249.2	35.5	18.9	73.7
	Dividend	-15.5	-1.7	-17.9	-23.7	-89.0	952.9	32.4
5	Private transfers	3,245.8	3,577.5	4,042.5	4,881.60	10.2	13.0	20.8
	o/w: Private Individuals	1,945.9	2,491.3	2,971.4	3,796.70	28.0	19.3	27.8
6	Current account balance excluding official transfers (3+4+5)	-4,587.8	-4,349.4	-5,865.2	-8,899.10	-5.2	34.9	51.7

S/N	Particulars	2011/12 B	2012/13 C	2013/14 D	2014/5 E	C/B	D/C	C/B
7	Official transfers, net	1,787.9	1,529.9	1,161.6	886.5	-14.4	-24.1	-23.7
8	Current account balance including official transfers (6+7)	-2,799.8	-2,819.5	-4,703.7	-8,012.60	0.7	66.8	70.3
9	Capital account	2,119.8	3,226.4	3,901.6	7,030.60	52.2	20.9	80.2
	Off. Long-term Cap., net	937.8	1,687.5	1,287.4	2,566.00	79.9	-23.7	99.3
	Disbursements	1,007.0	1,743.3	1,374.1	2,653.70	73.1	-21.2	93.1
	Amortization	69.2	55.8	86.7	87.7	-19.4	55.4	1.2
	Other pub. Long-term cap.	230.8	398.9	1,082.9	2,228.00	72.8	171.5	105.7
	Foreign Direct Investment(net)	1,072.1	1,231.6	1,467.0	2,202.20	14.9	19.1	50.1
	Short-term Capital	-120.9	-91.6	64.3	34.3	-24.2	-170.2	-46.7
10	Errors and omissions	-292.7	-413.4	710.7	460.6	41.2	-271.9	-35.2
11	Overall balance (8+9+10)	-972.8	-6.5	-91.4	-521.4	-99.3	1306.2	470.5
12	Financing	972.8	6.5	91.4	521.4	-99.3	1306.2	470.5
13	Reserves [Increase (-), Decrease (+)]	980.8	15.5	94.9	521.4	-98.4	512.3	449.4
14	Central Bank (NFA)	846.5	-57.2	-48.0	-92.9	-106.8	-16.1	93.5
	Asset	810.0	-127.2	-95.2	-663.1	-115.7	-25.2	596.5
	Liabilities	36.6	70.0	47.2	570.2	91.3	-32.6	1108.1
15	Commercial Banks (NFA)	134.3	72.7	142.9	614.3	-45.9	96.6	329.9
16	Debt Relief	-8.0	-9.0	-3.5		12.5	-61.1	
	Principal	6.7	7.1	2.9		6.0	-59.2	
	Interest	1.3	2.0	0.6		53.8	-70.0	

Source: National Bank of Ethiopia

The Capital account performed well as the surplus grew by 80.2 percent relative to the fiscal year 2014/15. The capital account surplus for the fiscal year was USD7030.6 million. The major components such as long term capital, and disbursements played a significant role for the surge in capital account balance and in turn minimized the widening of the balance of payments. This might be due to the high disbursement for the mega projects under the GTP plan.

1.5.2 Exports

While GTP I succeeded in major macroeconomic goals such as growth, and capital accumulation, meeting targets on export earnings remained elusive. Export earnings declined by 7.2 percent relative to fiscal year 2013/14. Still the export items of Ethiopia are primary agricultural products. Though the dominant share of gold and coffee is declining in recently there has not been a significant shift away from agricultural commodities. This can be confirmed from the fact that only seven major commodities of Ethiopian export contributed close to 85 percent of export proceeds.

It has been a general pattern in the international market that exports of primary commodities are characterized by volatile international prices. It is apparent that recent global economic recession has hampered the export of Ethiopia due to low price of top export items like gold and coffee. Coffee export value during the review year increased by 9.2 percent despite the fact that the export volume decreased by 3.1 percent. The rise in coffee price by 12.7 percent helped the export earnings from coffee to increase. Coffee is still the top contributor to the country’s export earnings with a share of 25 percent.

Table 1.8: Values of Major Export Items* *(In Millions of USD)*

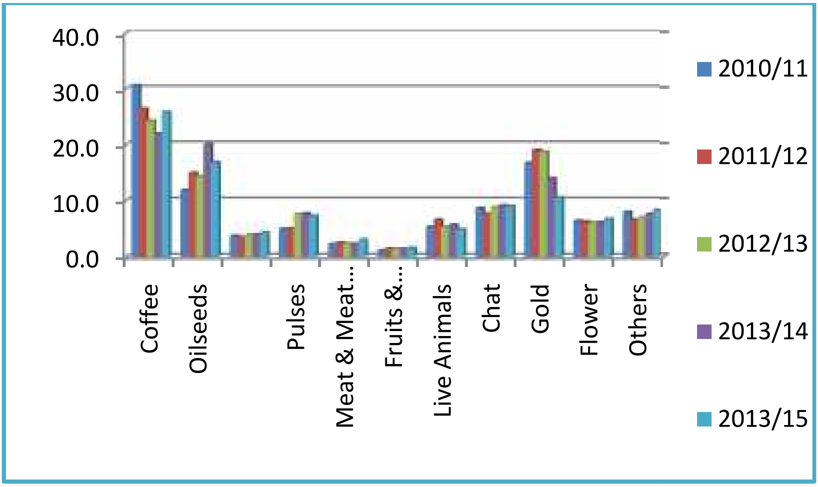
Particulars	2010/11	2011/12	2012/13	2013/14	2014/15	Percentage change		
	A	B	C	D	E	C/B	D/C	E/D
Coffee	841.8	833.1	746.6	714.4	780.5	-10.4	-4.3	9.3
Oilseeds	326.6	472.3	443.5	651.9	510.1	-6.1	47.0	-21.8
Leather & Leather products	103.8	109.9	121.1	129.8	131.6	10.2	7.2	1.4
Pulses	137.9	159.7	233.3	250.7	219.9	46.1	7.5	-12.3
Meat & Meat Products	63.3	78.8	74.3	74.6	92.8	-5.7	0.4	24.4
Fruits & Vegetables	31.5	44.9	43.9	45.9	47.6	-2.2	4.6	3.7
Live Animals	147.9	207.1	166.4	186.7	148.51	-19.7	12.2	-20.5
Chat	238.3	240.3	271.3	297.3	272.42	12.9	9.6	-8.4
Gold (*in mill of grams*)	461.7	602.4	578.8	456.2	318.7	-3.9	-21.2	-30.1
Flower	175.3	197	186.7	199.7	203.1	-5.2	7.0	1.7
Others	219.1	207.1	215.4	247.4	294.2	4.0	14.9	18.9
Total	2747.2	3,152.70	3,081.20	3,254.80	3,019.43	-2.3	5.6	-7.2

Source: National Bank of Ethiopia

Recently, oil seeds overtook the share of gold in Ethiopia's export. Customarily it was gold that had the highest share in export next to coffee but after the fiscal year 2013/14 on wards oilseeds has taken the second highest share in terms of value. However, the growth of oilseeds highly deteriorated by (21.8 percent) in the fiscal year under review. Gold which is Ethiopia's third highest contributor to the export proceeds kept on deteriorating after 2012/13 largely due to the high price reduction in the world market. Similarly in the review year the export earnings from gold declined by 30.1 percent. The main factors attributed to the reduction of export proceeds from gold are the decline in both price and export volume.

In the fiscal year under review, the export of meat and meat products as well as coffee performed relatively well as export earnings from these items increased by 24.4 and 9.3 percent, respectively.

Figure 1.16: The Share of Export Items from the Total Export



Source: National Bank of Ethiopia

Coffee, gold, oilseeds and Chat alone accounted for 62.3 percent of the total export during 2014/15. 1.5.3 Imports.

Total import bill increased by 20 percent and reached 16.5 billion USD in the review period. Ethiopia's import share from total GDP reached 26.3 percent. Capital goods dominated the total imports surging by 53 percent during 2014/15. Among the component of capital goods, imports of industrial goods rose by 57.1 percent, and transport by 53 percent. However, imports related to agricultural capital goods dwindled by 57.1 percent.

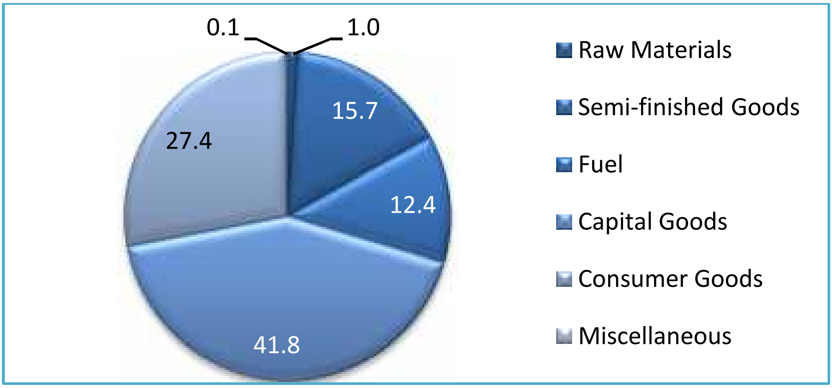
Table 1.9: Value of Imports by End Use *(In Millions of USD)*

Particulars	2010/11	2011/12	2012/13	2013/14	2014/15	Percentage change		
	A	B	C	D	E	C/B	D/C	
Raw Materials	183.7	199.7	145.6	165.2	170.5	-27.1	13.5	3.2
Semi-finished Goods	1,228.00	1,957.20	1,753.90	2,098.10	2,578.40	-10.4	19.6	22.9
Fertilizers	342.4	604.6	291.8	398.9	502.9	-51.7	36.7	26.1
Fuel	1,659.30	2,124.80	2,163.90	2,543.20	2,040.90	1.8	17.5	-19.8
Petroleum Products	1,648.80	2,078.30	2,128.20	2,494.90	1,966.70	2.4	17.2	-21.2
Others	10.5	46.4	1,236.10	48.4	55.9	2564.0	-96.1	15.5
Capital Goods	2,757.00	2,961.70	3,572.60	4,500.30	6,882.30	20.6	26.0	52.9
Transport	688.1	809.7	903.1	1,084.30	1,699.10	11.5	20.1	56.7
Agricultural	63.6	119.5	129.9	166.8	71.6	8.7	28.4	-57.1
Industrial	2,005.40	2,032.50	2,539.60	3,249.20	5,111.60	24.9	27.9	57.3
Consumer Goods	2,294.80	3,531.70	3,452.40	3,834.10	4,510.90	-2.2	11.1	17.7
Durables	868.5	1,105.30	1,089.80	1,501.10	1,608.00	-1.4	37.7	7.1
Non-durables	1,426.30	2,426.40	2,362.60	2,333.00	2,902.90	-2.6	-1.3	24.4
Miscellaneous	130.5	286.3	378.9	581	275.6	32.3	53.3	-52.6
Total Imports	8,253.30	11,061.20	11,467.30	13,721.90	16,458.60	3.7	19.7	19.9

Source: National Bank of Ethiopia

In general, capital goods accounted for 41.8 percent of total imports while, imports of consumer goods had a share of 27.4, and the decline in fuel price helped to reduce import bills and fuel had a share of 12.4 percent in the total imports.

Figure 1.17: Share of Major Imported Commodities from Total Imports



Source: National Bank of Ethiopia

1.6 Fiscal Developments

Total revenue and grant showed a significant expansion during the period of GTP1 as it grew by 24.9.In particular, tax revenue collection grew by 31 percent over the GTP I period surpassing the 29 percent rate of expansion of tax revenue during PASDEP. Total expenditure grew by 26.5 during GTP I, a 2 percentage point rise over what had been observed during the period of PASDEP. Consistent with the tenets of GTP, capital budget dominated the government expenditure accounting for about 56.7 percent of the total outlay during the last five years. This contrasts with *the 50.5 percent share of the capital expenditure in the total federal outlays during the period of PASDEP.*

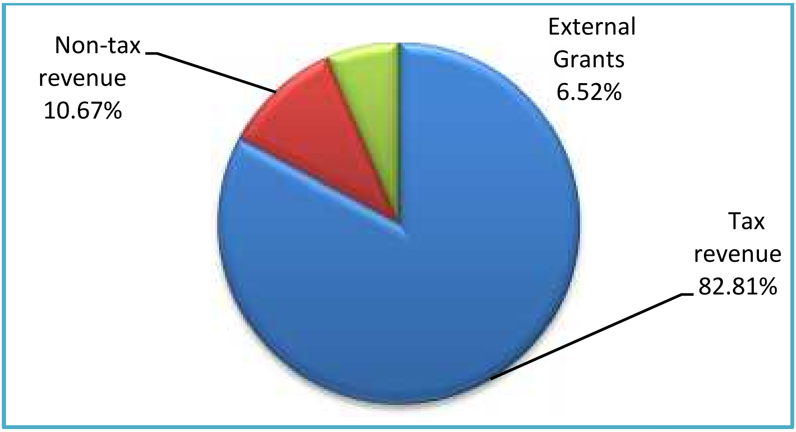
Total revenue and grants as percent of GDP during the GTP I period was 18.6 percent, only 1 percentage point below the plan. The government achieved tax revenue collection which is equivalent to 13.4percent of GDP at the end period of GTP I (2014/15) against the 15.3 percent target Budget deficit stood at 2.5 percent in the year 2014/15 which is slightly higher than the 2 percent target by the end of GTP I.

1.6.1 Government Revenue

The Ethiopian government collected 199.6 billion Birr in 2014/15 in revenues. This showed a 26.3 percent growth relative to the previous period. The sources are tax revenue, non-tax revenue and grants. Tax revenue contributed the lion's share of total revenue and grants of the government (82.81 percent), and non-tax revenue had a share of 10.67 percent. The balance was contributed by external grants. The government successfully managed to raise 186.62 billion Birr in domestic revenues. This showed a 27.7 percent growth over the previous period. This rate was the highest during the GTP I period. This result was achieved because both tax and non-tax revenues increased significantly under the review year by 24.2 and 63.2 percent, respectively.

A total of 13 billion Birr was gained from external grants in the review period and this was a 9.4 percent increase relative to the previous fiscal year (2013/14). A typical pattern in the external grant figures is that there is a high and persistent fluctuation over the years. To have an insight about this fact, the average percentage increase during the whole GTP period was 2.7 percent and the maximum and minimum growth rates were 33.3 in 2010/11 and -22.4 in 2011/12. This pattern shows the fact that foreign grants are becoming less predictable.

Figure 1.18: Share of Government's Different Revenue Components



Source: Customs Authority and National Bank of Ethiopia

Table 1.10: Growth Rate Different Components of Government Revenues (2005/06-2014/15)

Fiscal Year Ending July 7	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Tax revenue	14.21	22.56	37.16	21.83	49.38	36.17	45.37	24.81	24.40	24.18
Direct Taxes	13.51	15.85	35.76	40.51	51.17	31.18	47.61	26.11	29.20	27.93
Indirect Tax	14.54	25.65	37.76	14.02	48.45	38.78	44.26	24.15	21.92	22.14
Domestic indirect taxes	14.32	28.47	27.44	43.83	46.45	46.40	48.52	39.07	24.84	29.31
Import duties and taxes	14.64	24.32	42.80	1.04	49.69	34.16	41.43	13.77	19.44	15.77
Export taxes										
Non-tax revenue	68.11	-17.27	34.84	86.52	-5.64	-3.86	68.89	-0.33	-23.51	63.21
Total revenues	25.26	11.61	36.69	34.84	34.07	28.33	48.82	20.62	17.81	27.67
External Grants	-18.25	103.20	30.70	45.83	-14.37	33.25	-22.41	2.50	-9.24	9.38
Grants in kind/earmarked	24.52	25.53	26.98	9.57	14.45	23.34	17.94	19.90	-3.14	8.10
Untied cash & CPF/grants	-59.24	330.63	33.88	75.19	-28.97	41.34	-51.15	-27.40	-26.53	14.19
Total Revenue and Grants	15.40	26.30	35.14	37.58	21.25	29.25	35.10	18.62	15.22	26.29

Source: Ministry of Finance and Economic Development

Over all the government managed to finance its expenditure from both domestic and external sources of finances. It financed 81 percent of its total expenditure from domestic resources (tax and non-tax domestic income). And 86.6 percent of its total expenditure was financed from both domestic and external revenues (total revenue and grants). The government of Ethiopia has shown a gradual shift of financing its expenditure from domestic sources and minimizing reliance on external finance. While this would in principle help planning and reduce dependency on volatile external grants, the effort needs to be accompanied by increased export earnings as the financial requirements of most projects is in foreign currency.

1.6.2 Government Expenditure

Total government expenditure stood at 230.5 billion Birr in the period reviewed. It showed a 24.3 percent growth over the previous fiscal year. Capital expenditure had a share of 50.8 percent in the total government expenditure. The balance is the share of recurrent expenditure. Both capital and recurrent expenditures grew by 9.1 and 45.2, percent respectively. While capital expenditure has had a share of more than 50 percent since 2007/8, the two components of the expenditure were in par during the fiscal year 2014/15. This may indicate that further capital deepening requires efforts beyond infrastructure expansion and investments in the construction sector.

Table 1.11: Growth Rate of Expenditures

Ethiopian fiscal year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Fiscal Year ending July 7	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Expenditure	19.1	7.1	49.6	23.1	23.5	31.5	32.6	23.7	20.5	24.3
Current expenditure	15.1	13.7	31.6	19.2	17.8	26.6	26.9	22.0	24.4	45.2
o/w: defense	3.1	-0.2	14.9	15.8	0.0	18.7	36.5	0.1	15.3	17.7
Interest & charges	4.2	14.5	-6.1	13.5	23.4	20.5	16.6	31.4	29.4	40.7
Capital expenditure	23.8	0.0	71.8	26.9	28.5	35.5	36.9	25.0	17.8	9.1
Central Treasury	28.8	0.0	69.5	-100.0			49.9	19.3	19.9	11.8
External assistance 2/	45.1	0.0	83.7	-91.6	85.6	933.5	24.0	19.9	-3.1	8.1
External loans	-27.1	0.0	70.7	-100.0			-11.8	74.8	21.5	-4.5
Overall balance including grants	36.0	-67.0	263.1	-56.4	62.0	61.3	6.5	91.1	63.7	12.7
Overall balance excluding grants	8.4	-1.8	78.9	2.8	-0.7	41.4	-12.8	38.5	31.6	11.7
Financing	256.6	-140.2	-334.3	-63.5	64.5	86.8	6.5	91.1	63.7	12.7
External (net)	-52.3	-43.7	0.0	273.3	30.1	88.7	-16.3	158.0	21.7	-8.6
Domestic(net)	259.7	-74.8	460.2	-106.6	-521.5	-93.7	3311.1	-53.5	665.7	36.7
Banking system	-8.9	48.1	0.0	-79.9	61.3	-319.9	25.9	-15.2	-168.4	384.1
Non-bank sources	-141.9	-1512.6	0.0	-77.9	-14.7	739.5	141.8	-34.2	125.4	-31.6
Privatization Receipts							89.6	-56.6		
Other and residual	-178.9	-389.3	-102.2	-174.3	1672.5	-23.0	277.6	-29.0	115.0	2.9

Source: Ministry of Finance and Economic Development

1.6.3 Financing

Excluding deficit, external grant was about 19 percent from the total expenditure whereas including deficit, grant was 13.4 percent of the total government expenditure. The government used both domestic and external sources to finance its deficits. External grant financed about 8.1 percent of the total expenditure. Fiscal performance under PASDEP verses GTP I.

Total revenue and grant showed a significant expansion both under the PASDEP and GTP I period. It expanded on average by 27.1 percent and 24.9 in the PASDEP and GTP I period, respectively. This implies that revenue and grant collection by the government depicted a slight deceleration over the GTP I period compared that of PASDEP.

The domestic resource mobilized by the government increased during the PASDEP and GTP I periods with a similar average growth rate of 28.5 percent. This shows that the fluctuation in total revenue and grants resulted from the fluctuation of external grants. Furthermore, the figures revealed that the growth of external grant flow was lower during GTP I. From the total revenue components government showed a persistent tax revenue collection. The non-tax revenue collection also increased though it showed significant variability over the five years. Accordingly tax revenue collection growth in the GTP I period was higher than in that of PASDEP. It grew by 29 and 31, percent respectively. Non tax revenue collection grew on average by 33.3 percent during PASDEP and 21 percent during GTP I.

Consistent with the tenets of GTP, capital budget dominated the government expenditure. It accounted for about 56.7 percent of the total outlay during the last five years of GTPI. This contrasts with the 50.5 percent share of the capital expenditure in the total federal outlays during the period of PASDEP. Looking at the average rate of expansion of government outlays, GTP I performed better than PASDEP by 2 percentage points. Total expenditure grew by 24.5 percent under PASDEP and by 26.5 during GTP I. Component wise, capital expenditure grew on average by 30.2 percent during PASDEP but it grew at a lower rate during GTP I (24.9 percent). The rate of expansion by recurrent expenditure during GTPI was also significantly high. It grew by 29 percent in contrast to the 19.5 percent growth rate during PASDEP.

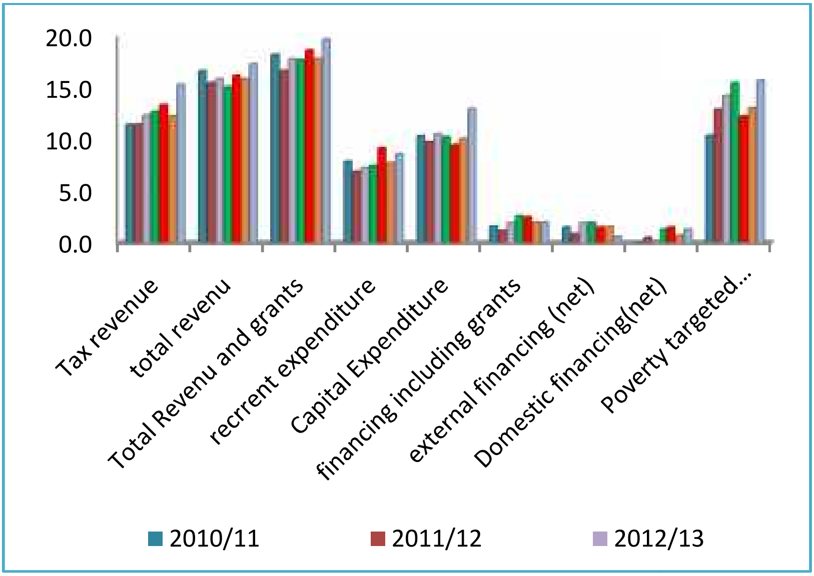
Fiscal Performance under GTP I verses Targets

Revenue and grants were planned to stand at 19.8 percent of GDP during GTP I. The actual performance was 18.6 percent of GDP at the end of GTP I –only one percentage point below the target. Tax effort measured by tax to GDP ratio was also targeted to stand at 15.3 percent. The actual performance was 13.4 percent. Moreover, budget deficit in the fiscal year 2014/15 was 2.5 which is slightly higher than the 2 percent target of GTP I.

On the expenditure side, the trend is similar with that of the revenue counterparts. Government targeted 8.6 and 13 percent of GDP both for recurrent and capital expenditure in that order. Average recurrent expenditure for the period of GTP I was 7.7 percent of GDP. The average capital expenditure for the last five years of the period was 10.1 percent of GDP. The performance shows the government was 2 percentage points behind the GTP targets.

One of the successes of GTP I is that the federal government met the target of fiscal discipline as budget deficit was maintained at 2.0 percent on average for the period 2010/11-2014/15, 2.6 percent in the fiscal year 2013/14, and 2.5 in 2014/15. These rates are only slightly higher than the 2 percent target.

Figure 1.19: Government Revenue, Expenditure and Finance over GTP, Targets and Five Years average



Source: Ministry of Finance and Economic Development

Poverty related targeted expenditure is another expenditure component that needs to be looked at. The plan targeted a 15.7 percent of GDP to finance poverty related projects. The average performance was13.0 percent over the five year plan period.

Chapter II

Brief Assessment of the Performance of the Ethiopian Agriculture

2.1 Production in the Crop Sector

Ethiopian agriculture has been hit hard by El Niño in 2015/16. As a result, food insecurity and malnutrition rates are alarming in Ethiopia, with some 10.2 million people now food insecure. One-quarter of all districts in Ethiopia are officially classified as facing a food security and nutrition crisis (FAO, 2016). Apart from this periodic drought, soil degradation caused by overgrazing, deforestation, high population density and other practices associated with the predominantly subsistent nature of the production system still affect the performance of the agricultural sector. Yet agriculture is the country's most promising sector. A potential exists for self-sufficiency in grains and for further export development in livestock, grains, vegetables, and fruits.

This chapter tries to update the performance of the Ethiopian agriculture especially the performance of the grain sub-sector in 2014/15 (vis-à-vis the level in the preceding year). The impact of the current El Niño induced drought[4], therefore, is not reviewed in this report; and this is mainly because of the delay in the publication of the CSA's 2015/16 agricultural sample survey report.

[4]FAO, however, estimates that grain production in 2015/16 will decline by 14% compared to the level in 2014/15.

2.1.1 Grain crops

Grains are the most widely grown crops in Ethiopia. They are important especially to enhance the food security of small holder framers in Ethiopia as they accounted for about 63% of the total agricultural crop output of smallholder famers in 2014/15 production year A (CSA, 2015).CSA report indicates that a total 13.7 million and 612 thousands hectares of farm land were cultivated for grain production by smallholder and commercial farmers, respectively, in 2014/15 crop year. The report also indicates that 279,157 and 6121 metric tons of grains were produced by small and commercial farmers, respectively[5]. Accordingly productivity among smallholder farmers was 20.3 qt./ha, while commercial farmers produced 19.9 quintals on a hectare of farmland (Table 2.1 & 2.2).

Table 2.1: Grain Crops Production among Smallholder Farmers (2014/15 crop year)

	Total Production and Area (2014/15)		Share of Mehr/main season in percentage points*	
	Production (qt.)	Area (ha.)	Production (%)	Area (%)
Crops	279,156,957	13,724,798	96.8%	91.4%
Cereals	243,498,664	11,020,458	96.9%	92.0%
Pulses	28,050,507	1,819,727	95.2%	85.6%
Oilseeds	7,607,786	884,613	99.9%	96.7%

Source: CSA (2015).
* The balance indicates the share of the Belg/small rain season/.

[5]This production data includes production from both Mehr/main and Belg seasons.

Table 2.2: Area and Production of Grain Crops for Commercial Farms (201/15 crop year)

	Production (qt.)	Area (ha.)
Grain crops	12,151,039	612,081
Cereals	8,992,766	278,787
Pulses	826,523	46,073
Oilseeds	2,331,750	287,221

Source: CSA (2015)

Grain production grew by 7.4 percent in 2014/15 (as compared to the preceding year). Cereals and oilseeds contributed 9.3% and 6.9%, respectively, to this growth. Production of pulses, however, declined by 6.5% percentage points during the reporting period (CSA, 2015).

Within the category of grains**,** cereals are the major food crops both in terms of the area they are planted on and volume of production obtained. They are produced in large amounts compared to others because they are the staple crops. Cereals are grown in all the regions with varying quantities; at national level they accounted for 79.4% and 85.8% of to total grain area and production, respectively, followed by pulses with 14.0% and 11.4% contribution to the total grain area and production in that order. The balance, 6.6% for area and 2.8% for production was taken by oil crops.

There were about 14.1 million farmers who engaged in grain production. The average household harvested 19.1 quintals of grain in 2014/15, which indicates a 6.9% increase over the preceding year. In terms of productivity, the average grain farmer produced close

22 quintals of grain on a hectare of farm land (during the *Mehr* season)[6]. The productivity of cereals, pulses and oilseeds was 23.3 qt./ha, 17.1 qt./ha and 8.9 qt./ha, respectively.

As shown in Figure 2.1 below, an average grain producer harvested 21.5 quintals of grain on a hectare of farm land. Compared to the preceding year, this shows a 6.1% growth. As the average producer cultivated a little less than a hectare, the amount harvested was only 19 quintals of grain (Figure 2.2). Still this indicates a 6.9% growth over the preceding year (2013/14 crop year).

In terms of cereals, pulses and oilseeds the average farmer harvested 17.7 qts., 3.4 qts. and 2.6 qts., respectively, in the 1914/15 crop year. This again indicates a 9.9% and a 36.8% growth for cereals and oilseeds, while for the average pulses producers, however, growth declined slightly.

Productivity of crops directly determines the volume of total agricultural crop production. Crop yield has shown a promising increment in recent years. In the 2014/15 crop year, the average cereal, pulses and oilseeds producers harvested 23.3 qts., 17.1 qts. and 8.9 qts., respectively, on a hectare of farmlands. Compared to the previous year, this indicates a growth of 6.2%, 4.5% and 1.9% for cereal, pulses and oilseeds, in that order.

[6]As indicated earlier, due to lower yield during Belg season, productivity for the whole crop year (including the Mehr season) was only 20.3 qt./ha.

Figure 2.2: Land Productivity in Grain Production (qt./ha)

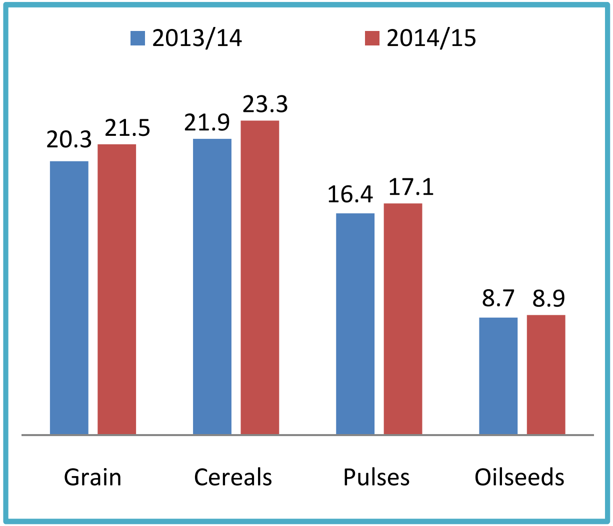
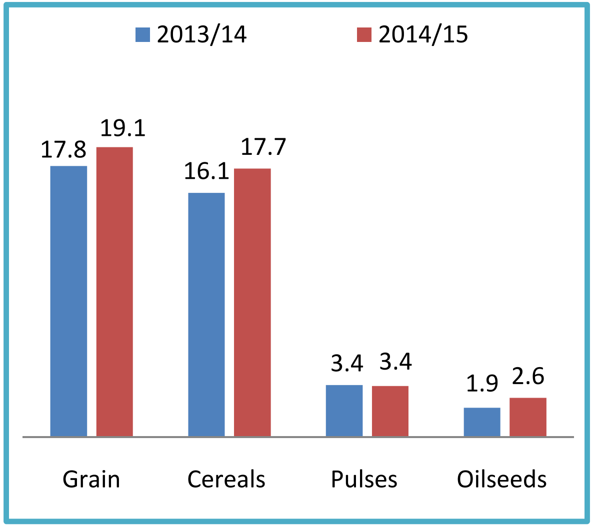


Figure 2.3: Production at Farm/Level (qt./household)

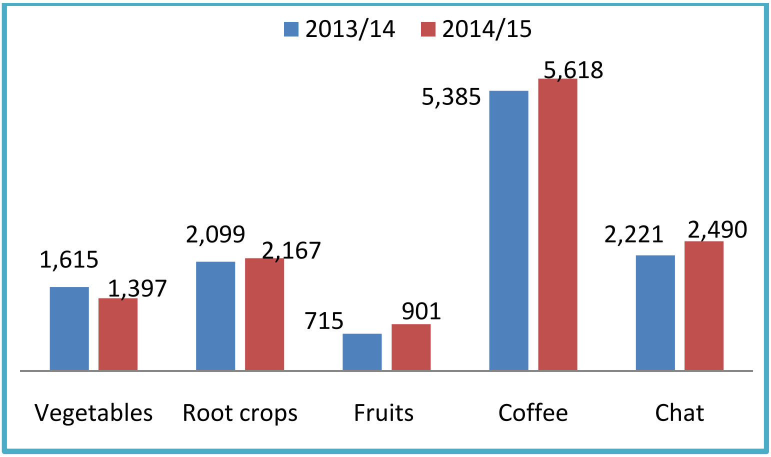


Source: Computed based on CSA Reports.

2.1.2 Production of other crops

Other crops which are all non-grain such as vegetables, fruits, root crops and other permanent crops occupied a total of 2,008,988 hectares of land in the 2014/15 agricultural year. The total estimated output from these crops was found to be 233,822,619 quintals (CSA, 2015).

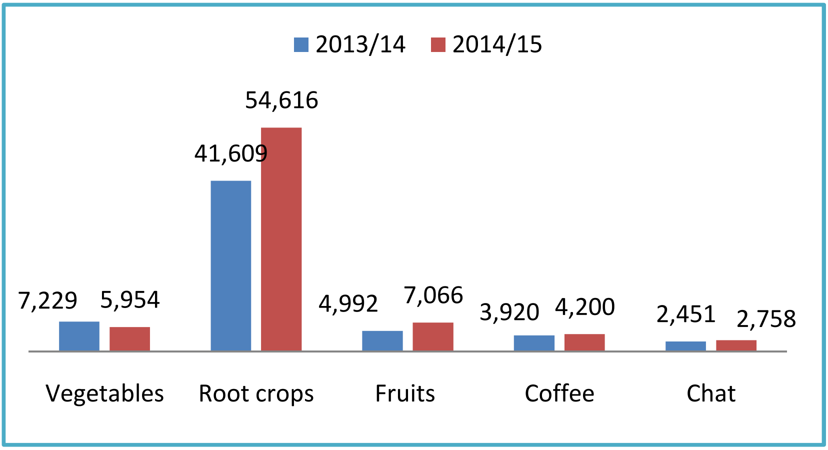
Figure 2.4: Crop Land Covered by Non-grain Crops (in 100 ha.)



Source: Computed based on CSA reports.

- **Vegetables:** Vegetables are largely produced by holders living near urban centers. Most vegetables are not commonly produced by rural private peasant holders, hence the small volume of production recorded as evidenced by the survey results (CSA, 2015). Vegetables took up about 1.18 % of the area under all crops cultivated at national level. However, of the total estimated area under vegetables, the lion's share which is about 67.53% and 21.37% was under Red peppers and Ethiopian Cabbage, respectively. Production of vegetables contribute 2.0% of the total crops production. Conversely, of the total production of vegetables, the above mentioned crops have the lions share, i.e. about 35.16 % and 49.85%, in that order.

Figure 2.5: Crop Land Covered By Non-grain Crops (in 100 ha.)

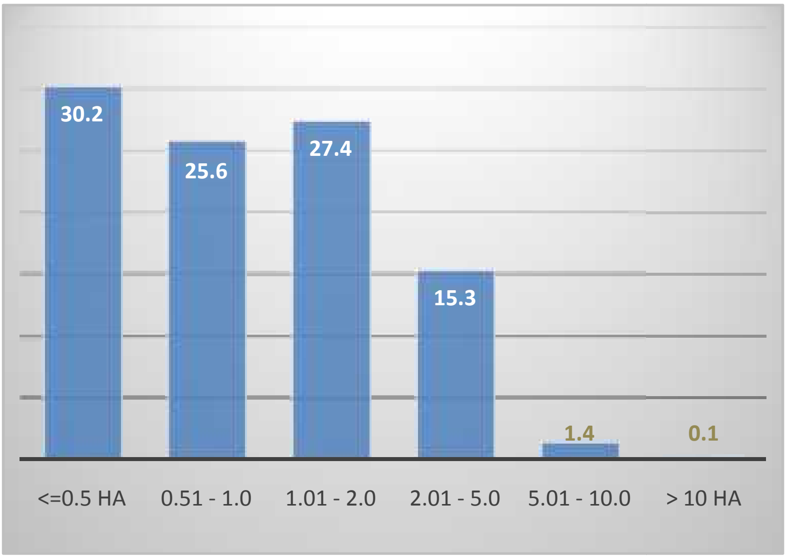


Source: Computed based on CSA reports.

- **Fruit Crops.** Fruits were produced by a small number of farmers. The number of holders practicing fruit farming is much less than that of grains or cereals. About 71,507.13 hectares of land was under fruit crops in Ethiopia (in 2014/15 crop year). Bananas covered about 58% of the fruit crop area followed by mangoes with 14.5%. More than 4,991,837.64 quintals of fruits were produced in the country in 2014/15. Bananas, mangoes, papayas, and oranges took up 68.1%, 14.46%, 6.3%, and 6.2% of the fruit production, respectively (CSA, 2015).

- **Stimulant crops. S**timulant crops such as coffee and Chat are produced by greater number of farmers than those growing crops like fruits and vegetables. The area and production of these crops are also larger than that of fruits since they are earners of a considerable amount of cash for the holders. According to CSA report, Chat and Coffee took up 1.58% and 3.84% of the area under all crops in the country and 2,450,629.21 and 3,920,062.22 quintals of produce was obtained from these crops in the same agricultural year, respectively.

Figure 2.6: Landholding Size among Smallholder (Percent of Farm Households)



Source: Computed based on CSA (2015)

2.2 Land Use and Market among Smallholder Farmers

The Central Statistical Agency (CSA) estimated that more than 17.7million hectare of farm land was cultivated by about 15.5 million agricultural households in 2014/15 crop year, indicating an average holding size per household of 1.14 ha. The average cropland area, however, was only 0.95 ha, indicating a 0.20 ha of non-cropped land allocated for other purposes like grazing or left fallow.

As indicated in Figure 2.5 above, a little over 30% of Ethiopia's 15 million smallholder farmers cultivate farms less than half a hectare. This is in addition to another close to 26% of smallholders who cultivate farms that vary between 0.5 ha and 1 ha. On the other hand, farmers who managed to operate 2 ha or more do not exceed 17% of the total number of farmers.

Figure 2.7: Farmers Participation in Land Rental Market (No.)

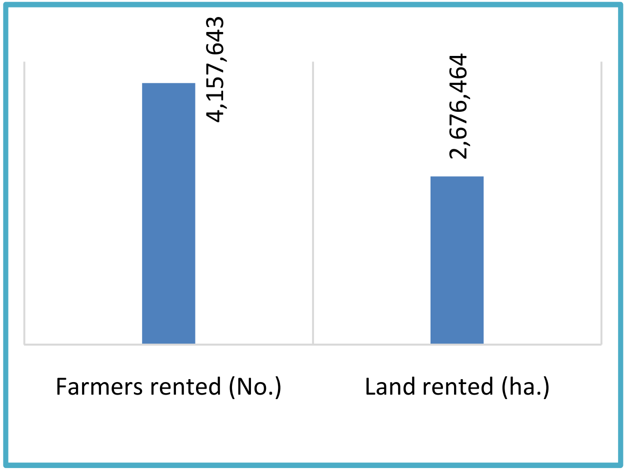
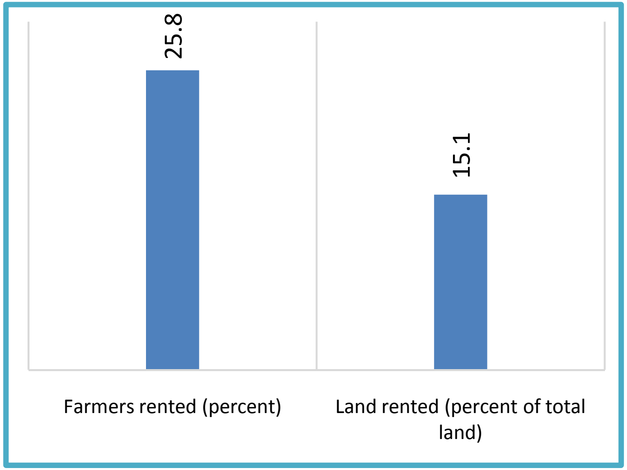


Figure 2.8: Farmers Participation in Land Rental Market (%)



Source: Computed based on CSA (2015)

Smallholders participate extensively in land rental markets mainly due to shortage of their own farmlands. A little more than 4 million farmers or close to 26% of the reported 15 million smallholder farmers participated in land rental market, largely in share-cropping arrangements. In terms of farmland, the land rental market covered 15% of total cultivated land in 2014/15 crop year. In other words, about 2.68 million hectares of land cultivated in the 2014/15 crop year was obtained from the land-rental market.

Table 2.3: Participation in Farmland Rental Market by Holding Size

Holding size	Percent of farmers	Percent of rented land
<=0.5 ha	15.8%	3.3%
0.51 - 1.0	21.4%	11.6%
1.01 - 2.0	35.6%	33.3%
2.01 - 5.0	24.9%	43.0%
5.01 - 10.0	2.1%	7.8%
> 10 ha	0.2%	1.1%
N	4,157,463 farmers	2,676,036 ha

Most farmers rented farms greater than a hectare but less than 5 hectares. As shown in Table 2.3 above, about 36% of the 4.1 million participants in land market rented-in farms that vary between a hectare and two. Similarly, this holding size accounted for 33% of the 2.7 million farmlands that changed hands for temporary use by other farm households in the 2014/15 crop year. On the other hand, farmers who rented-in farms greater than 5 ha accounted for 2.3% (in terms of their number) and 8.9% (in terms of size of land transferred through the land rental market).

2.3 Use of Modern Farm Inputs and Extension

2.3.1 Fertilizer use

Fertilizer is one of the major agricultural inputs that help farmers to increase their yield/land productivity. The importance of fertilizer and other yield augmenting practices and inputs like improved seeds have also increased over time as availability or access to suitable farmland has increasingly become scarce due to population pressure and other factors like land degradation and unsustainable land management practices. Between 2002 and 2011, sale of fertilizers and consumption in Ethiopia, for instance, grew by more than 100%, which implies an average growth rate of 6 per year (IFDC, 2012).

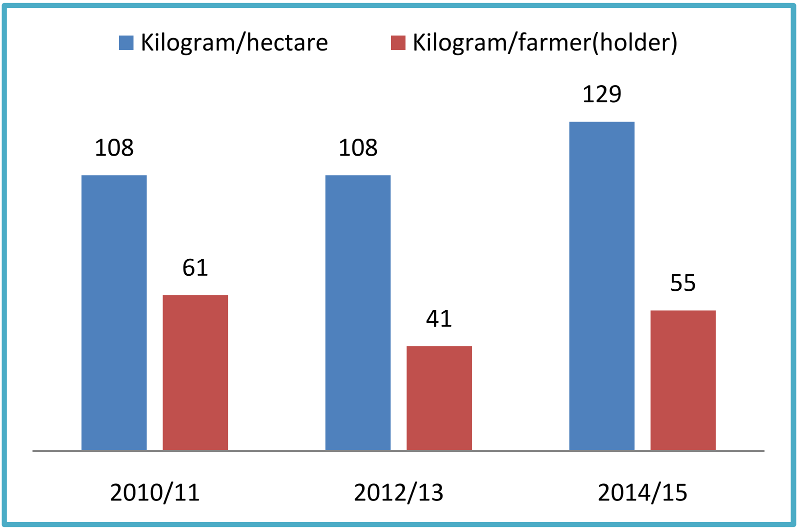
A CSA survey indicates that in the 2014/15 crop year, more than 8.5 million quintals of fertilizers were applied on about 6.6 million hectares of smallholder farm lands, indicating an average application rate of 1.29 qt./ha. Most of the fertilizer used was applied to Teff (about 2.5 million quintals), maize (nearly 2.2 million quintals) and wheat (1.9 thousand quintals). The largest area to which fertilizer was applied was covered by Teff (about 2.3 million hectares) followed by wheat (1.29 million hectares) and maize (1.25 million hectares) (CSA, 2015). In the reporting year, the proportion of cultivated land under chemical fertilizers reached 46% of the total cultivated cropped area at country level.

Table 2.4: Quantity of Inorganic Fertilizer Used by The Smallholder Sector in Mehr Season of 2014/15 Crop Year (qts.)

Type	DAP alone	Urea alone	Both (DAP & Urea)	Total
Cereals	1,461,076	213,809	6,024,524	7,699,409
Pulse	154,235	7,171	134,149	295,555
Oil crops	18,164	7,016	88,531	113,711
Other crops	74,207	28,285	380,080	482,572
All Crops	1,707,682	256,281	6,627,284	8,591,247

Source: CSA (2015)

Figure 2.9: Intensity of Fertilizer Use among Small Farmers over the Past Few Years



In terms of fertilizer use over time, the amount of fertilizers applied on a hectare of land increased by 4.5% over the past four years, and reached 129 kilograms per hectare in the 2014/15 crop year. But fertilizer use at household level was about half of this amount, indicating the average farmer applied on part of his farm or/and own farm less than a hectare. The average farm household applied only 55 kilogram of fertilizer in 2014/15. While this exceeds the level applied a year ago by 25%, but it is 10% lower than the 61 kilogram applied by the average household some four years ago.

Despite the increase in number of fertilizer users and the proportion of farmlands treated by fertilizers, the intensity of fertilizer use is very low. A more detailed and extended discussion on the fertilizer sector is presented in the second part of this report.

2.3.2 Improved seed applied area

Improved seeds are another input that contributes to increase agricultural productivity. They also play central role in raising and optimizing the benefits associated with the use of fertilisers.

The amount of improved seeds and the extent of the area under application are increasing from year to year. However its rate of growth has not been as expected. The use of these improved seeds still remains very low and has not been widely practiced by small holder farmers.

Figure 2.10: Comparison of fertilizer and improved seeds use in 2013/14 crop year.

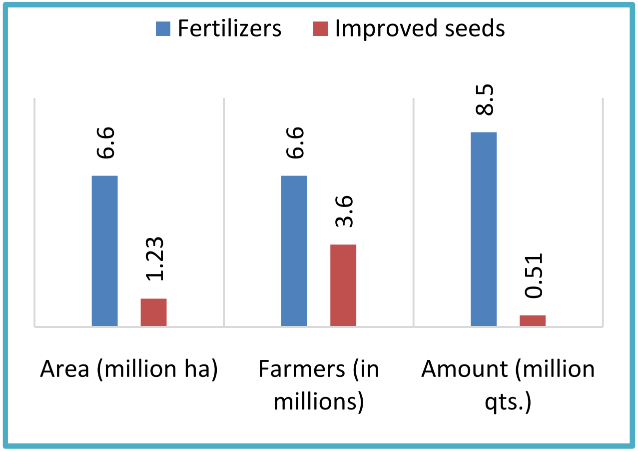
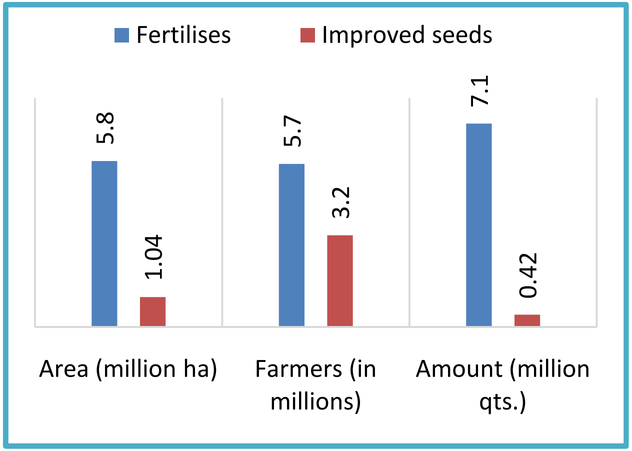


Figure 2.11: Comparison of fertilizer and improved seeds use in 2014/15 crop year.



Source: Computed based on CSA reports

Compared to the 6.6 million hectares fertilized farmlands, improved seeds were applied only on 1.23 million hectares (in 2014/15), indicating a 5 to 1 gap in the use of fertilizer and improved seeds. There was no improvement compared to the situation in the preceding year. There is, however, a slight progress over time. There was, for instance, an 18%, 21% and 13% change in area planted with improved seeds, quantity of improved seeds used and the number of farmers who used improved seeds, respectively, over the past year (between 2014/15 and 2013/14). The progress in the size of fertilized land, fertilizer quantity and the number of farmers that actually applied chemical fertilizers was only 14%, 20% and 16%, during the same period (see Tables 2.10 and 2.11).

In terms of farmers' crop preference for use of improved seeds, maize is the most preferred. CSA (2015) indicates that of the total area under improved seeds allocated to cereals, about 83% was covered by maize. The share for wheat, Teff and barely were 10.3%, 6.4% and 0.5%, respectively. The amount of improved seeds per hectare (improved seeds application rate) for these major cereal crops is increasing from year to year. Higher application rates were reported for wheat and barley, 1.89 & 1.77 quintal per hectare, respectively, and the lowest application rate was for sorghum (0.33 quintal per hectare). The application rate for Teff and maize were 0.34 quintal and 0.24 quintal per hectare of cultivated land, respectively (CSA, 2014/15).

2.3.3 Irrigation and pesticides use

The total irrigated land (by the smallholder sector) for the year 2014/15 was about 179 thousand hectares. The crop land under the practice of irrigation increased from the previous production year. On average only 1.3% of the total cultivated land was under irrigation. Of this irrigated land about 40% was covered by cereals (CSA, 2015).

The total pesticide applied area for the year 2014/15(2007 E.C.) main production season was more than 3.2 million hectares. Most of the pesticides applied on cultivated land were again on cereal crops.

As the findings of the survey indicate around 39.3% of the cultivated land under cereal crops was covered by extension package programs. In the 2014/15 main cropping season, the number of holders participating in various crop extension packages was estimated to be more than 7.3 million or about half of Ethiopian small farmers.

2.4 Livestock Production

Ethiopia is believed to have the largest livestock population in Africa. Based on its 2014/15 annual Livestock Sample Survey which covered the rural agricultural population in all the regions of the country except the non-sedentary population of three zones of Afar and six zones of Somali regions, CSA estimates that the country has over 50 million cattle, close to 30 million sheep and goats each, as well as close to 10 million donkeys, horses, mules and camels.

For Small farmers, livestock provide draught power for the cultivation of their smallholdings and for crop threshing virtually all over the country and are also essential modes of transport for farmers as well as their products to market places. Livestock also play other important roles for small farmers as they provide some degree of security since they are 'near liquid asset' and provide manure to fertilize their farmlands. In addition to these, they are a major source of foreign exchange earnings for the country.

2.4.1 Livestock products

It is eminent that livestock products and by-products in the form of meat, milk, honey, eggs, cheese, and butter, provide the needed animal protein that contributes to the improvement of the nutritional status of the people. Using various techniques, CSA also estimates livestock products and by-products the country produces in the form of meat, milk, honey, eggs, cheese, and butter etc. The estimate of total cow milk production for the rural sedentary areas of the country was about 3.1 billion liters (for 2014/15 agricultural year). On the other hand, the estimate on camel milk for the same areas of the country was about 233 million liters.

Compared to the production level in 2012/13 and 2011/12, the amount of cow milk produced in 2014/15 declined by 19% and 8%, respectively (Table 2.5). This decline over the past few years, however, fails to depict the long-term trend. FAO statistics, for instance, show that milk production has been growing over the past two decades especially since 2001[7]. As shown in Figure 2.11 below the country has managed to triple its milk production over the past fifteen years alone. This is very encouraging, but not sufficient in view of the potential the country has and the high rise in population and rapid economic growth the country achieved over the past decade.

In terms of production of camel milk, a high rise in the production of camel milk was reported in 2014/15. A CSA survey indicates that production in 2014/15, exceeded the levels in 2012/13and 2011/12, by 42% and 33% in that order.

Similarly, a CSA survey result shows that 48.7 million kilograms of honey was produced during the survey year (2014/15), while 106 million eggs were produced during the same period. Compared to the level three years ago, honey and egg production grew by about 23% and 13%, respectively.

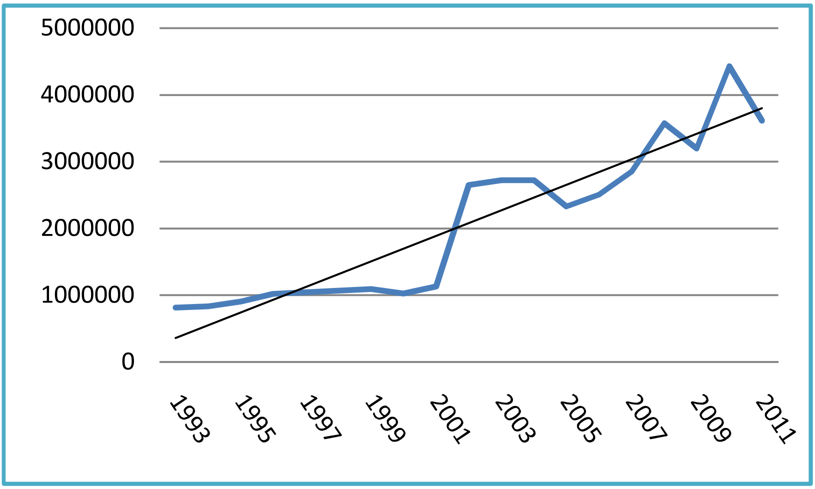
[7]Most of the growth in milk production was reported in 2001 and 2003. Milk production in these two years alone grew by over 150%. Though FAO statistics explains this growth in total milk production to corresponding improvement in yield (changes in production per cow), this study could not able to find the specific factors that explain or contributed for this very high growth or growth trajectory in yield as well as production between 2001 and 2003.

Table 2.5: Estimated Milk, Egg and Honey Produced by Small Farmers

Livestock Products	Amount produced from the smallholder sector		
	2014/15	2012/13	2011/12
Cow milk (million liters)	3,072	3,805	3,330
Camel milk (million liters)	234	165	176
Honey (million kg.)	49	46	40
Egg (million)	107	93	95

Source: CSA (2015) and EEA (2014).

Figure 2.12: Trend in Milk Production over the Past Two Decades in Ethiopia



Source: Computed based on data from FAO Statistics on Livestock Production. http://faostat3.fao.org/faostat-gateway

Chapter III

Large and Medium Scale Manufacturing Industries: Performance over the GTP I period and Prospects during GTP II

3.1 Introduction

This chapter assesses the performances of the Large and Medium Scale Manufacturing Industries (LMSMI) during the first Growth and Transformation Plan (GTP) period, and presents GTP II's base, objectives, strategic pillars, targets and identifies challenges and prospects.

3.2 Performance of LMSMI during the GTP I Period

One of the key objectives of the first GTP was preparing the ground for the industrialization of the country. Since GTP I is over, attempt is made here to briefly look at the performance of LMSMI in the overall structural transformation.

3.2.1 Structural Transformation

Structural transformation remains to be the highest priority, and industrialization is the top strategy to achieve it. Structural transformation is not just change in terms of shifts in sectorial composition among primary, secondary and tertiary activities. It is moving to higher productive activities within each sector as well as achieving inter-sectoral reallocation of resources (structural-change). Growth and productivity enhancing structural changes require reallocation of resources from low-productivity activities to high-productivity ones across and within sectors.

Structural Transformation consists of purposeful and concerted societal efforts towards creating a well-articulated economic structure, where economic activities are closely linked to each other in a dynamic, coordinated manner. It is diversification into higher productive activities with large positive externalities and dense dynamic spill-overs spatially overtime. Transformation should entail creating inclusive growth, through which opportunities are created, and benefits are widely shared.

Developing economies are characterized by large productivity gaps between different sectors of the economy. Arthur Lewis, has typically emphasized productivity differentials between broad sectors of the economy, such as the traditional (rural) and modern (urban) sectors. More recent studies have identified significant differentials within modern sectors and even among firms and plants within the same industry. These gaps tend to be much wider in developing countries than in advanced ones indicating the allocative inefficiencies in the former that reduce overall labour productivity.

When labour and other resources move from less to more productive activities, the economy will grow even though no productivity growth is seen within sectors. This kind of growth-enhancing structural change can be an important contributor to overall economic growth. High-growth countries are typically those that have experienced substantial growth-enhancing structural change. The bulk of the difference between Asia's recent growth, on the one hand, and Latin American and sub-Saharan Africa's on the other, can be explained by the variation in the contribution of structural change to the overall labour productivity.

Developing countries, almost without exception, have become more integrated with the world economy since the early 1990s. Industrial tariffs are lower than they ever have been and foreign direct investment flows have reached new heights. Clearly, globalization has facilitated technology transfer and contributed to efficiencies in production. Yet the diverse outcomes among developing countries suggest that the benefits of globalization depend on the manner in which countries integrate into the global economy. In several cases – most notably China, India and some other Asian countries – globalization's promise has been fulfilled. High-productivity employment opportunities have expanded and structural change has contributed to overall growth. But in many other cases – in Latin America and sub-Saharan Africa – globalization appears not to have fostered desirable kind of structural change.

In economies that do not exhibit large inter-sectoral productivity gaps or high and persistent unemployment, labour displacement would not have important implications for economy-wide productivity. In developing economies, on the other hand, the prospect that the displaced workers would end up in even lower-productivity activities (services, informal activity) cannot be ruled out. That is indeed what seems to have happened typically in Latin

America and sub-Saharan Africa. Study findings on Ethiopia also support this evidence.

McMillan and Rodrik (2011)[8] identify three factors that help determine whether (and the extent to which) structural change is in the right direction and contributing to the overall productivity growth.

First, economies with a revealed comparative advantage in primary products are at a disadvantaged position. The larger the share of natural resources in exports, the smaller the scope of productivity-enhancing structural change. This is because minerals and natural resources do not generate much employment, unlike manufacturing industries and related services. Even though these "enclave" sectors typically operate at very high productivity, they cannot absorb the surplus labour from agriculture.

Second, countries that maintain competitive or undervalued currencies tend to experience more growth-enhancing structural change because undervaluation acts as a subsidy on those industries and facilitates their expansion.

Finally, countries with more flexible labour market experience greater growth-enhancing structural change since rapid structural change is facilitated when labour can flow easily across firms and sectors.

[8] Margaret McMillan and Dani Rodrik, Globalization, structural change and productivity growth

Is there a universal transformation model that a particular country should pursue to transform its economy? The answer from the literature is 'no' since the nature of countries is diverse and they face different challenges. They are also different in development stages, economic geography, etc. But there are experiences that can be shared from others, especially the way successful countries constructed their transformation models.

The transformation models that successful countries constructed and implemented share some common features. These include prepared clear vision; defined development priorities; constructed theoretical/conceptual framework which guides the overall development direction; established macroeconomic and sectoral policies which are geared towards transformation; identified key institutions for leading the transformation and coordination; alignment of the different critical sectors of the economy towards the common goal of industrialization; forecasted financial resources required to finance the transformation; In-depth studies on sectoral linkages and input- output tables of the country, and resource potentials and strategies for realizing them; comparative advantage of the country in production and export; identified potential risks that may affect the smooth implementation of the plan during the design stage including suggestion on the possible way outs; reviewed countries' transformation experience and ways of replicating relevant ones; a monitoring and evaluation system; engaged key stakeholders in the planning exercise through different mechanisms; etc.

Having seen the above plan preparation requirements, one may ask whether GTP I and GTP II were prepared accordingly. The answer to the question is yes and no. Although assessing the way GTPs were prepared is important for revising the plan in action and preparing a good plan, this report did not attempt that. Rather it indicates to the relevant public bodies and other interested researchers the task of evaluating whether or not the GTPs were prepared in the best ways possible.

3.2.2 The Overall Transformation Trends

Transformation occurred both between and within a sector. Labour moved from the traditional agriculture (low productive sector), to a modern manufacturing industry (high productivity sector). A shift also took place within a sector. In agriculture, for instance, activities moved towards mechanization and in manufacturing industry towards higher end commodity production.

Despite transformation endeavours, the Ethiopian economy has remained dominantly to be subsistent rain-fed agriculture in rural and low productive informal sector in urban areas. The economy has been suffering from various structural rigidities. The linkages between agriculture and industry sectors have remained very weak for a long time and each sector of the economy has linked more to foreign economies for its inputs rather than to domestic ones.

According to data from MOFED, the share of agriculture value added in GDP has kept declining while the share of agriculture sector employment depicted only a slight decline over time indicating only partial changes in the value added shares of sectors. In 1974/75, for instance, the respective shares of agriculture value added and employment were about 59.6 percent of GDP and 85 percent of the total population (30 million). The figures in 1984/85, were 48.2 percent of GDP and 88.6 percent of the total population (40 million)[9]. In 1992/93, the corresponding shares of agriculture value added and employment were 64.3 percent of GDP and about 85 percent of the total population (52 million). The figure for 2007/08, and were about 47.9 percent of GDP and 84.1 percent of the total population (73.8 million). In 2013/14, the respective shares of agriculture value added and employment were about 38.9 percent of GDP and 81.04 percent of the total population (87 million)[10].

Unemployment statistics also provides evidence that the modern industry sector has not been creating sufficient jobs for the unemployed pool of urban labour force (including graduate unemployed labour) let alone absorbing the labour released from agriculture. A study by Tadele (2015)[11] shows that labour has been moving from low productive agriculture sector to low productive urban informal service sector during the last decade. In general, the economy has not been transforming at the expected pace, direction and in an inclusive way to improve all aspects of the lives of the population.

[9] Excluding Eritrean population

[10] Rural population data used to calculate the share of population in agriculture sector is collected from CSA's 1984, 1994, and 2007 censuses, and population projection.

[11] Tadele Ferede, 2015. Sectoral economic growth and structural transformation in Ethiopia

3.2.3 Structural Transformation within LMSMI

3.2.3.1 The Role of Manufacturing Industry in Economic Transformation

Industrialization experiences of countries indicate the critical role played by manufacturing industries in transforming the economies of the now developed nations and the emerging economies. Innovation is a major force in economic transformation, and the manufacturing industry has been the centre where new technologies were generated for both its own and other sectors' advancement. Innovations emanating from the manufacturing industry have helped in enhancing efficiency, productivity, environmental friendliness, etc. of its own sector and others. This sector has been helping other sectors to develop by providing them with improved technology, machinery, equipment, inputs, etc.

3.2.3.2 Structural transformation/change within the LMSMI

It is stated that transformation could happen from one sector to another or transformation could take place within a sector or both simultaneously. This section tries to assess whether transformation within the LMSMI has been taking place over the last quarter of a century for the period data is available.

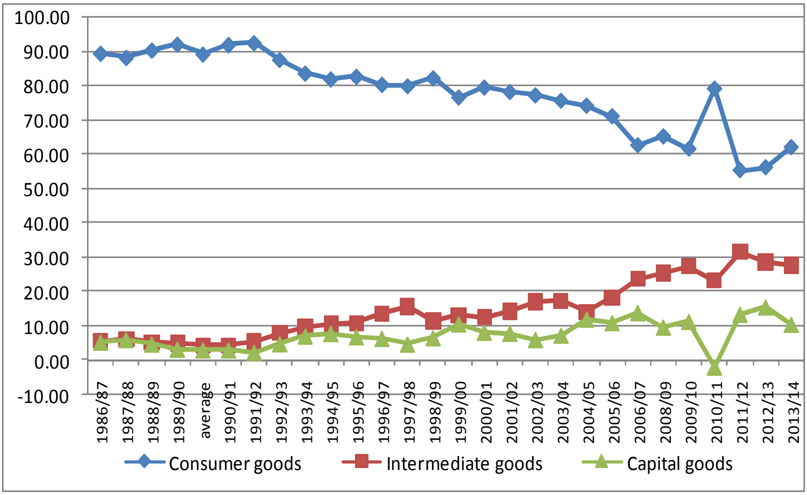
The structure of the manufacturing industry in a country depends primarily on the country's initial resource base and in the course of time on the science and technological capabilities of the country which, in turn, would help develop the country's dynamic comparative advantage. Recently, as countries' integration into the global economy increased, their industrial structure responded to the changes by fitting into the global value chain.

The structure of the manufacturing industry of a country may include different proportions of consumer, intermediate and capital goods producing subsectors. But there is no hard and fast rule regarding the optimal proportion of each sub-sector in the total manufacturing industry. The ideal structure is such that it comprises consumer, intermediate and capital goods producing sub-sectors in a balanced way where by consumer goods producing sub-sectors get a large share of their intermediate inputs and machinery from local manufacturing industries thereby strengthening intra-industry linkages and reducing high dependence on foreign suppliers for their critical inputs.

Evidence shows that the manufacturing industry of Ethiopia has remained dominated by consumer goods producing sub-sector with a slight decline in the share of consumer goods producing sub-sector value added in the total industry. The sector got its structure from the objective at its very inception as a sector which produces finished goods locally which otherwise would be imported, through the implementation of Import Substitution Industrialization (ISI) strategy.

After long term stagnation, a relatively fast change in the structural of manufacturing industries has been witnessed since 2004/05.As a result, the share of consumer goods producing sub-sector value added in the total LMSMI valued added has started declining whereas the share of intermediate goods producing sub-sectors has been observed rising mainly due to the growth in cement and articles of cement producing firms which, in turn, is due to the booming of the construction industry. The share of capital goods producing sector, however, has been fluctuating around its long time share value during the same period (Figure 3.1).

Figure 3.1: Trends in the Consumer, Intermediate & Capital Goods Producing sub-Sectors, Share in the Total Manufacturing Industry Value Added



Source: Calculated based on CSA time series data on LMSMI

3.3 The Recent Performances of the Manufacturing Sector

Under this section, attempt is made to assess the recent performances of the whole manufacturing sector and the LMSMI based on some key performance indicators.

3.3.1 The Manufacturing Industry

Agriculture, industry and services sectors contributed to GDP, on average, about 41.5 percent, 12.7 percent and 45.8 percent, respectively over the GTP I period. Compared to the base case (2009/10), the share of the agriculture sector declined, while that of the industry increased and service sector remained more or less the same. Despite the designing and implementation of an industrial development strategy in 2002, the Plan for Accelerated and Sustainable Development to End Poverty (PASDEP) in 2005 and GTP in 2010 which contain due emphasis for the manufacturing industry, the sector has not been registering encouraging results.

Table 3.1: Value Added of Major Sectors, share in GDP in %

Sectors	2009/10	Period average (2002/03-2009/10)	2010/11	2011/ 12	2012 /13	2013 /14	2014 /15	GTP I (Period average)
Agriculture	45.2	48.6	44.4	42.9	41.8	39.9	38.5	41.5
Industry	9.8	10.0	10.4	11.5	12.9	13.7	15.1	12.7
Manufacturing	3.9	4.1	4.0	4.1	4.3	4.6	4.8	4.4
Large and Medium Scale	2.5	2.4	2.6	2.7	3.1	3.4	3.7	3.1
Small Scale and Cottage	1.4	1.7	1.4	1.3	1.2	1.2	1.1	1.2
Services	45.0	41.4	45.2	45.7	45.3	46.4	46.3	45.8

Source: MOFED, various reports.

The value added of the manufacturing sector comprises both the Large and Medium Scale and the Small and Cottage industries. The share of the total manufacturing industry, LMSMI and small and cottage industries averaged at about 4.4 percent, 3.1 percent and 1.2 percent of the GDP respectively during the GTP I implementation period. While the share of the total manufacturing and LMSM industries slightly increased at the end of the plan period compared to the base case, the share of small scale and cottage industry declined slightly. This is contrary to the expectation that small scale and cottage industries would generate employment opportunities for the vast unemployed urban labour force and create linkages with the rest of the sectors (Table 3.1).

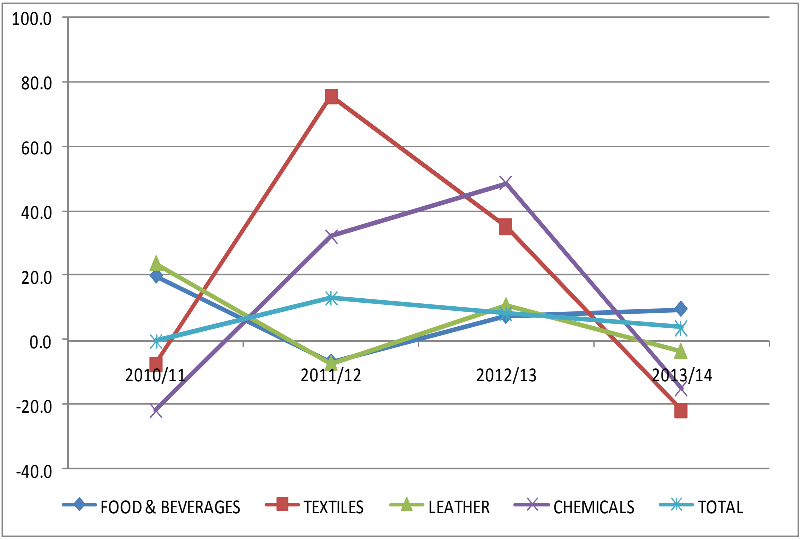
3.3.1.1 Large and Medium Scale Manufacturing Industries (LMSMI) Performance

i) Number of Enterprises

The trend in the number of LMSMI shows that there was a net increase in the number of enterprises joining the sector every year over the period (2010/11-2013/14). The number of enterprise had been growing, on average, by 6.3 percent per annum over the period (2010/11-2013/14). In general, fluctuations had been observed in the growth in the number of enterprises operating in the priority sub-sectors during the same period indicating the presence of exiting firms from operating in the sub-sectors (Figure 3.2).

The issue is that enterprises had not been increasing in the priority and exporting sub-sectors that would help transform the sector such as intermediate and capital goods producing enterprises. The food and beverage sub-sector, for instance, had grown, on average, by 7.5 percent (of which grain mill and soft drinks groups grew, on average, by 12.2 percent and 18.3 percent, respectively). While under non-metallic minerals (intermediate goods producing sub-sector), those increasing enterprises were sub-sectors which produce articles of concrete, cement and plaster (Figure 3.2).

Figure 3.2: Trends in the Number of Enterprises, Growth in %



Source: CSA, Various Issues

In order for the manufacturing sector to play the expected transformative role in the economy, the government has to introduce differential incentive schemes so that investors willing to join intermediate and capital goods producing sectors (or subsectors that the economy needs most) could find the required sectors relatively attractive and invest in them.

ii) Scale of Enterprises

Scale of enterprises can determine its competitiveness, especially for exporting manufacturing enterprises since it entails production volume and thus enjoy economies of scale and lower unit cost. According to CSA, manufacturing industries which employ ten persons and above and use power driven machines are categorized as Large and Medium Scale Manufacturing Industries (LMSMI).

Of the total LMSMI, those employing 10-19 persons, 20- 49 persons and 50 & above persons were about 38.8 percent, 27.2 percent and 34 percent, respectively in 2009/10, indicating the concentration of manufacturing industries in firms employing below 50 persons. If one considers only permanent employees, the concentration gets worse since the number of permanent employees is usually lower than the number of total personnel engaged. Contrary to the target set in GTP I, the concentration of manufacturing industries in those industries employing below 50 persons slightly increased to 67 percent in 2013/14, indicating the entry of more medium sized industries into the sector during the first four GTP implementation years. Compared to the base case(2009/10), the concentration of industries employing below 50 persons declined, remained the same and increased the consumer goods , intermediate and capital goods producing sub-sector in 2013/14, respectively (Table 3.2).

Table 3.2: Manufacturing Industries by size of persons engaged, in %

Sectors	% of establishments by size of persons engaged					
	2009/10, Base year			2013/14		
	10 - 19	20 - 49	50 & Over	10 - 19	20 - 49	50 & Over
Consumer Goods						
Food and Beverages	29.5	30.2	40.2	31.9	31.7	36.4
Tobacco	0.0	0.0	100.0			100.0
Textiles	5.0	5.0	90.0	5.8	24.6	69.6
Wearing Apparel	25.5	27.5	47.1	16.1	22.6	61.3
Leather	14.9	34.2	50.9	20.0	30.7	49.3
Wood & Cork, Except Furniture	42.6	20.4	37.0	50.0	27.1	22.9
Paper And Printing	22.0	35.8	42.3	26.5	28.6	44.9
Furniture; Manufacturing N.E.C.	59.8	26.3	13.9	62.5	24.0	13.5
Rubber and Plastic	20.9	30.2	48.9	15.7	29.4	54.9
Sub-Total	**32.6**	**29.0**	**38.4**	**34.6**	**29.0**	**36.4**
Intermediate Goods						
Chemicals	17.7	25.0	57.3	12.8	24.0	63.2
Other Non-Metallic Mineral	60.2	23.4	16.4	55.0	28.8	16.1
Sub-Total	**53.1**	**23.7**	**23.2**	**48.4**	**28.1**	**23.6**
Capital Goods						
Basic Iron and Steel	30.8	25.6	43.6	31.6	15.8	52.6
Fabricated Metals	45.5	24.7	29.9	45.7	20.2	34.1
Machinery and Equipment N.E.C.	20.0	33.3	46.7	38.1	23.8	38.1
Motor Vehicles, Trailers & Semi-Trailers	27.3	9.1	63.6	11.1		88.9
Sub total	**40.2**	**24.7**	**35.2**	**41.5**	**19.1**	**39.4**
TOTAL	**38.8**	**27.2**	**34.0**	**39.2**	**27.8**	**33.0**

Source: CSA, Various issues

NB: The categorization of manufacturing industries into consumer, intermediate and capital goods producing subsectors are made at sub-sector level without going into looking at the kind of products that each firm under each subsector produces.

iii) Employment

Looking at the share of employment in the major sectors of the economy (i.e., agriculture, industry and service), one can tell the development stage of a country. Obviously, the large share of agriculture in the economy shows the infancy stage of the development of the country.

In analysing employment in LMSMI, the most relevant types is permanent employment since industrial capabilities such as skill, technology transfer, etc. pass through permanent than temporary employees. The number of permanent employees had not been increasing as planned during the GTP I implementation period. The number of employees during 2013/14 was higher compared with the base case (2009/10) but lower compared with the preceding year. The decline in the number of permanent employees was observed in the consumer goods producing sub-sectors. Within the consumer goods producing sub-sector, the main decline was registered in the priority and exporting sub- sectors, including food and beverage, textile and garment and leather. This is a bit disturbing given the attention and incentives provided to the sub-sectors and the expecting that the sub-sector spear head the transform the manufacturing sector and other sectors of the economy (Table 3.3).

Table 3.3: Trends in the number of permanent employees

Industrial Group	2009/10	2010/11	2011/12	2012/13	2013/14
Consumer Goods					
Food & Beverages	49,453	55,1	50,148	51,174	48131
Tobacco	572	1,338	1,338	976	976
Textiles	20,366	11,029	29,806	33,741	30,586
Wearing Apparel	9,743	5,655	11,347	8,817	6,856
Leather	9,102	12,014	14,178	17,202	15,939
Wood & Cork	2,718	3,082	3,305	4,711	2,459
Furniture; N.E.C	6,951	5,460	7,013	9,348	8,282
Paper And Printing	8,862	8,817	8,343	9,311	9,957
Rubber And Plastic	12,776	10,634	12,860	15,123	17,923
Sub Total,(In Number)	**120,543**	**113,223**	**138,338**	**150,403**	**141,109**
Share In Total Employment, (In %)	**75.7**	**77.2**	**76.0**	**74.0**	**71.9**
Intermediate Goods					
Chemicals	9,318	9,235	10,905	14,967	14,365
Non-Metallic Mineral	14,939	12,620	20,718	17,640	20,281
Sub Total,(In Number)	**24,257**	**21,855**	**31,623**	**32,607**	**34,646**
Share In Total Employment, (In %)	**15.2**	**14.9**	**17.4**	**16.0**	**17.6**
Capital Goods					
Basic Iron and Steel	2,641	4,136	2,792	3,130	2,680
Fabricated Metal	9,240	5,408	7,572	12,126	11,628
Machinery and Equipment N.E.C.	795	542	40	380	1,750
Motor Vehicles, Trailers & Semi-Trailers	1,747	1,525	1,672	4,734	4,514
Sub-Total, (In Number)	**14,423**	**11,611**	**12,076**	**20,370**	**20,572**
Share In Total Employment, (In %)	**9.1**	**7.9**	**6.6**	**10.0**	**10.5**
Total	**159,223**	**146,689**	**182,037**	**203,380**	**196,327**

Source: CSA, Various issues

iv) Wages and Salaries

The wage rate, though not the only factor, would definitely play a crucial role for retaining and attracting experienced workers in the manufacturing industry sector. Therefore, an attractive pay scale would encourage workers and hence help improve productivity and efficiency in the sector. However, evidence shows that the pay in the sector is low.

Table 3.4 shows that the lowest wage for a worker in the LMSMI, the modern urban sector was about US 10 Dollars in 2013/14. Thus, by any measure, the wage rate paid by the sector is far below what would enable a worker to command the basic necessities of life in the major urban areas of the country, where most LMSMI are located and the cost of living has been rising. As the result, workers are not interested to work in sector and those who are in it use it as a transit for better jobs in service sector.

Cognizant of the problem of the high cost of living, some manufacturing industries, especially foreign owned ones, have started providing daily meals for workers at their enterprises. Even with this daily meals support, the workers struggle to cover house rent, which has been increasing at alarming rates from year to year. This ever rising cost of living pressuring worker to demand wage rate increases have started eroding the comparative advantage of the country in cheaper labour. In order for the industrial sector to become successful and retain experienced workers, either the wage rate in the sector has to rise compared to other competitor sectors or the cost of living should be significantly reduced through issuing policies of ensuring basic necessities for all. The economic realities during the last decade depict that real estate and land related businesses which have no value addition and linkage with key sector s of the economy have been barring from investing and even working in value adding manufacturing and other productive sectors.

Table 3.4: Number of permanent employees and their salaries, 2013/14

Monthly salary, in Birr	< 200	[200-400)	[400-600)	[600-800)	[800 - 1200)	[1200 - 1600)	[1600 - 2000)	[2000 & Above)	TOTAL
Monthly salary, in USD	<10	[10 -20)	[20-30)	[30- 40)	[40 - 60)	[60- 80)	[80- 100)	[100 & Above)	
Number of employees	422	2712	11834	37892	44150	31159	21557	46601	196327
Share of employees (in %)	0.21	1.38	6.03	19.30	22.49	15.87	10.98	23.74	100.00
Cumulative (Share in %)		1.60	7.62	26.92	49.41	65.28	76.26	100.00	

Source: CSA, Various issues

NB: USD = Birr 20, annual average exchange rate for the year 2013/14

v) Value Added

The overall real value added of the LMSMI had been growing, on average, by 16.8 percent over the period (2010/11-2013/14). The consumer and intermediate goods producing sub-sectors had been growing, on average, by 16.3 percent and 25.1 percent, respectively over the same period. The growth in the capital goods sub-sector had been highly fluctuating. Since the share of the manufacturing industry in the overall economy is very low, this growth may not show significant effect on the economy (Table 3.5).

Table 3.5: Trends in real value added, growth in %

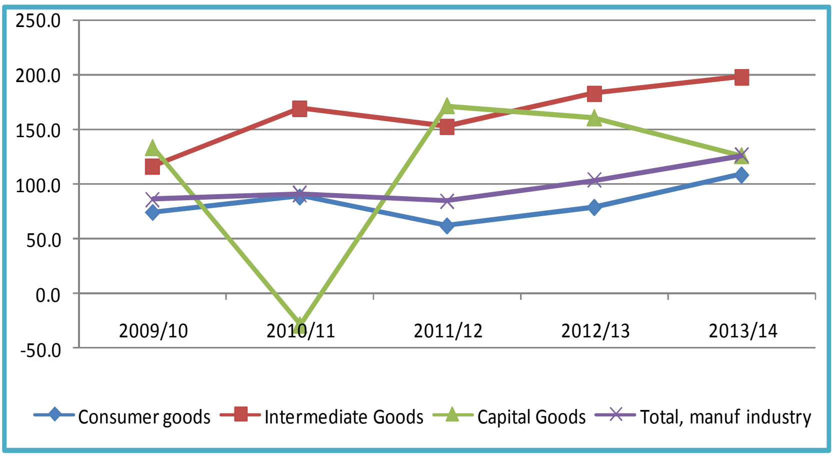
Sectors	2010/11	2011/12	2012/13	2013/14	(2010/11-2013/14) period average
Consumer Goods					
Food & Beverages	42.6	-21.0	37.8	36.1	23.9
Tobacco	-1125.9	-17.2	51.7	-7.8	-274.8
Textiles	-80.3	-62.3	320.2	-75.2	25.6
Wearing Apparel	-44.2	64.6	-103.6	-4228.6	-1078.0
Leather	158.7	-7.1	94.8	0.0	61.6
Wood	962.9	-94.4	651.8	-56.3	366.0
Furniture; N.E.C.	-53.1	74.4	-15.8	7.1	3.2
Paper & Printing	-5.9	-28.3	27.0	23.5	4.1
Rubber & Plastic	-35.5	11.9	36.1	54.8	16.8
Sub-Total	11.9	-14.7	38.9	29.3	16.3
Intermediate Goods					
Chemicals	4.2	-8.5	76.9	-5.0	16.9
Non-Metallic Minerals	58.4	54.6	3.8	27.7	36.1
Sub-Total	**31.8**	**30.1**	**23.7**	**14.9**	25.1
Capital Goods					
Basic Iron & Steel	119.4	-19.8	7.7	5.8	28.3
Fabricated Metals	-196.8	-202.1	35.4	-3.1	-91.7
Machinery & Equipment N.E.C.	-13.7	-95.6	1095.8	386.4	343.2
Motor Vehicles, Trailers & Semi-Trailers	-57.2	160.7	161.0	-69.6	48.7
Sub-Total	**-117.3**	**-721.3**	**57.8**	**-20.8**	**-200.4**
Total	**-2.2**	**15.3**	**36.7**	**17.5**	**16.8**

Source: CSA, Various issues

vi) Productivity

Productivity is another important performance indicator. Here, productivity is calculated as the ratio of real value added to the total number of permanent employees in the sector. According to the data, the overall productivity in LMSMI had been trending upwards over the whole GTP I implementation period. Had productivity been calculated based on the number of persons engaged, instead of permanent employees, productivity trends may have taken a different pattern. In general, the productivity in the mainly intermediate goods producing sector had been, on average, greater than capital and consumer goods producing sub-sectors. While the productivity of both intermediate and capital goods producing sector remained above the industry total, consumer goods producing sector manifested below it thereby indicating the relative labour intensity of consumer goods producing sector (see Figure 3.3).

Figure 3.3: Real Value Added per Workers, in '000 Birr per annum



Source: CSA, Various issues

vii) Export Receipt

The major of objective of the GTP in relation to manufacturing industry was to increase manufactured export receipt by mainly increasing the volume of its export and shifting from primary commodity to value added exports, especially in the priority sub-sectors such as textile and leather, and food processing. However, the result registered so far has fallen short of meeting the target set by the plan.

The growth in export receipts had been encouraging during the first two GTP I implementation years. Since then, however, the growth in export receipt declined. In 2013/14, almost all priority exporting manufacturing sub- sectors registered relatively lower performance (17.2 percent decline) compared with the preceding year. In terms of structure, almost all export receipts had been due to consumer goods producing sub-sectors (averaging 95.9 percent per annum over the period. of which, food and beverage, textile and leather sub-sectors together account for, on average, about 89.3 percent of the total export receipts during the same period (Table 3.6).

Table 3.6: Trends in the Manufactured Export Receipt, Growth in % and Share in %

Sectors	Value, in 000 USD					Growth in %				Share in %				
	2009/10	2010/11	2011/12	2012/13	2013/14	2010/11	2011/12	2012/13	2013/14	2009/10	2010/11	2011/12	2012/13	2013/14
Consumer Goods														
Food & Beverage	21557.9	75671.5	118727.9	89608.2	80479.7	251.0	56.9	-24.5	-10.2	23.41	34.08	30.74	18.96	19.89
Tobacco	334.8	267.8	250.2	252.0	240.4	-20.0	-6.6	0.7	-4.6	0.36	0.12	0.06	0.05	0.06
Textile	14560.4	11779.1	77181.3	89587.8	96352.8	-19.1	555.2	16.1	7.6	15.81	5.30	19.98	18.95	23.81
Wearing apparel	6793.0	809.0	13275.0	10412.8	1940.3	-88.1	1540.8	-21.6	-81.4	7.4	0.4	3.4	2.2	0.5
Leather	38557.9	99360.5	161924.6	236785.6	197018.3	157.7	63.0	46.2	-16.8	41.9	44.7	41.9	50.1	48.7
Wood	6.5			29.0	27.6	-100.0			-4.6	0.0	0.0	0.0	0.0	0.0
Furniture	1.5		13.4	2015.2	28.0	-100.0		14951.7	-98.6	0.0	0.0	0.0	0.4	0.0
Paper and Printing	2796.1		5834.3	3075.8	22.0	-100.0		-47.3	-99.3	3.0	0.0	1.5	0.7	0.0
Rubber & Plastic	274.8	22212.8	334.3	33610.9	9205.3	7981.9	-98.5	9953.9	-72.6	0.3	10.0	0.1	7.1	2.3
Consumer Goods	**84883.0**	**210100.8**	**377540.9**	**465377.2**	**385314.4**	**147.5**	**79.7**	**23.3**	**-17.2**	**92.2**	**94.6**	**97.7**	**98.4**	**95.2**
Intermediate Goods														
Chemicals	0.0	7926.0	7559.4	4983.5	3680.6		-4.6	-34.1	-26.1	0.0	3.6	2.0	1.1	0.9

Sectors	2009/10	2010/11	2011/12	2012/13	2013/14	2010/11	2011/12	2012/13	2013/14	2009/10	2010/11	2011/12	2012/13	2013/14
	Value, in 000 USD					Growth in %				Share in %				
Non-Metallic Minerals	210.5	1813.6	561.6	1042.4	4988.8	761.4	-69.0	85.6	378.6	0.2	0.8	0.1	0.2	1.2
Intermediate Goods	**210.5**	**9739.6**	**8121.0**	**6025.9**	**8669.4**	**4526.1**	**-16.6**	**-25.8**	**43.9**	**0.2**	**4.4**	**2.1**	**1.3**	**2.1**
Capital Goods														
Basic Iron and Steel	2953.7	2014.1				-31.8	-100.0			3.2	0.9	0.0	0.0	0.0
Fabricated Metal	3714.6	183.8	624.5	1332.4	5466.9	-95.1	239.7	113.3	310.3	4.0	0.1	0.2	0.3	1.4
Machinery &Equipment	341.3				5156.4	-100.0				0.4	0.0	0.0	0.0	1.3
Motor Vehicles										0.0	0.0	0.0	0.0	0.0
Capital Goods	**7009.7**	**2197.9**	**624.5**	**1332.4**	**10623.3**	**-68.6**	**-71.6**	**113.3**	**697.3**	**7.6**	**1.0**	**0.2**	**0.3**	**2.6**
Total	**92103.2**	**222038.4**	**386286.4**	**472735.5**	**404607.2**	**141.1**	**74.0**	**22.4**	**-14.4**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: CSA, Various issues

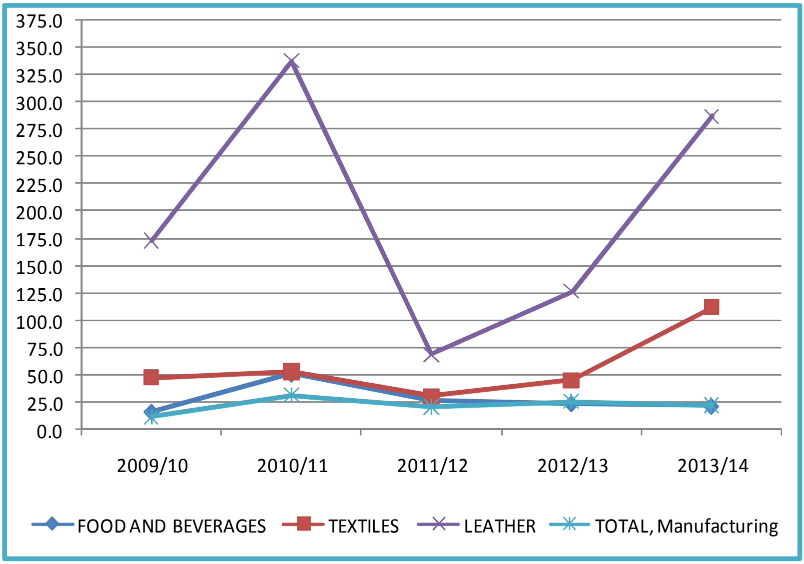
viii) Export Receipt to Import Bill Ratio

Looking at export receipts in isolation tells only one side of the story. The complete picture can be obtained if one presents the net-export receipts of the sector, i.e., the export receipt of exporting industries less their import bill.

To this end, attempt is made to give the extent to which the export receipt of LMSMI covers its import bill. According to Figure 3.4, the total export receipts, on average, covered only about 25 percent of its import bill for its raw materials over the first four GTP implementation years. It was however, higher than the base case (12 percent). Although improvements was registered compared with the base case (not target set by GTP I), the sector was unable to cover its hard currency demand from own export receipt. This indicates that the import bill of manufacturing industries have continued to be financed by export receipts from other sectors of the economy.

In fact, export to import coverage varies from sector to sector. During the first four GTP implementation years, food and beverage, textile and leather sub-sectors have registered export receipt to import bill ratio of, on average, about 30.5 percent, 60.2 percent and 204.9 percent, respectively. All three sub-sectors depicted better performance compared with their respective shares of 16.3 percent, 47.3 percent and 172.9 during the base year (2009/10) (Figure 3.4).

Figure 3.4: Export Receipt to Import Ratio in Percent



Source: Computed based on CSA, Various issues

ix) Import Intensity

The plan was to reduce import dependency of the manufacturing sector. However, the data shows that import intensity which started declining at the initial years of the plan implementation period became equal to the base case later. This could be due to the manufacturing industries' weak linkages with themselves and with the agriculture sector and/or newly entering industries had been relatively import dependent. At the end of the fourth year(2013/14), the import intensity of the overall sector remained at more or less the same ratio as in the base year (2009/10) of 0.51 indicating lack of strengthened inter and intra-sectoral linkages during the period under review. Specifically, the import intensities of the priority sub-sectors had shown an increasing trend, which would affect the competitiveness of thee exporting sub-sectors because high import contents of exporting sectors face doubling of transport and other logistics costs when importing inputs and exporting finished goods (Table 3.7).

Table 3.7: Import Intensity in Raw Materials

INDUSTRIAL GROUP	Base year	First four GTP I implementation years			
	2009/10	2010/11	2011/12	2012/13	2013/14
Food and Beverages	**0.248**	0.181	0.206	0.304	0.297
Tobacco	**0.055**	0.533	0.533	0.780	0.780
Textiles	**0.370**	0.388	0.244	0.277	0.457
Wearing Apparel	**0.503**	(0.092)	0.166	0.341	0.719
Leather	**0.344**	0.206	0.186	0.248	0.338
Wood	**0.211**	0.434	0.061	0.152	0.352
Paper and Printing	**0.595**	0.733	0.584	0.563	0.722
Chemicals	**0.705**	0.749	0.822	0.705	0.778
Rubber and Plastic	**0.923**	0.930	0.870	0.849	0.777
Non-Metallic Mineral	**0.581**	0.255	0.297	0.322	0.158
Basic Iron and Steel	**0.791**	0.786	0.778	0.805	0.976
Fabricated Metals	**0.846**	0.524	0.571	0.591	0.520
Machinery and Equipment N.E.C.	**0.851**	0.870	0.109	0.668	0.827
Motor Vehicles, Trailers & Semi-Trailed	**0.985**	0.866	0.766	0.409	0.490
Furniture; Manufacturing N.E.C.	**0.501**	0.360	0.435	0.511	0.795
TOTAL	**0.510**	**0.441**	**0.372**	**0.443**	**0.509**

Source: CSA, Various issues

x) Energy Utilization

Energy is the key for social, economic and industrial development. Energy and industrial sector are highly interdependent. The availability and cost of energy supplied has a major influence on industrial development. It is not only availability of energy which matters but also the types of the energy provided. A strategy for greening the industrialization process, will deliver a more competitive and resource-efficient industrial sector which is climate resilient and decoupled from environmental degradation and which provides employment.

There has been a growing commitment by the Ethiopian government to pursue green development and to that end it has prepared Climate-Resilient Green economy strategy. According to the strategy[12], the development of a green economy will be based on four pillars:

- Agriculture: Improving crop and livestock production practices for higher food security and farmer income while reducing emissions
- Forestry: Protecting and re-establishing forests for their economic and ecosystem services, including as carbon stocks
- Power: Expanding electricity generation from renewable energy for domestic and regional markets for transport, industrial sectors and buildings promotes leapfrogging to modern and energy efficient technologies.

[12]Federal Democratic Republic of Ethiopia, 2011. Ethiopia's Climate-Resilient Green Economy strategy

The country‘s energy source is dominated by hydro power, which, in turn, is the function of rainfall. Thus, one can say that the sector is rain fed and is not dependable. Currently, manufacturing industries have been facing the problem of both access to power and interruption giving rise to adverse consequences such loss in working hours, stacking in the middle of the production, under capacity utilization, etc. It is therefore, critical to have dependable and greener sources of energy if the country is required to green its industrialization.

Here attempt is made to see whether the manufacturing industry has been moving towards greener sources of energy during the first four GTP implementation years. The share of electricity (greener sources of energy) cost in the total energy consumption decreased during the first four GTP implementation years in almost all manufacturing industry sub-sectors. This is contrary to the expectation that the share of greener sources would increase by substituting the brown sources. Surprisingly, some of the sub-sectors which have not been using other than hydropower used wood, charcoal and oil, may be with the aim of coping with electricity interruption (Table 3.8).

Energy infrastructure is an economically meaningful way helps to explain why some countries have managed to industrialize while others were less successful. Energy infrastructure is positive and significant across all country groups as well, but, as expected, there are important differences. The impact is greatest for the poorest economies and fast-growing Asian ' tigers'. Energy infrastructure also offers an explanation for differing industrial growth rates (UNIDO, 2010)[13]

Table 3.8: Hydropower Cost in the Total Energy Cost of the LMSMI, share in %

	Base Year	GTP I Period			
SECTORS	**2009/10**	**2010/11**	**2011/12**	**2012/13**	**2013/14**
Food & Beverage	33.79	29.15	23.22	22.01	22.69
Tobacco	100.00	99.30	99.30	12.53	12.53
Textiles	45.33	30.25	19.61	21.89	25.46
Wearing Apparel	39.13	27.26	52.37	8.18	26.70
Leather	44.89	37.93	29.97	35.62	25.27
Wood	46.29	25.87	40.76	41.84	34.44
Paper & Printing	54.95	47.28	31.92	59.02	35.85
Chemicals & Chemical Products	39.10	32.75	30.23	20.56	18.64
Rubber & Plastic	47.27	36.65	33.06	37.56	47.96
Non-Metallic Mineral Products	10.26	12.79	6.88	13.40	16.55
Basic Iron and Steel	26.55	22.82	31.04	36.74	21.79
Fabricated Metals	50.75	30.73	30.79	17.39	20.11
Machinery & Equipment N.E.C.	63.59	68.74	89.20	70.28	45.12
Motor Vehicles, Trailers & Semi-Trailers	19.91	40.08	5.80	15.76	22.00
Furniture N.E.C.	46.29	46.98	33.01	31.15	30.92
Total	25.76	11.50	14.88	20.62	21.65

Source: CSA, Various issues

[13] UNIDO, 2010. Energy Infrastructure and Industrial Development, Anders Isaksson, Research and Statistics Branch Programme Coordination and Field Operations Division, WORKING PAPER 12/2009

Compared with agriculture and services, manufacturing production is relatively energy-intensive, which implies that industrialization increases demand for energy and, thus, a need for adequate energy infrastructure.

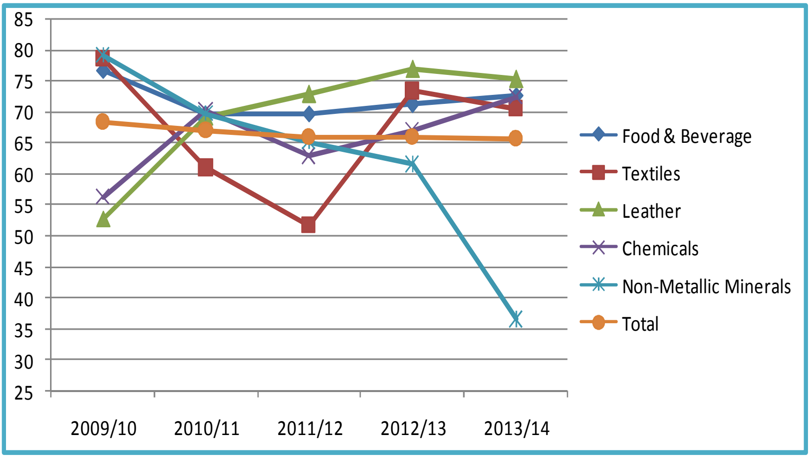
The most direct role of energy is its use as an input for production. In effect, a world without electricity amounts to non-mechanized production. While erratic supplies of electricity disrupt production, voltage fluctuations negatively affect the durability of machines. Better electricity-compatible infrastructure can, thus, raise the efficiency and durability of physical capital.

xi) Capacity Utilization

Capacity utilization is one of the most important indicators of the performance of the sector. Capacity underutilization occurs due to a variety of problems including shortage of raw materials, lack of market, power interruption, breakage of machinery, etc. Low capacity is related with low economies of scale and hence low competitiveness. The overall capacity utilization of the LMSMI declined to (64.3 percent) in 2013/14 from 68.4 percent in 2009/10 (the base year). The registered capacity utilization during the first four GTP I implementation years was below the base case and the GTP target of 90 percent (Figure 3.5).

Of the priority sub-sectors, the leather industry was the only one whose capacity utilization had been consistently increasing over the period. The other industries, however, have not shown improvements vis-à-vis the base case. Moreover, a sudden drop in capacity utilization had been witnessed in the non-metallic minerals sub-sector mainly due to a dramatic drop in the capacity utilization by the manufacturing of articles of concrete, cement and plaster (Figure 3.5).

Figure 3.5: Trends in Capacity Utilization, in %



Source: Computed based on CSA various issues

3.4 The Prospects of LMSMI during GTP II

Evaluation of past performance has an important role in planning because it serves as a spring board for future activities. Accordingly, GTP II started by assessing the performances of the preceding plan period. This report also assessed the recent performance of LMSMI. Both reports have come to the same conclusion that that the performance registered during the first GTP implementation period was not encouraging, especially performances of the priority exporting manufacturing industries.

The factors responsible for the weak performance of the manufacturing sector during GTP I period were not unknown at all. They were there for ages affecting the sector's development. These include shortage and poor quality of domestic raw materials, lack of foreign exchange for importing raw materials, weak agriculture-industry linkage, backward technology, low capabilities, low productivity and competitiveness compared with foreign suppliers, low capacity utilization, frequent interruption of power supply, etc. The problem is that these issues were not given serious attention at the outset by GTP I.

3.4.1 GTP II[14]

3.4.1.1 Bases, objectives and strategic pillars of GTP II

i) Bases of GTP II

As a vehicle towards the realization of Ethiopia's vision of becoming a lower middle income country by 2025, the Second Growth and Transformation Plan (GTP II) is built on Sectoral Policies, Strategies & programs, lessons drawn from the implementation of the first GTP, and the post-2015 Sustainable Development Goals (SDGs). It has also taken into account the global & regional economic situations with direct or indirect bearings on the Ethiopian economy.

Although the bases of the plan have touched upon some important issues, they did not discuss the critical macroeconomic policies in the country containing industrialisation. These include the foreign exchange regime to be pursued during GTP II and issues related

[14] This section draws on MOFED, GTPII final draft (2015).

with inter sectoral linkages (especially agriculture and industry). It has been noted that the existing foreign exchange regime works against exporters by reducing the amount of receipts in local currency, pegging of the Birr to only US Dollars while the major partner is EU and the existing small holder peasant agriculture has not been able to supply inputs to the manufacturing industry by the required quantity and quality. These issues have not been thoroughly discussed along with indicating concrete measures on the ground to be taken during the implementation of the second GTP.

ii) Objectives of GTP II

The overarching objective of GTP II is the realization of Ethiopia's vision of becoming a lower middle income country by 2025. Thus, GTP II aims at achieving an annual average real GDP growth rate of 11 percent within a stable macroeconomic environment while at the same time pursuing aggressive measures towards rapid industrialization and structural transformation.

The vision is long term by nature and can be maintained for the future. However, the projected annual average real GDP growth rate of 11 percent for GTP II period is less likely to realize owing to a variety of factors. First, it would be difficult for the country to grow by the same high rate as it used to grow when its economic base was small. Second, due to the domestic and global environment facing the country, the GTP II implementation period may not be as good as that of GTP I and the economy has already started facing formidable challenges of various kinds. Third, as a drought stricken country, the first two GTP II implementation years will actually be expectedly to be a recovery rather than a high growth period.

iii) Strategic Pillars of GTP II

In order to achieve the objectives of GTP II, the following eight pillar strategies are pursued:

- Sustain the rapid, broad based and equitable economic growth and development witnessed during the last decade including the first GTP.
- Increase productive capacity and efficiency to reach the economy's productive possibility frontier through rapidly improving quality, productivity and competitiveness of productive sectors(agriculture and manufacturing industries);
- Enhance the transformation of the domestic private sector to enable it to become a capable development force;
- Build the capacity of the domestic construction industry, bridge critical infrastructure gaps with particular focus on ensuring quality provision of infrastructure services.
- Manage proactively the on-going rapid urbanization to unlock its potential for sustained rapid growth and structural transformation of the economy.
- Accelerate human development and technological capacity building and ensure its sustainability;
- Continue to build democratic and developmental good governance through enhancing implementation capacity of public institutions and actively engaging the citizens.
- Promote women and youth empowerment, ensure their effective participation in the development and democratization process and enable them to equitably benefit from the outcomes of development;

GTP II came up with two new strategic pillars in order to achieve its objectives. These are enhancing the transformation of the domestic private sector to enable it to become capable development force; and proactively manage the on-going rapid urbanization to unlock its potential for sustained rapid growth and structural transformation of the economy.

Given the critical importance of the manufacturing industry in the structural transformation of the economy, the role given to it during GTP is not explicitly included as one of the eight pillars in GTP II.

3.4.2 Industrial Development and Structural Transformation in GTP II

With regard to industrial development, GTP II has stated the following strategic directions, objectives, implementation strategies and targets.

i) Strategic Direction

The strategic directions of the industrial sector are to:

- establish light manufacturing industries which are labour intensive and benefit citizens, globally competitive and leading in Africa and environment friendly;
- establish the foundation which enables to create an industrialized country by moving into the development of strategic heavy industries;
- working on opportunities which enable high-tech industries to contribute to the development of the industrial sector; and

- conduct various studies to identify future potential growth industries with the view to making the necessary preparations for future development.

ii) Major Objectives

The main objective of Industrial Development and Structural Transformation during GTP II is to bring about significant growth of the manufacturing industry so that it could play the leading role in job creation, technology learning, and structural shift in Ethiopia's export and address trade imbalance.

iii) Implementation Strategies

In order to achieve the above goals and accelerate growth and expansion of the industrial sector, a number of implementation strategies are devised. These strategies mainly focus on the implementation of projects and programs which gear towards attracting quality investment, enhancing production and productivity, boosting export accelerating technological learning and strengthen the linkage among industries.

Public support of institutional capacities to provide effective support to the private sector

The various subsector institutions will be brought to the level where they can assess appropriate technologies and organize information, adopt and transfer technologies to the private sector through improving their research and extension capacity and equipping them with the necessary infrastructure.

Existing industrial forums will continue and policies and legal frameworks which enable to lead the sector to the required direction will be put in place.

Implementation of the Kaizen philosophy, establishing industrial parks and clusters will be undertaken in the next five years.

- With regards to Kaizen,
  - the first level will be implemented on 75-100 export oriented companies to improve quality and production up to 20-30% ;
  - the second level Kaizen will be implemented on 50- 75 export oriented companies to improve quality and production by 20-25%, and
  - Kaizen will also be implemented in other import oriented companies.
  - With regard to the establishment of industrial parks and clusters,
  - Seven million square meters of land will be made available for investors engaged in manufacturing and related sectors,
    - four pilot agro industry parks will be established which will be linked with millions of smallholders to supply inputs, and
    - regional administrations, cities and towns will get the necessary support to develop standardized industrial clusters and parks for those investors promoted from small to medium industries, and hence generate employment opportunities.

Further strategies are devised and programs are put in place in terms of enhancing productivity, quality and technological capacity. This program focuses on avoiding rent seeking, enhancing continuous improvements in productivity, production and quality and increasing international competitiveness through changing the attitudes of workers and investors, improving existing technologies and implementing Kaizen and benchmarking tools. In addition, the linkage between industries and educational institutions will be strengthened to improve the quality and productivity of manpower supplied to the sector.

Investment expansion programs, which focus on attracting quality private investments will be undertaken. Attracting new foreign and domestic investments is paramount. The transformation of domestic private sector investment will be greatly encouraged on top of attracting foreign direct investment to ensure the rapid growth of the manufacturing sector. Hence, different projects will be designed and implemented to boost investment during the plan period.

Similarly, a program will be designed and supportive policies will be developed to encourage new industries. This will be realized through creating industrial linkages, expanding both domestic and foreign trade and improving labour and capital productivity. Expanding the manufacturing sector will focus on identifying new investment areas and these areas include biotechnology, petrochemicals, electricity and electronics, information and communication technologies (hardware and software production industries). Formulating policies and strategies to support strategic domestic industries and supporting the metal and engineering industry to accelerate its growth will also be undertaken.

The key strategy which will be given due emphasis is the development of industrial parks and clusters. To improve fast engagement and timely commissioning of projects, adequate emphasis will be given to provide infrastructures, avoid rent seeking in relation to land and curb problems associated with customs and logistic services. Emphasis will also be given to attract investments by building industrial parks on identified lands by the government, private, or joint arrangements.

iv) Major Targets and Assessment

a) Manufacturing industry VA Share in GDP

One of the transformation indicators considered in GTP II is the share of the manufacturing industry in total GDP. The plan has set targets in two scenarios: base case and high growth. Both the base and the high case scenarios have no different target It planned to bring the share of industry and manufacturing sector to 22.3 percent and 8 percent, respectively at the end of the plan period. According to the plan, the share of manufacturing in GDP will increase from 4.8 percent in 2014/15 to 8.0 percent in 2019/20, increasing its share by 66.7 percent over the five year period. It seems a bit ambitious given the sector's stagnation for so long and it slow performance during the preceding GTP I despite favourable environment and various incentive package provided to it. Moreover, no specific incentives are suggested in the plan document to help to raise investment in the sector to bring the sector's share in the economy to the planned level (Table 3.9).

Table 3.9: The Share of the Major Sectors of the Economy in GDP during GTP II, in %

Sectors	Base year, 2014/15	GTP II period					
		2015/16	2016/17	2017/18	2018/19	2019/20	Annual average
Base case							
Industry sector	15.1	16.6	18	19.4	20.9	22.3	19.4
Manufacturing	4.8	5.2	5.7	6.2	6.9	8.0	6.3
Large and Medium scale	3.7	4	4.4	4.8	5.3	5.9	4.9
Small Scale and cottage	1.1	1.2	1.3	1.4	1.6	1.8	1.4
High case							
Industry sector	15.1	16.6	18	19.4	20.9	22.3	19.4
Manufacturing	4.8	5.2	5.7	6.2	6.9	8.0	6.3

Source: National Plan Commission, GTP II volume I main document (Amharic version) pp111-112, December 2015,

b) Manufactured Export share in total Export Earnings

The expected growth during GTP II is a little bit more likely compared with the planned targets in GTP I. Overall, the growth in the share of manufacturing export in total export earnings seems reasonable if pressure is put to realize it. Export receipt from manufacturing is planned to grow from 13.4 percent of total export earnings in 2014/15 to about 26 percent at the end of the plan period nearly doubling its share in five years (Table 3.10).

During the second GTP implementation period, some of the items which were indicated to be exported during GTP I, were not explicitly shown. For instance, export receipt from cement export is not shown in GTP II.

Some products planned for export during GTP II look a little bit ambitious, given Ethiopia's past experience in the production of these items, for example exporting of metal and engineering, products electric and electronic items. With respect to these items, what is feasible at the initial phase is to start producing them locally and substitute import then gradually move to exporting them. Given the country's experience, it is unlikely to achieve the target set for producing and exporting these items during GTP II.

GTP II has indicated it has learned, among others, from the performance of the GTP I. However, review of the two plan documents show that the lesson was mainly from assessing the implementation problems of GTPI and not from findings emanated from going deep into the plan and rechecking the validity of the overall direction taken, priorities defined and projects identified for promotion during GTP I. The manufacturing industry development plan under GTP I suffered from different problems; first, it was too ambitious given the low state of the sector in terms of financial and human capacity; second, it was not seen within a comprehensive framework , considering the backward and forward linkages concretely; third, the long gestation nature of industrial projects and their demand for in-depth and comprehensive studies before implementation was not considered; fourth, contextualization and replication to the Ethiopian setting were ignored while learning the industrialization experience of other countries.

Table 3.10: Planned Export Earnings during GTP II

Description	Base year, 2014/15	GTP II period					
		2015/16	2016/17	2017/18	2018/19	2019/20	Annual average
Export Earnings, in million USD							
Total Export Earnings	3,983	5,101	6,876	8,797	11,084	13,968	9,165
Industrial sector	706	1,060	1,888	2,375	3,160	4,249	2,546
Manufacturing	532	887	1,354	1,849	2,582	3,613	2,057
Food and Beverage	17	29	51	88	152	265	117
Meat and Meat products	84	109	144	195	266	372	217
Sugar and mollasses	133	163	305	380	491	659	400
Leather and Leather Products	160	206	273	368	505	706	412
Textile products	137	181	267	392	549	767	431
Chemicals	0.05	28	50	63	81	101	65
Pharmaceutical	0.49	30	55	69	89	111	71
Metal and Engineering products	0	92	121	181	303	448	229
Electric and Electronics products	0.34	49	89	114	146	182	116
Electric power	173	173	534	526	579	636	490
Minerals	508	603	702	1,155	1,551	2,009	1,204
Share in total export earnings, in %							
Industrial sector	17.73	20.78	27.46	27.00	28.51	30.42	27.78
Manufacturing	13.36	17.39	19.69	21.02	23.29	25.87	22.44
Electric power	4.34	3.39	7.77	5.98	5.22	4.55	5.34
Minerals	12.75	11.82	10.21	13.13	13.99	14.38	13.14

Source: FDRE, Second Five Year Plan, GTP Final Draft

3.4.3 Challenges of the Manufacturing Industry during GTP II

Having reviewed the sector, this report has come up with the following challenges, which may affect the successful implementation of the manufacturing industry sector plan during the GTP II. These include:

- Low inter and intra-sectoral linkages and dependence on import even for agricultural raw materials;
- Lack of horizontal and vertical integration among manufacturing industries.
- Low capabilities in the sector such as skill, technology, entrepreneurship, marketing, etc.
- Inability to produce quality products and meet world standards, sanitary and phyto-sanitary conditions, and other requirements of the developed world's consumer requirements.
- Mounting pressure on the country to join WTO and Regional trading blocs, which may lead to deindustrialization.
- Low productivity and competitiveness compared with foreign producers.
- Low capabilities and technological base contributing to slow catch-up with advanced countries and leaving the country in the vicious circle of technological backwardness;
- Huge backlogs from GTP I compelling GTP II to postpone its targets to the next plan period;
- The constraints hampering the industrial development are beyond the mere of bureaucratic setbacks, lack of incentive schemes, etc. They are structural requiring structural solutions such as strengthening agriculture-industry linkages, the

continued rising of cost of living which is not recommended for industrial development, etc.;

- Insufficiency of consultations with key stakeholders on GTP II thereby giving rise to low sense of ownership, which in turn affects the smooth implementation of the plan;
- Underdeveloped labour/skill market and taking time of developing a properly functioning labour market takes longer time;
- Lack of clear and concrete plans/strategies on how the various critical problems constraining the development of the manufacturing sectors of the country for ages would be solved during GTP II;
- The various logistics services, including transportation are inefficient and expensive to help realize the competitiveness of the sector during GTP II;
- Availability of foreign exchange will remain a challenge for the country in the near future since export earnings may not increase over a short period as the sector has structural rigidities of various kinds.
- Persistence of industrial raw material problems both in terms of quantity and quality since the upper-stream in the value chain of manufacturing industries has remained underdeveloped and a lot needs to be done to change it radically.
- Significant smuggling/dumping into the local market thereby weakening the domestic growing manufacturing industries.
- Continued interests of local investors in the service sector hampering investment flow into manufacturing sector;
- Deteriorating peace and security due to increasing in stability in the major and investment potential regions of the country.

3.4.4 The Prospects during GTP II

The prospects of the manufacturing industry development during GTP II is formed based on the trends observed during the preceding plan period and events which are expected to happen during the plan implementation period both at national and global levels.

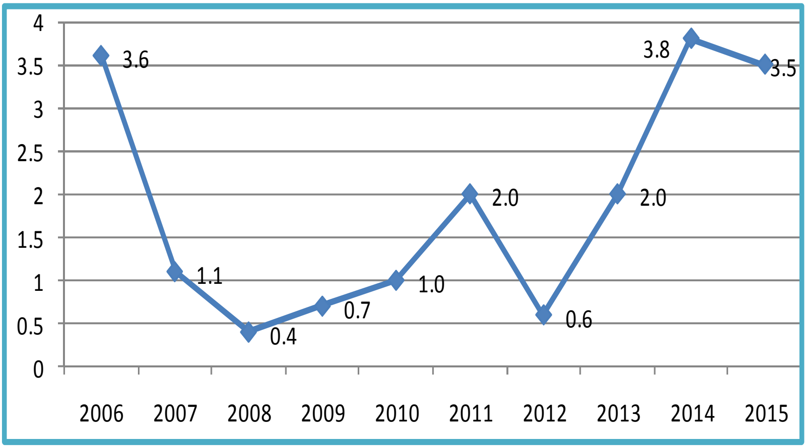
i) Past Trends in Domestic and FDI flows into the sector

The recent performance of the manufacturing industry was not good and if the recent trend continues into the GTP II no dramatic change will be observed on the degree of industrialization of the country at the end of the plan period.

FDI has been flowing into Ethiopia during the last ten years with some degree of fluctuations. The flow was, on average, 1.87 percent of GDP per annum over the period 2006-2015. The minimum rate witnessed was in 2008 which could be attributable to the global financial crisis and its implications (Figure 3.6). The World Investment Report released on June 24, 2014, revealed that Ethiopia was the third largest recipient of foreign direct investment (FDI) in Africa in 2013.

Unless the local pull factors and external push factors during the plan period work towards increasing the annual flow of FDI to be more than the observed trend during the last ten years, this report assumes the continuation of an average level of FDI flow into the economy during GTP II.

Figure 3.6: FDI, Net Inflows in % GDP



Source: World Bank database, accessed June 25, 2016

ii) The Domestic and Global Environment

a) The Domestic Environment during GTP II

1) Government commitment

In GTP II, the government has indicated its commitment to support the development of the manufacturing industry in different ways such as: improving the overall investment climate, boosting private sector participation in the sector, privatization of public enterprises, expanding infrastructure coverage and services, improving the supply of power, improving the supply of skilled manpower, establishing industrial parks, providing favourable credit facility for investors in the manufacturing sector, etc. If implemented as stated, this would perform better than GTP I.

2) The economic reality of the country

The economic reality of the country would be a combination of recovery from draught and growth. As a result, the overall growth of the economy would not be double digit like the preceding plan period.

The overall income of the country has kept increasing; especially the middle class has continued to expand in size along with its increased consumption of manufactured goods. This, in turn, will encourage investors to engage in import substitution activities by locally producing goods which otherwise would be imported. All these factors indicate that the domestic market for industrial products will grow during the plan period.

b) The global environment and FDI flow

Growth prospects have weakened throughout the world economy. Global growth for 2016 is projected to bet 2.4 percent, unchanged from the disappointing pace of 2015, and a 0.5 percentage point below the January forecast. Emerging markets and developing economies (EMDEs) are facing difficult situations, including weaker growth among advanced economies and persistently low commodity prices, as well as lackluster global trade and capital flows. Divergence between commodity exporters and importers persist. Conditions remain markedly challenging for commodity exporters, which continue to struggle to adjust to the new era of depressed prices. In contrast, commodity importers are showing greater resilience to difficulties, although the expected growth windfall from low energy prices has been surprisingly modest. Global growth is projected to pick up slowly to reach 3.0 percent by 2018, as stabilizing commodity prices provide support to commodity exporting EMDEs. The risks have become more pronounced. These include deteriorating conditions among key commodity exporters, softer-than expected activity in advanced economies, rising private sector debt in some large emerging markets, and heightened policy and geopolitical uncertainties (WB, 2016)[15].

Likewise, growth in Sub-Saharan Africa is projected to slow again in 2016, to 2.5 percent, down from an estimated 3.0 percent in 2015. The forecast is 1.7 percentage points lower than the January 2016 projections. Low commodity prices, tightening global financial conditions, and drought in parts of the region will continue to weigh on growth this year. The recovery is expected to rise to an average of 4.1 percent in 2017-18, driven by a gradual improvement in the region's largest economies and as commodity prices stabilize. Nonetheless, risks in the outlook remain tilted to the downside, including a sharper-than-expected slowdown in major trading partners, further decline in commodity prices, delays in adjusting to the negative terms-of-trade shocks, worsening drought conditions, and political and security uncertainties [WB, 2016][16].

The global trends show that emerging economies are looking for countries to invest and relocate some of their manufacturing industries on account of a variety of reasons. This could be considered as an opportunity for developing countries, like Ethiopia, for it generates transfer of technology, employment, foreign exchange, etc. These investments are another important opportunity to develop the manufacturing industry.FDI usually flows following investors' personal interest and comparative advantages. In Africa, FDI mostly finds its way into extractive industries.

[15] The World Bank. 2016. Global Economic Prospects, June 2016
[16] The World Bank. 2016. Global Economic Prospects, June 2016

Ethiopia, though not a mineral rich country, has started attracting FDI during the last decade owing to a variety of reasons. Specifically, investments in light manufacturing have attracted and continue to attract investors from China, Turkey and India.

There have been various economic and non-economic factors driving the flow of FDI from one country to another. Historical evidence attributes the loss in comparative advantage, which was mainly due to the rising wage rate, has been the prime reason for relocating industries form one country to another. Chinese labour-intensive manufacturing industries have witnessed relocation overseas as China's comparative advantage in low-end manufacturing has steadily waned.

Environmental concern has become among the driving force in relocating manufacturing industries from one country to another. Countries/companies have been relocating their polluting industries from areas where environmental concern is intense to where it is loose.

In this connection, there[17]is evidence indicating China's plan of relocating its heavy and polluting industries to overseas. For instance, the Chinese province of Hebei, pressured by overcapacity in the domestic market and growing concerns over industrial pollution plans to relocate its heavy and most polluting industries overseas including steel, cement and glass factories to countries in Africa, South America, East Europe and the rest of Asia,. The three

[17] This section draws heavily on the article by Zhang Yu: Global Times Published: 2014-12-22 18:28:02

industries, steel, cement and glass contribute to almost a third of the Hebei's economy. Steel, cement and glass are regarded as the major sources of pollution in China's highest emitting province. According to Hebei's Department of Environmental Protection, steel, electricity, cement and glass industries account for 65 percent of the province's sulphurdioxide emissions and 61 percent of its smoke and dust emissions.

By 2017, Hebei Province plans to move capacity for 5.2 million tons of steel, 5 million tons of cement and 3 million units of glass abroad. The targets for 2023 are more ambitious, with capacity for 20 million tons of steel, 30 million tons of cement and 10 million units of glass waiting to be relocated abroad. Researchers believe that China's rapid economic development came at the expense of its environment.

Environmental issues have been the centre of controversy for many of China's overseas investment projects, and previous attempts of Chinese companies to open factories abroad had been dogged by problems. In 2009, Shanghai's Baosteel Group had to abandon a proposed joint venture to build a steel mill with a Brazilian mining firm, CIA Vale do Rio Doce, after failing to secure approval from Brazilian environmental authorities. Wuhan Iron and Steel Group's attempt to establish a factory in Brazil also failed.

A Chinese decision to relocate some of their industries in Africa might boost the flow of FDI into Ethiopia, as the country would be one among the destinations for which it has applied. Would this flow of polluting manufacturing industries be considered as an important opportunity to be seized? It has to be noted that the relocation of these industries has both advantages and disadvantages. The question is whether Ethiopia is in a position to screen out the polluting firms from the clean ones during the flow. Otherwise, they would compel Ethiopia to pay expensive prices sometime in the future in terms of damaged environment as China has started paying now. Therefore, great care should be taken while letting industries to relocate in the country.

Chapter IV

Rural Non-Farm Enterprise Engagement and Gender in Ethiopia

4.1 Introduction

According to UN data, 46 percent of the world's population lives in rural areas with low income countries contributing 70 percent to the figure (UN, 2014). Ethiopia is no exception to this situation with 83 percent of its population and a similar proportion of its poor living in rural areas[18]. In rural Ethiopia, employment rates stood at 81.6 percent (86.9 and 76.3 percent for men and women, respectively) according to a national labor force survey conducted in 2013. In rural employment, agriculture accounted for 83.2 percent (91.1 for men and 74 percent for women) in this period (CSA, 2014).

Availability of a large rural labor force poses a challenge as it may not be productively absorbed in the agricultural sector. Migration to urban areas or the development of non-farm employment is among the common ways to ease the challenge (Lanjouw and Lanjouw, 2001). Rural non-farm employment is widely considered to be a potentially promising poverty alleviation strategy. According to Haggblade et al. (2010 cited in

[18] Eighty-five percent of the Ethiopian poor lives in the rural according to our calculation using data from CSA (2008) and WB (2015)

Costa and Rijkers, 2011) rural non-farm enterprises account for about 35 to 50 percent of rural income and roughly a third of rural employment in developing countries.

Lanjouw and Lanjouw (2001), say rural non-farm sector has also a distributional effect through the pathways: (1)by producing lower quality goods which are more heavily consumed by the poor, and the success of this sector has indirect distributional benefits via lowering prices to the poor,(2) by generating employment to the poor who, because they are small landholders or are landless, cannot find sustenance in agriculture, (3) by helping poor individuals and households who do not have sufficient access to formal insurance and credit markets to cope with risks, smooth their income over the years and, and (4) by improving the functioning of local agricultural labor markets by raising wages and/or reducing underemployment. Nagler and Naude (2014) also mention the importance of the relative contribution of the rural non-farm economy to household income in Africa.

In their studies of the gender dynamics in rural non-farm entrepreneurship in Bangladesh, Ethiopia, Indonesia and Sri Lanka, Costa and Rijkers (2011) found that off-farm entrepreneurship participation rates are lowest in Ethiopia (around 9.5 percent for both men and women) and highest in Bangladesh (52.8 percent for men and 8.6 percent for women). Compared to these countries, a smaller proportion of Ethiopian women reported not having at least one non-farm activity as compared to the other countries. The proportion of women was higher than men in Ethiopia in non-farm enterprises, which was an exception for this group of countries. Non-farm self-employment was found to be important for women who are the heads of their households, as they are much more likely to work in a non-farm enterprise. In Ethiopia female headed households derive 19 percent of their household budget from non-farm enterprise activity, while male-headed household derive only 6 percent of their income from it, on average (Costa and Rijkers, 2011).

Participation in non-farm employment is determined by a combination of both economic and non-economic factors which in turn can be grouped under push- and pull-factors. Push factors such as household shocks, seasonality in agriculture, and household surplus labor are important determinants of a rural household's decision to operate a non-farm enterprise. Studies reviewed by Nagler and Naude (2014) show that due to the high risks involved in agriculture, households may cope with or manage this risk through operating such enterprises. In the presence of market failures for credit and insurance, most households operate enterprises of low-risk, low-productivity types of sectors, such as trade, sales and services. Fewer households can enter into more risky, but are more lucrative sectors.

In assessing the productivity of different types of non-farm employment(NFE), Nagler and Naude (2014) found businesses in the transport sector or in bars and restaurants in Ethiopia, and professional services or non-agricultural businesses in Malawi as more productive types of enterprises compared to agribusiness or the sales sector (in both countries). They also found that women are constrained in terms of time as businesses can be very time-consuming to run, and women tend to be more time-constrained due to pressures from other duties in the household. Their findings also indicate enterprises operated by women-headed households to be less productive than those operated by male-headed households in both countries. Non-farm enterprises in rural areas are less likely than those in urban areas to operate continuously throughout the year indicating some seasonality in rural NFE.

In Ethiopia, other factors affecting participation in non-farm employment include education, religion and gender of household head (Owoo and Naudé, 2014). Male household-heads appear to perform better than female heads (in contrast with Costa and Rijkers (2011)), and participation declines with distance from asphalt roads. They also found a negative relationship between rural non-farm enterprise performance and agricultural activity in Ethiopia and Nigeria, implying that increases in farm productivity are not necessarily associated with increases in non-farm enterprise productivity in the same region.

In rural Nigeria, Shehu and Abubakar (2015) found that education of the family head, household size, community level infrastructures and its distance to market to be important factors of engagement in NFE. Households having access to social and financial capital are more likely to engage in NFE as it helps them to overcome the entry barriers. Female headed households were more likely to diversify into NFE, which Shehu and Abubakar (2015) claimed to be in line with the findings of Ali and Peerlings (2012); and Abdulai and Delgado (1999) from Ethiopia and Southern Ghana, respectively. It was also found that households with younger heads are more likely to diversify into NFE activities. Education was found to have a non-linear effect on NFE, a finding consistent with the finding of Loening et al. (2008) for rural Ethiopia. Education had a positive effect up to a certain educational level and becomes negative thereafter.

Other important factors identified by Shehu and Abubakar (2015) include that households with larger family size and those with access to electricity and mobile phone services are more likely to diversify into NFE activities. Access to formal credit is positive and significant indicating the importance of formal credit to the development of non-farm enterprises in rural areas and proximity to market is one of the factors that influenced NFE participation decision.

Loening et. al. (2008) used sales, profit, labor and investment as dependent variables for the several models they used to identify determinants of performance of non-farm enterprises in rural Ethiopia. They found that sales and profits are much higher in enterprises with a male manager than in enterprises headed by a female. They also noted that enterprise age had a positive and statistically significant coefficient, indicating that profitability grows over-time. It was also identified that good performance in the agriculture sector was accompanied by increase in sales and profits in the non-farm enterprise sectors unlike the findings of Owoo and Naudé (2014); and strong evidence was mentioned showing that droughts reduce sales and profits in the non-farm enterprise sector.

The labor and investment side of their study indicated that initial capital stock of the enterprise was strongly and positively associated with the probability of investment, indicating that larger firms were more likely to keep investing. The age of the firm was also positively associated with the probability of investing. The role local demand plays was also recognized (Loening et. al, 2008).

In Bangladesh landholding was found to be crucial for financing NFEs. Education was also found to be important particularly for high-return non-farm wage employment and remittance incomes from abroad but non-farm self-employment income is negatively associated with household head education. Participation of females in direct economic activities is negligible. Social capital and local institutions are not significantly active in promoting either local or non-local NFS (Malek and Usami, 2009).

The studies reviewed above covered different time periods, countries and dimensions of NFE. The studies, despite their differences, share the similarity of doing their analysis at household level. This report tires to build on this by taking the focus one level up from the household to the community. This was possible due to availability of nationally representative panel data collected both at household and community levels. As a result we built up our analysis from household up to community level analysis that assessed the same households and villages over time.

4.2 Data

We used the rural part of the data from two waves of the Ethiopian Socioeconomic Survey (ESS) conducted by the Central Statistical Agency (CSA) in collaboration with the World Bank for this analysis. Wave 1 was conducted in 2011/12 while wave 2 was conducted in 2013/14. The sampling covered a population frame that includes all rural and small town areas of Ethiopia except for three zones of Afar and six zones of Somali regions in the first wave. The second wave has expanded the sampling into urban areas in order to make the data representative at national level instead of for rural areas only (CSA & WB, 2013 and CSA & WB, 2015).

The survey in 2011/12 was designed in such a way that it is representative at the regional level for the most populous regions of Amhara, Oromiya, SNNP, and Tigray. The sample size is insufficient to support region-specific estimates for each of the small regions including Afar, Benishangul Gumuz, Dire Dawa, Gambella, Harari, and Somalie regions. However, estimates can be produced for a combination of all smaller regions as one "other region" category. The 2011/12 survey resulted in 3,962 households selected from 290 rural and 43 small town Enumeration Areas (EAs) or communities (CSA & WB, 2013).

The second wave was also designed to provide population inferences for the same five domains as in the first wave plus an additional domain for the city of Addis Ababa. Specifically, the 6 strata are: Addis Ababa, Amhara, Oromiya, SNNP, Tigray, and "other regions". In the second wave 3,776 households were re-interviewed out of the 3,969 households that were interviewed during the first wave, resulting in a panel attrition rate of 5 percent, or successful follow-up rate of 95 percent. The second wave was expanded to urban areas by including a total of 1,486 urban households in addition to the rural follow-ups. This wave was conducted in the original 290 rural and 43 small town EAs as well as 100 new mid and large town EAs (CSA & WB, 2013).

Household data was collected information on different socioeconomic characteristics of households and household members. There is also data collected at community (Enumeration Area – EA) level. We have used the household datasets to get information about the characteristics of households including household heads demographics, characteristics of Non-Farm Enterprise (NFE) operators and information regarding NFE operation of a household. For data on market access, access to infrastructure and other community level information, we used data from the community questionnaires.

4.3 Data Analysis

4.3.1 Household Summaries

Since the focus of this analysis is rural non-farm enterprises (NFE), we have dropped all non-rural observations in both waves and focused on datasets on rural areas. The descriptive analysis below is organized into two sets, the first being summaries at household level followed by the second set of summary statistics at EA (also interchangeably referred to as village or community) level. We have put infrastructure related community level summaries in a third separate subsection.

Table 4.1 shows that the sample households (and the rural population of Ethiopia) could be described as mainly headed by males between the ages of 43 and 46, monogamously married and in most cases illiterate. But there is much more discrepancy when we disaggregate the data further by different socioeconomic characteristics and looking across the two waves of data collected. The weighted frequency distribution shows that about 80 percent of the households were headed by men with the proportion of female headed households showing an increase of about one percentage point between the two waves.

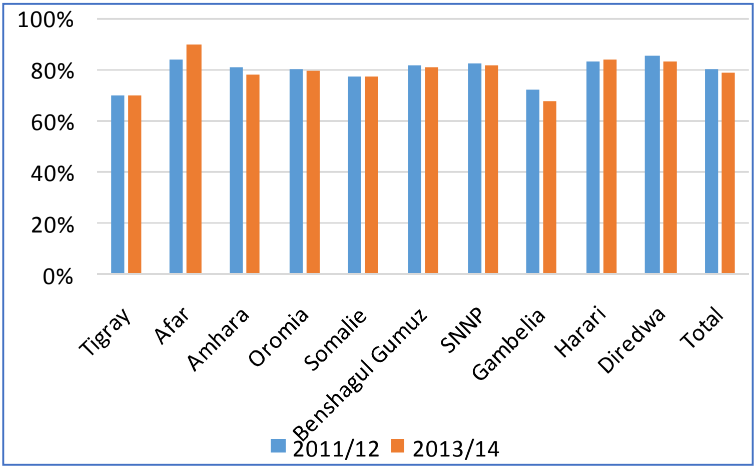
Table 4.1: Sex of the Household Head

Sex	2011/12		2013/14	
	Freq.	%	Freq.	%
Female	680	19.93	699	21.05
Male	2,730	80.07	2,623	78.95
Total	3,410	100	3,322	100

Source: Own computation

Figure 4.1 portrays the gender composition of household respondents in the 2011/12 and 2013/14 surveys. As can be seen in the figure, the proportion of male headed households covered by the surveys across different regions has either remained the same or declined in most regions except Afar (increased by 6 percentage points) and Harari (increasing by only 1 percentage point) regions.

Figure 4.1: Proportion of Male Headed Households per Region



Source: Own computation

Household heads sampled were 44.6 years old on average during the 2011/12wave and 46.3 in the second (Table 4.2). Female headed households have a higher average age than that of male headed ones. Female heads were on average about 5 years older than their male counterparts and this difference is statistically significant at 1 percent level of significance. It can be hypothesized that female headed households mostly result from separation, divorce and death of husbands. Even if we cannot conclude this based on our data, it can be indicated so by looking at the higher proportion of female heads in such categories as compared to males (Figure 4.2).

Table 4.2: Average Age of the Head

	Obs	Mean(SD)	Female	Male
2011/12	3403	44.55(15.60)	48.57***	43.55
2013/14	3316	46.34(15.34)	50.54***	45.21

Source: Own computation

*** Significant at 1% level of significance (age of heads of female headed households is greater than that of male headed ones)

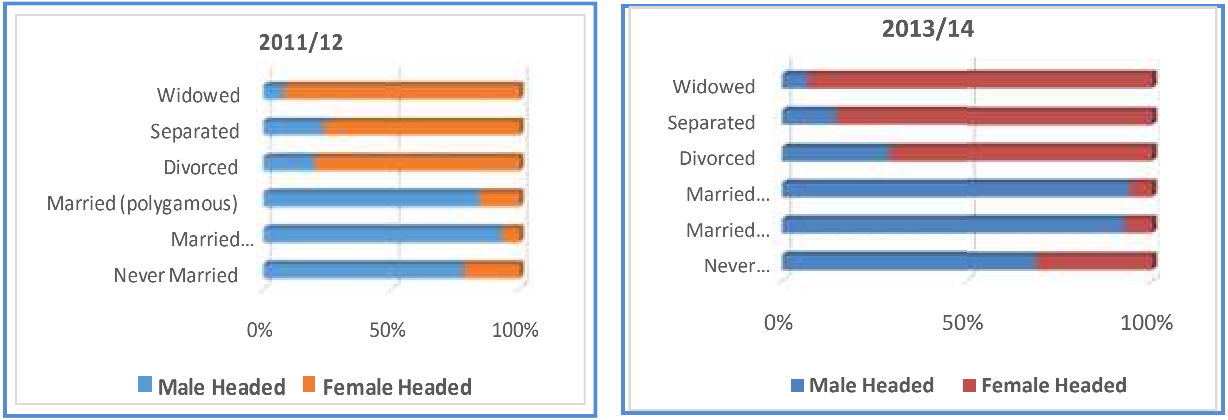
Looking at the marital status of the heads across the two waves in Table 4.3, we notice that the proportion of never married and separated remain the same while the "married" categories (monogamous and polygamous) decrease by 1 percentage point each. On the other hand the proportion of divorced and widowed increased by 1 percentage point each. Figure 4.2 below shows the proportion of male and female heads in each of the categories of marital status in the two rounds of the survey.

Table 4.3: Marital Status of Heads of Households

Marital status	2011/12		2013/14	
	Freq.	%	Freq.	%
Never Married	72	2%	68	2%
Married (monogamous)	2,601	77%	2,503	76%
Married (polygamous)	159	5%	118	4%
Divorced	120	4%	149	5%
Separated	38	1%	31	1%
Widowed	404	12%	428	13%
Total	3,395		3,297	

Source: Own computation

Figure 4.2: Proportion of Male and Female Heads in Marital Status Groups in the Two Waves



Source: Own computation

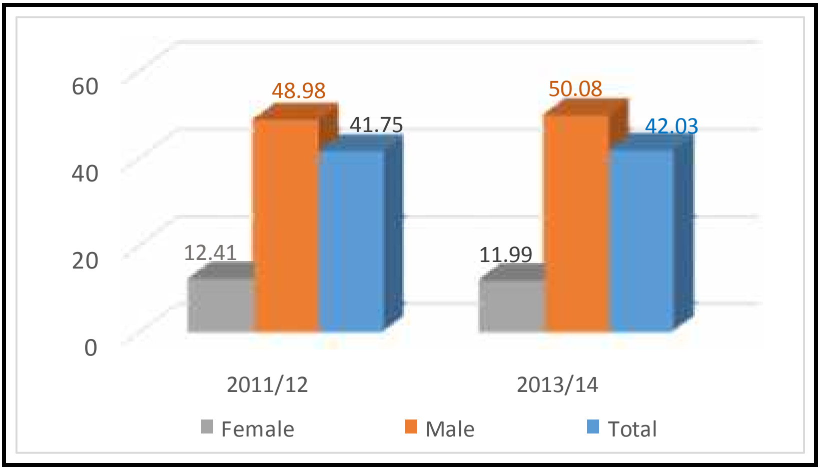
The majority of the household heads are illiterate, i.e. could not write or read in any language. The illiteracy rate remained at around 58 percent with no noticeable change over the two waves of the survey (see Table 4.4 and Figure 4.3 below). It is not unexpected to experience absence of change in literacy levels of household heads since the two waves were only two years apart and the heads are already adults who are not actively going to school at present. The illiteracy of female heads are even much worse with their literacy level standing around 12 percent while that of male heads is closer to 50 percent. Even if the changes are very small, we can see that the literacy of female heads has decreased while that of male heads increased between the two surveys.

Table 4.4: Literacy of the Head of the Household

Can read and write in one language	**2011/12**		**2013/14**	
	Freq.	**%**	**Freq.**	**%**
No	1,975	58.25	1,909	57.97
Yes	1,415	41.75	1,384	42.03
Total	3,390	100	3,293	100

Source: Own computation

Figure 4.3: Proportion of Literate Household Heads by Sex of the Head



Source: Own computation

4.3.2 Participation in Non-Farm Enterprise

Coming to non-farm enterprises (NFE), we have considered households to have a NFE if they have answered yes to at least one the following eight activities: owned a non-agricultural business or provided a non-agricultural service, processed and sold any agricultural by-products, owned a trading business, offered any service or sold anything on a street or in a market, owned a professional office or offered professional services, drove a household-owned taxi or pick-up truck to provide transportation or moving services, owned a hotel, bar or restaurant or owned any other non-agricultural business.

During 2011/12 close to 19 percent of the households answered 'yes' to taking part in at least one of the above eight NFE activities.

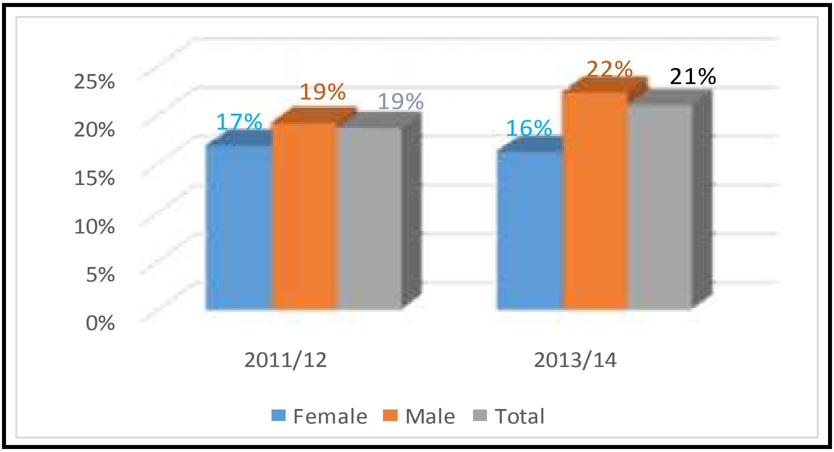
In the follow-up survey, this number increased to 21 percent rising by 2.3 percentage points (Table 4.5). Figure 4.4 shows the breakdown by headship of the household which decreased for female headed households of by about 1 percentage point while that of male headed households' NFE participation increased by about 2 percentage points.

Table 4.5: Proportion of Households with at least one NFE

NFE	2011/12		2013/14	
	No. HH	**%**	**No. HH**	**%**
No	2,814	81.19	2,621	78.89
Yes	652	18.81	701	21.11
Total	3,466	100	3,322	100

Source: Own computation.

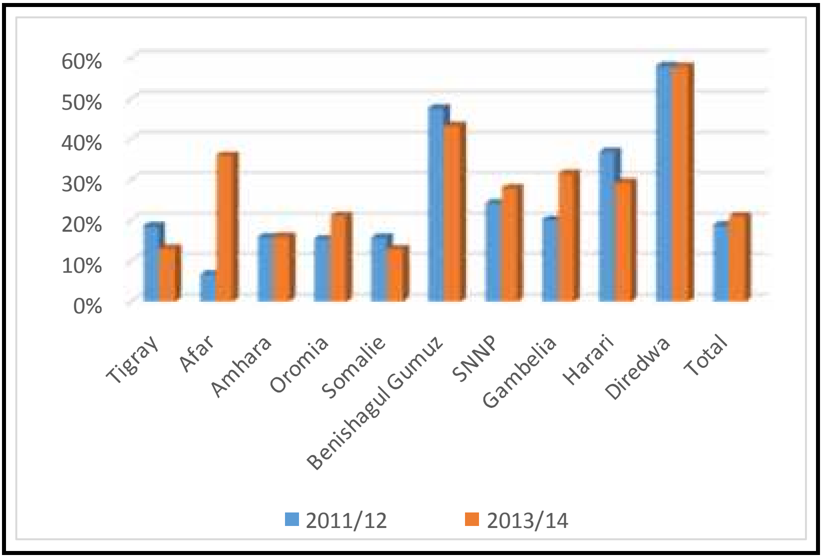
Figure 4.4: Proportion of Households with NFE by Sex of the Head



Source: Own computation

Figure 4.5 shows trends of engagement in NFE among regions in Ethiopia. NFE participation had increased by about 2 percentage points between 2011/12 and 2013/14. As might be expected, however, NFE participation varied across regions. The highest participation rate is found in Dire Dawa followed by Benishangul Gumuz. As can be seen from the figure, NFE participation shows divergent trends across regions. Between 2011/12 and 2013/14, NFE participation increased in Afar, Oromia, SNNP and Gambella regions. On the other hand, Tigray, Somali, Harari, and Benishangul Gumuz regions experienced a decrease in NFE participation. NFE participation remained generally stable in Amhara and Dire Dawa regions.

Figure 4.5: Proportion of Households with NFE by Region



Source: Own computation

4.3.3 Ownership of Non-Farm Enterprises

Respondents were asked by whom NFEs were owned. Breaking down the ownership of these NFE by the number of owners within the household (see Table 4.6); it is found that most of the enterprises are owned by single owners (83 percent). Proportion of enterprises with single owners are higher in female headed households (86 percent) compared to that of male headed (82 percent). Looking specifically at the sex of the owners of the NFE at enterprise level, single owner-female and single owner-male dominate the list (no surprise here since the single owner category is the dominant one as mentioned above). Figure 4.6 shows that female owned NFEs have a slightly higher proportion (close to 44 percent in both rounds) followed by male owned (41 percent). The remaining multiple owners groups, male-female owners (10 percent), female-female owners (about 3 percent) and male-male owners (about 2 percent) have smaller proportions. With the exception of female-female multiple owners type, the remaining groups showed a slight increase in proportion between the two waves of surveys.

Table 4.6: Ownership of the NFE Activity within the Household[19]

	2011/12			2013/14		
	Ownership		Total	Ownership		Total
	Single	Multiple		Single	Multiple	
Total						
Freq.	681	139	820	684	132	816
%	83	17	100	84	16	100
Female Headed Household						
Freq.	163	26	189	167	19	186
%	86	14	100	90	10	100
Male Headed Household						
Freq.	512	110	622	521	109	630
%	82	18	100	83	17	100

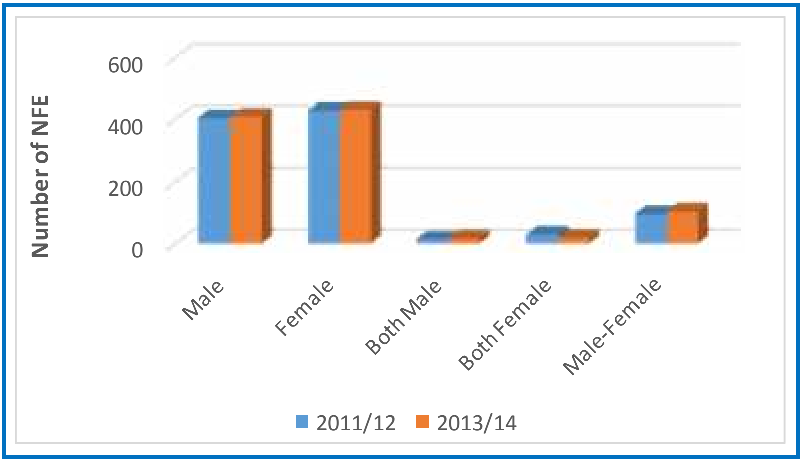
Source: Own computation

Proportion of female NFE owners taken separately for male headed and female headed households have an interesting deviation from this overall picture. The proportion of female NFE owners in male headed households is only 32-34 percent while the proportion of female NFE owners in female headed households was 87 percent in the 2011/12wave and dropped to 84 percent in the second. Despite this decrease, the proportion of female owners in female headed households has a high proportion. Proportion of male owned NFE are about 45 percent in male headed households and 7-15 percent in female headed households. The third category is NFE owned by

[19] Analysis is at household level but the numbers are higher here than the number of households engaging in NFE since there are more than one enterprises in some of the households with different structures of ownership

male and female owners. Such groups have a proportion of about 23 percent in female headed households and 1 to 5 percent in male headed households.

Figure 4.6: Sex of the Owner(s) of each of the NFE



Source: Own computation.

4.3.4 Reported Intention to Participate in NFE

Households were asked if they have any member planning to engage in NFE within the 12 month period following the survey regardless of their current engagement in NFE. Those responding 'Yes' were about 10.5 percent in 2011/12 and almost doubled in 2013/14 as can be seen in Table 4.7. Breaking this up by current NFE participation status, those currently active had a higher proportion (21.8 and 34.7 percent in 2011/12 and 2013/14, respectively) as compared to those currently not involved (7.1 and 15.4 percent for 2011/12 and 2013/14, respectively). The trends are similar when disaggregated by sex of the household head except that male headed households had a slightly higher proportion in 2011/12 while this was reversed in 2013/14.

Table 4.7: A Household Member Planning to Engage in NFE

Plan to engage in NFE	Participate in NFE 2011/12			Participate in NFE 2013/14		
	No	Yes	Total	No	Yes	Total
Yes	184	170	354	387	276	663
%	7.14	21.79	10.54	15.41	34.67	20.04
No	2,394	610	3,004	2,125	520	2,645
%	92.86	78.21	89.46	84.59	65.33	79.96
Total	2,578	780	3,358	2,512	796	3,308

Source: Own computation

4.3.5 Constraints to Participate in NFE

Households were asked if they faced electricity, telecommunication, water, postal services, transportation, financial, market, government, safety, technology, registration and tax related challenges deterring them from engaging in NFE. The top three challenges reported by households are summarized in Table 4.8 below. In the first round only 162 households reported challenges while in the follow up survey it increased to 760. In both rounds of data collection access to market, difficulty of borrowing money from family and friends, and from formal financial institutions ranked first, second and third, respectively. In addition to these, female headed households mentioned the difficulty of obtaining market information regarding their product (not reported in the table) with equal frequency as the challenge of accessing finance from formal financial institutions in the 2011/12 survey. In the 2013/14 survey, the second ranked challenge for female headed households was fear of not being able to pay loan installments. From this we could see that all the top 3 challenges faced by households for engaging in NFE activities are either market related or financial.

Table 4.8: Main Challenges for Engaging in NFE

Top 3 Challenges	2011/12	2013/14
	Total (%)	Total (%)
Access to markets	31 (19.1%)	140 (18.4%)
Difficulty to borrow from family, friends or others	21 (13%)	81 (10.7%)
Difficulty to borrow from formal financial institutions	20 (12.4%)	62 (8.2 %)
Total	162 (100%)	760(100%)

Source: Own computation.

4.3.6 Community Level Summaries

Community level data was collected using a community questionnaire. A group of informants responded to questions on the community questionnaire. We have used a combination of data from this questionnaire and household data aggregated at community level for the analysis hereunder. In the first and second rounds of the survey there were 290 and 298 rural EAs, respectively. The sampling design was done in such a way that 12 households were selected from each of the communities (CSA & WB, 2013 and CSA & WB, 2015). Out of these households, 74 percent in 2011/12 and 75 percent in 2013/14, had at least one household with NFE. The proportion of households in each community with NFE averaged at 23 and 24 percent in 2011/12 and 2013/14, respectively (Table 4.9).

Table 4.9: Average Proportion of HH with NFE per Community

Wave	Total	Head of the Household	
		Male	Female
2011/12	23%	17%	5%
2013/14	24%	19%	5%

Source: Own computation

Out of about 23 to 24 percent of the average proportion of households operating NFE, the male headed households account for 17 and 19 percent in 2011/12 and 2013/14, respectively, while their female headed counterparts averaged at 5 percent across rural communities.

The surface of the main access roads in these communities is dominated by dirt track (Table 4.10). Even if there was only a two year gap between 2011/12 and 2013/14 surveys, the proportion of communities reporting dirt track as the surface of their main access road dropped from 45 percent to almost 40 percent. On the other hand, maintained dirt road increased from 21 to 26 percent and graded gravelled from 15 to 18 percent. There is a slight decrease in tar/asphalt covered road from 19 to 17 present.

Table 4.10: Type of Main Access Road

Type of road	2011/12		2013/14	
	Freq.	%	Freq.	%
Tar/Asphalt	54	18.62	49	16.5
Graded Gravelled	44	15.17	52	17.51
Dirt Road (Maintained)	61	21.03	76	25.59
Dirt Track	131	45.17	118	39.73
Unspecified			2	0.67
Total	290	100	297	100

Source: Own computation

As summarized in Table 4.11, average distance of these communities from asphalt roads was 54 km in 2011/12 which dropped to 41 km in 2013/14. The average distance to the nearest bus station decreased from 20 to 16 km between the two periods. The reported distance to the nearest Woreda town was 22 and 21 km for 2011/12 and 2013/14, respectively. Large weekly markets are located about 8 km from these communities, on average.

Table 4.11: Distance to Asphalt Road, Bus Station and Woreda Town

Wave	Average distance to (in km)						
	Asphalt road	Bus station	Woreda/ Town	Large weekly market	Pay phone	Primary school	MFI
2011/12	54.44	20.21	22.38	8.32	12.64	0.92	14.93
2013/14	40.75	16.05	21.29	7.91	12.86	0.51	15.04

Source: Own computation

The above table also shows that twenty five percent of the communities reported that there is a place in the community that a person can pay to make a telephone call, such as a public phone, telephone bureau or a tele-center. The average distance to such a place is reported to be about 13 kilometers. The proportion of communities having a government primary school increased from 17 to 23 percent between these surveys. Rural communities seems to be well served by government primary schools as the average distance to such a facility was less than a kilometer in 2011/12, which further declined to half a kilometer in 2013/14 looking at access to financial institution, only 3 communities reported having a bank nearby while about 22 reported Micro-Finance Institutions (MFIs) in the community. Overall, the average distance of communities to MFIs is about 15 km.

Table 4.12 below indicates 40 to 43 percent of the communities experienced in-migration of people looking for (mostly seasonal) work. There is a notable change in the proportion of communities having cooperatives; the percentage more than doubled between the surveys going from 8 to 18 percent. About 41 to 42 percent of the communities reported some activities of Productive Safety Net Programs (PSNP) taking place in their communities.

Table 4.12: Proportion of Communities with MFIs, In-migration, Cooperatives and PSNP

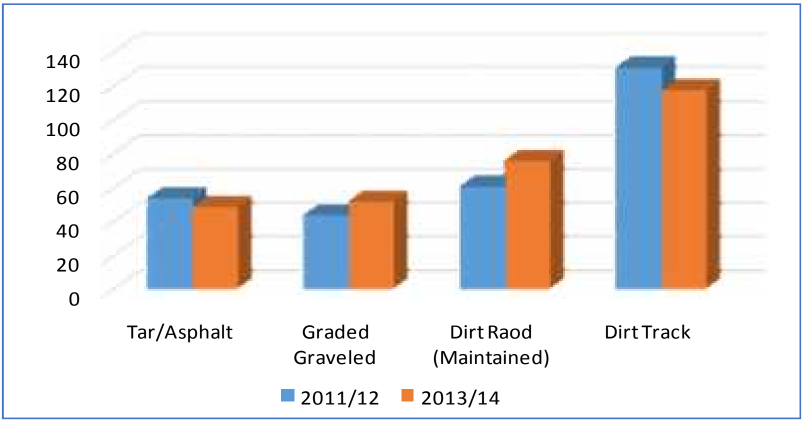
Wave	Proportion of communities with			
	MFI	In-migration	Cooperatives	PSNP activity
2011/12	22%	40%	8%	41%
2013/14	22%	43%	18%	42%

Source: Own computation

4.3.7 Infrastructure and Engagement in NFE

In this section we examine community level infrastructures such as roads, phone connectivity, financial institution as well as township and availability of large weekly markets and participation in NFE. Even if these enumeration areas are classified as rural by the study some respondents in the community questionnaire (7 or 2.4 percent in 2011/12 and 18 or about 6 percent in 2013/14) reported their villages as Woreda towns. Between 2011/12 and 2013/14 the number of communities reporting asphalt and dirt track roads as their main access road showed some decline while graded gravelled and maintained dirt road increased as displayed in Figure 4.7.

Figure 4.7: Type of Main Access Road of the Community



Source: Own computation

Looking at the changes in proportions of NFE by types of roads Table 4.13 shows that those communities having asphalt roads as their main access increased by 3 percentage points in proportion of households engaged in NFE. The increase for male headed households was 2 percentage points while female counterparts almost doubled it increasing from 4 to 7 percent. For the graded gravelled and dirt track roads there was a slight increase due to increase in male headed households' increase in proportion while for female headed counterparts it remained the same or decreased slightly. Proportions in maintained dirt roads were the same.

Table 4.13: Proportion of NFE by Type of Main Access Road

Type of Road (for each round of survey)	Total		Male Headed		Female Headed	
	2011/12	2013/14	2011/12	2013/14	2011/12	2013/14
Tar/Asphalt	21%	24%	16%	18%	4%	7%
Graded Gravelled	26%	28%	19%	22%	7%	6%
Dirt Road (Maintained)	23%	23%	18%	18%	5%	5%
Dirt Track	22%	23%	17%	17%	5%	5%

Source: Own computation

Among the rural communities considered here 43 percent and 48 percent of them had large weekly markets in 2011/12 and 2013/14, respectively. But looking at the proportion of households engaged in NFE showed increase in those communities that did not have such markets (see Table 4.14 below). In the overall case the NFE engaged households increased from 22 to 26 percent while male and female headed households involved in NFE increased by 3 and 1 percentage points, respectively, in communities with no large weekly markets. For communities having such markets showed a decline in the overall case and female headed cases while remaining the same for male. T-test results showed that there is no significant difference in proportions of households in communities with and without large weekly markets.

Table 4.14: Proportion of NFE Engaged Households and Availability of Markets in the community

Large weekly market in the community (for each round of survey)	Total		Male Headed		Female Headed	
	2011/12	2013/14	2011/12	2013/14	2011/12	2013/14
No	22%	26%	17%	20%	5%	6%
Yes	23%	22%	17%	17%	6%	5%

Source: Own computation

Another community infrastructure we considered was availability of a place where one can pay and make a phone call. The summaries in Table 4.15 show that twenty-five percent of the communities have such a facility. The proportion of households engaged in NFE between communities reporting having pay phones shows that the proportions are higher in no-pay-phone communities. The differences are significant at 5 percent level of significance for overall and male headed cases in 2013/14. The reason for this counter intuitive result could be penetration of mobile phones which makes the use of pay phones obsolete; in fact those still using pay phones could be communities that are lagging behind in mobile penetration; hence, less convenient for engaging in NFE activities.

Table 4.15: Proportion of NFE Engaged Households and Availability of Pay Phone in the Community

Pay Phone (for each round of survey)	Total		Male Headed		Female Headed	
	2011/12	2013/14	2011/12	2013/14	2011/12	2013/14
No	23%	26%	18%	20%	5%	6%
Yes	22%	19%**	16%	14%**	5%	5%

Source: Own computation

** shows significant group difference at 5% level of significance

Proportion of households engaged in NFE was higher in all cases where the communities have Micro-Finance Institutions (MFIs). These higher proportions are statistically significant at 5 and 10 percent levels of significance during 2013/14 as indicated in Table 4.16 below.

Table 4.16: Proportion of NFE Engaged Households and Availability of MFI in the Community

MFI (for each round of survey)	Total		Male Headed		Female Headed	
	2011/12	2013/14	2011/12	2013/14	2011/12	2013/14
No	22%	22%	17%	17%	5%	5%
Yes	23%	30%**	17%	23%*	6%	7%*

Source: Own computation

** shows significant group difference at 5% and * at 10 % level of significances

We have also noticed that there are higher proportions of households engaged in NFE activities where there is a cooperative within the community. The proportions were found to be higher in a statistically significant manner in overall and male headed households' case in 2011/12. But comparing results in Table 4.17 across the two surveys shows that proportion of households engaging in NFE decreased in communities where there was a cooperative and increased where there was none.

Table 4.17: Proportion of Households Engaged in NFE and Availability of MFI in the Community

Cooperatives (for each round of survey)	Total		Male Headed		Female Headed	
	2011/12	2013/14	2011/12	2013/14	2011/12	2013/14
No	22%	23%	17%	18%	5%	5%
Yes	33%**	26%	26%**	21%	8%	5%

Source: Own computation

** shows significant group difference at 5% level of significance

In communities where Productive Safety Net Programs (PSNP) are active there are smaller proportions of households engaged in NFE as compared to otherwise (Table 4.18). The difference is statistically significant using t-test at 10 percent for male headed and 5 percent for the overall case for 2013/14. The differences were not statistically significant for the case of female headed households in any of the cases.

Table 4.18: Proportion of Households Engaged in NFE by Availability of PSNP in the Community

PSNP (for each round of survey)	Total		Male Headed		Female Headed	
	2011/12	2013/14	2011/12	2013/14	2011/12	2013/14
No	24%	26%	18%	20%	5%	6%
Yes	21%	21%**	16%	16%*	5%	4%

Source: Own computation

** shows significant group difference at 5% level of significance

4.4 Concluding Remarks

This report tried to look at rural households of Ethiopia and their engagement in Non-Farm Enterprise (NFE). These rural households have household heads mostly male, married, illiterate and about 45 years old. Fewer households are headed by female heads who are older on average than their male counterparts, with higher illiteracy rate and mostly either divorced or widowed. Rural households engaging in NFE ranged between 19 and 21 percent in the two waves of data we considered with the same proportion appearing to be slightly lower for female headed households (around 17 percent) compared to male headed ones (between 19 and 22 percent).

NFEs operated by the households themselves have single owners for the most part (83 percent). The single owned enterprises have a higher proportion in female headed households (86 percent) than male headed ones (82 percent). When we see the sex of the owners of the NFEs, female owned lead the list in proportion followed by male owned and then by multiple owners. The proportion of female owned NFEs out of all NFE operators in male headed households is lower (32 to 34 percent) while that of female headed households have a high proportion (about 88 percent).

Out of the communities covered in the study about 75 percent have at least one household engaged in NFE. On average these communities have 24 percent of the households in them engaged in NFE. The proportion of male headed households was about 4 fold that of female headed ones. In terms infrastructures that creates enabling environment for NFE, banks are almost missing with only 3 out of 290 communities reporting having one in their village. MFIs have better presence, being reported in 22 villages. Communities having asphalt roads as their main access road show increase in NFE engagement particularly for female headed households that doubled in proportion in such areas, even if they started from a low base. NFEs increased more in areas where there are large weekly markets, MFIs, no pay phones and where there is no PSNP activity.

NFE show higher presence in male headed households as compared to female headed counterparts but when we look at the owners/operators of these enterprises we find that they are more female owned than male. Furthermore, female owned NFEs are more common in female headed households than male, demonstrating the importance of the sector for female headed households in particular.

Further studies are needed to understand the sector more and what it means particularly for female headed households. Issues for further studies include, for instance, the contribution of NFEs to incomes of male headed and female headed households, the reason for the counter intuitive result that the proportion of NFEs decreased in villages where there are cooperatives and the similar results for pay phones, PSNP and to some extent large weekly markets.

Policy makers should also consider ways of addressing the challenges faced by rural households in Ethiopia that deter them from engaging in NFEs. The most commonly reported challenges were access to markets and access to finance. Female headed households also reported difficulties in getting market information and fear of being unable to repay loans in addition to the challenges reported by all households combined.

Part II

Agricultural Transformation in Ethiopia: Prospects and Challenges

Introduction to Part II

The year 2015 marks the beginning of the second phase of the Growth and Transformation Plan (GTP) of Ethiopia with due emphasis given to the manufacturing industry. Nevertheless, the success of the plan in the manufacturing sector heavily relies on the success of simultaneously transforming the agriculture sector. Foreign exchange earning which was a critically important ingredient to the implementation of GTP was largely expected to come from the agricultural sector. However it performed less satisfactorily.

During 2015, it was also observed that the century long prime challenge to the Ethiopian agriculture, drought, is still lingering. After two decades of efforts to galvanize the agricultural sector to such shocks with encouraging results in crop productivity, it emerged that a lot needs to be done to convincingly change the situation to be able to withstand periodic shocks.

Shortage of raw materials in the manufacturing sector that normally should come from the agriculture sector remained a critical problem. Thus, the role of agriculture in Ethiopia in particular is significant: economy-wide structural transformation and even the long-awaited objective of food security and food self-sufficiency heavily rely on the transformation of agriculture.

The need for agricultural transformation in Ethiopia is crucial for several reasons:

1. the large segment of its population lives on agricultural activities.

2. the livelihood of the people depending on the sector is vulnerable to shocks, and
3. The country endeavors towards economy-wide structural transformation heavily depend on the transformation of its rural sector.

In the literature of development economics, structural transformation is mainly associated with type and level of capital (capability) a country has. A country that bases its economy on natural capital is likely to have localized agriculture. An economy based on man-made or physical capital is believed to have been transformed into industrial stage. Capabilities on human capital are features of a knowledge-based service economy. Structural transformation from localized agriculture to industrialization exhibits agricultural transformation, industrialization, and urbanization [Syrquin, 1988].

Another attribute of structural transformation is that high growth in per capita income and high rates of accumulations (physical and human capital) need to be accompanied by structural change which is a shift of economic activities from sectors of low productivity to sectors of high productivity. This means that high growth in per capita income does not necessarily guarantee an escape from the middle income trap.

Key issues of structural transformation that can be applied to agricultural transformation are that (i) that the type and quality of capabilities (physical, human, institutional) in the agricultural sector determine the level of agricultural transformation, and (ii) high growth in agricultural income does not necessarily guarantee sustainable rural livelihood and overall agricultural transformation. Moreover, due to the dual nature of most economies, agricultural transformation cannot be seen in separation from transformation of the economy as a whole. In some societies, such dualities are not limited to economic sectors; they include social duality governing production decisions, and consumption preferences. Social duality that implies economic incentives alone may not trigger agricultural transformation [Hayami and Ruttan, 1985].

The general objective of this research is primarily to document the theory and country experiences of agricultural transformation with the aim of taking lessons for Ethiopia. It also attempts to assess the status of transformation in the Ethiopian agriculture by standard measures, suggest key challenges of the sector for transformation based on some case studies, and forward policy recommendations that help facilitate the structural transformation process.

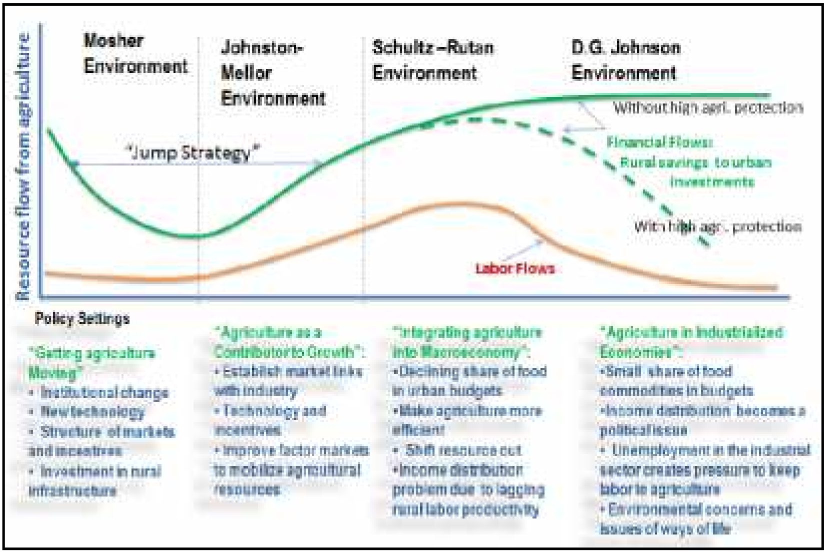
Chapter V

Agricultural Transformation: Theory and Country Experience

5.1 The Process of Agricultural Transformation

Historical and cross-section perspectives tend to show that agricultural transformation evolves through at least four phases. According to Timer (1988), phase 1 represents a stage wherein a rising agricultural productivity per worker creates surplus within the agricultural sector. In phase 2, rural factor and product markets are better integrated with the rest of the economy. Phase 3 is a stage where the agricultural sector progressively integrates with the macro economy through improved infrastructure and market equilibrium. In the last stage (phase 4), agriculture competes with the rest of the economy. This stage may also depict new challenges for the agricultural sector depending on the success of phase 3.

Figure 5.1: Stages of agricultural contribution to economic growth



Source: C. Peter Timmer, The Agricultural Transformation, Handbook of Development Economics, Vol 1, 1988.

5.2 Drivers of Agricultural Transformation

The main driver of agricultural transformation is productivity. International comparisons of developing and developed countries shows that approximately 95 per cent of the difference in labor productivity in agriculture is explained by differences in resource endowments, technical inputs, and human capital. Three of the factors were found to have roughly equal importance in explaining the difference in labor productivity. Resource endowment explains more than a third of the difference in labor productivity between resource rich countries such as Australia, New Zealand, Canada and

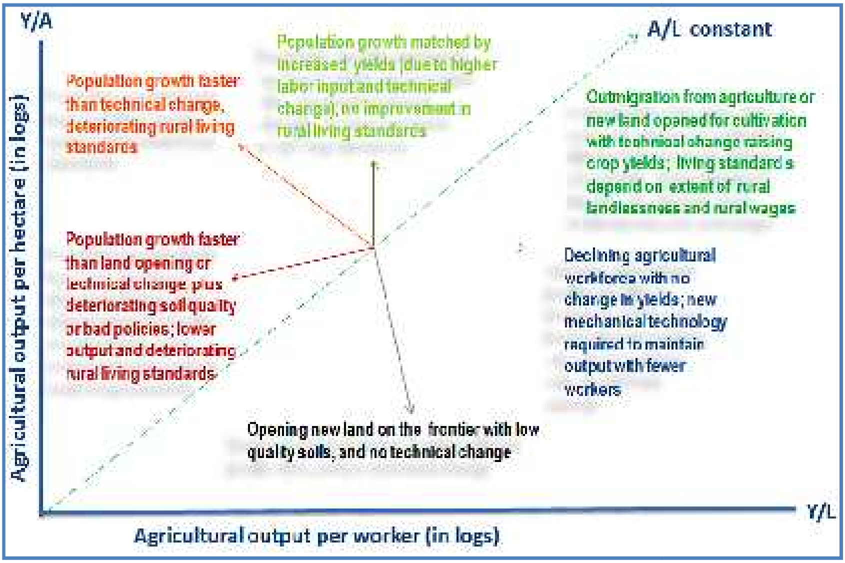
United States of America and other developed countries (Hayami and Ruttan, 1971).

"….. nearly all long term growth in crop and livestock production comes from investment that expands capacity and from technical change that increases output – input ratios." [Timer, 1988: 302]. While technology is critical in transforming agriculture, its diffusion is a matter of policy concern due to the fact that not all farmers do have equal access either to the knowledge to use new technology or financial resources that are required to exploit the best of the technology. Moreover, in smallholder agriculture, the fragmented land size is not suitable for some of the inputs as they are lumpy.

Lumpy inputs on which critical technology is embodied such as tractor, rental arrangements and a hiring of tractors can be facilitated. Whenever such entrepreneurial capability exists, rental business in such agricultural inputs emerge spontaneously [Goldman and Squire, 1992; Timer, 1988.].

Land and labor productivity are common measures of agricultural productivity. While agricultural per works is usually the relevant measure of productivity, the dual measures signals the nature of land resource, and the size of population. Using the two measures of productivity, Timer (1988) identified various possibilities of changes in productivity over time (Figure 5.2). He argued that the difference between developed and developing countries can be depicted by their relative position from the 45 degree line in Figure 5.2. Movements to higher output per worker or to the right in the figure would imply improvement in rural welfare depending on the further distribution of wealth among stakeholders in the sector based on ownership of resources and inputs. Increase in both labor and land as is depicted in the movement upward to the right is less common. As evidenced by Hayami and Ruttan (1985) and noted by Timer (1988), most developed countries were able to increase land per worker during the early stages of their development while only few developing countries did so.

Figure 5.2: Various Possibilities for Changing Land and Labor Productivities



Source: C. Peter Timmer, The Agricultural Transformation, Handbook of Development Economics, Vol. 1, 1998.

The reason for this is that "either new lands must be opened faster than population growth or outmigration from agriculture must proceed fast enough to cause an absolute reduction in the agricultural workforce." [Timer, 1988: 306].

A country facing limited land resource and rising population has an option of increasing labor productivity through technological innovation. Failure to do this may result in a situation where a rising population brings more marginal land into cultivation as a result of which both labor productivity and land productivity deteriorate. [Note the upward vertical movement from the 45-degree line and a movement in the direction of downward to the left].

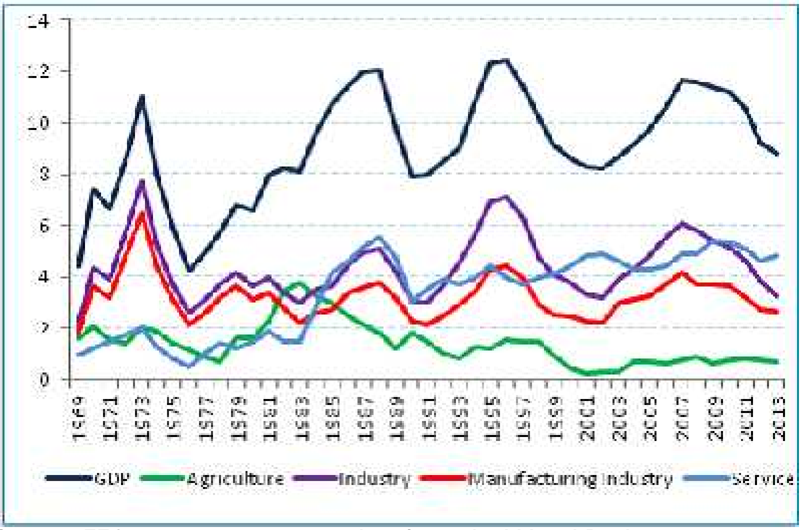
5.3 Country Experiences

The empirical literature on the experiences of countries on agricultural development shows that countries with different endowments can still undergo a successful agricultural transformation. Two typical examples for this assertion are Japan and Untied States of America. Japan was not well endowed with arable land while USA counted on its abundant land resource. Both countries transformed their agriculture tremendously between 1880 and 1960. An important development in these countries was increase in agricultural production and agricultural labor productivity due to significant changes in factor proportions between inputs in response to changes in factor prices. Naturally, the factors of production in short supply had inelastic prices so that economic agents substituted factor inputs with elastic prices, a phenomenon made possible through advancement in technology.

China

Chinese agriculture showed robust growth after the 1978 reform. Prior to the 1978 reform, food self-sufficiency and food security issues were illusive. Following the reform, agriculture in China contributed to the overall GDP growth before its role was overtaken by other sectors. Price reforms and institutional reforms explained the significant part of the rapid growth in China between 1978 and1984. The two-track price system and decollectivization played an important role in Chinese agricultural growth.

Figure 5.3: Contribution of Agriculture to GDP Growth in China (Five year moving average starting from 1965)



Source: EEA computations using data from the World Bank.

Data and researches on Chinese agriculture show that the best performance in the agriculture sector was observed for about six years after the reform in 1979. In particular, grain production decelerated and even fell thereafter. According to Lin (1992), about 47 per cent of growth in crop output registered from 1978 to 1984 was accounted for by a one-time discrete effect of the reform in the form of Household Responsibility System (HRS). Inputs, in particular fertilizer, capital, and labor accounted for 32 per cent, 10.8 per cent, and 4.5 percent, respectively, of the growth in crop production. Land had no contribution.

Table 5.1: Average Annual Growth Rates Of Chinese Agriculture, 1952-1987

	1952-1978	1978-1984	1984-1987
Crops	2.5	5.9	1.4
Grain	2.4	4.8	-0.2
Cotton	2.0	17.7	-12.9
Animal husbandry	4.0	10.0	8.5
Fishery	19.9	12.7	18.6
Forestry	9.4	14.9	0.0
Sidelines	11.2	19.4	18.5
Agriculture	2.9	7.7	4.1

Source: Lin, 1992

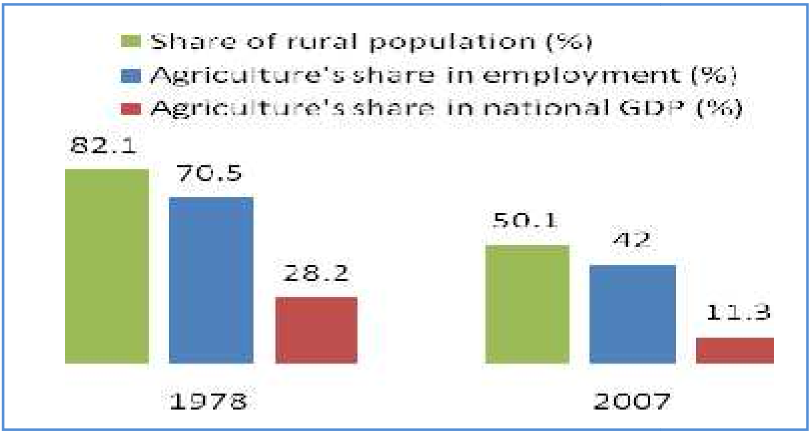
Even if crop agriculture tended to cease to grow after its pick performance over six years, rural reforms were accompanied and followed by broader reforms in the urban sector so that the formal urban sector took over the growth momentum, and agricultural activities had been extended to untapped subsectors. After 1985, there was an exodus of labor out of the agricultural sector. Economic activities in the agricultural sector shifted to sideline activities and animal husbandry. A useful lesson from this pattern is that once important changes begin to be observed in the agricultural sector, transformation in the sector cannot happen in isolation from the developments of other sectors. Agricultural transformation involves diversification of activities within the sector and mobilization of the rural population towards the modern sector.

As China moved away from strict socialist principles to market oriented liberalization, smallholder agriculture drove the county's agricultural revolution, which provided the basis for China's dramatic economic transformation and poverty reduction in the last 30 years (The China-DAC Study Group, 2010).The contribution of China's agricultural growth to poverty reduction over the 30-year period from 1978 to 2008 is estimated to be four times that of all manufacturing services combined (Ravallion and Chen, 2007; Ravallion, 2009, cited by Li, 2013). This suggests that China's significant poverty reduction was primarily the result of agriculture-led economic growth.

During China's rapid economic growth, agricultural growth was broad-based but driven by different sub-sectors, which had diverse effects on poverty reduction. Food crop production was central in linking growth with poverty reduction. Between 1978 and 1985, rice production grew at a rate of 4.5% and wheat at 8.2% a year. These were the primary drivers of China's increase in food crop production (Li, 2013). The growth of wheat and rice had major implications for household income, as both were widely grown by the rural poor. It is important to note that the food crop production increases were driven mainly by productivity increases and not by area expansion (Li, 2013).

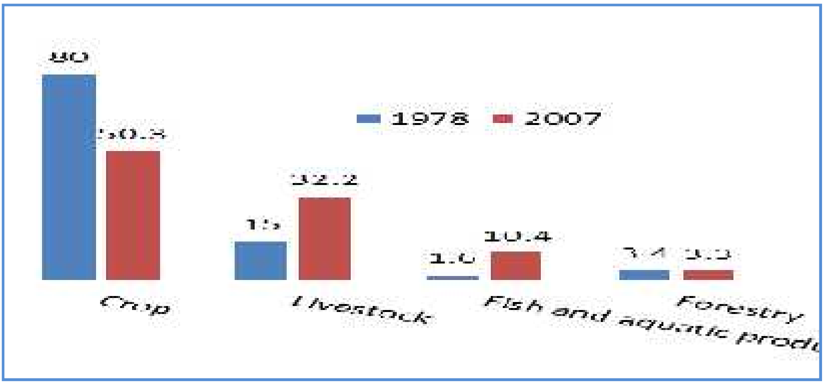
Cash crop production also increased during the same period, with cotton and oil seeds growing annually at 11.4% and 20.3%, respectively (Li, 2013). Although this increase had an impact on poverty in certain areas, it was limited by these crops' narrow geographical distribution. During this early reform period, vegetables and fruit production also grew annually by 10%. While this was more widely distributed across the country, the benefits were mainly accrued to the wealthier farmers (ibid).

Figure 5.4: The Changing Role of Agriculture in Chinese Economy



Source: Computed based on Ash R. (2010).

Figure 5.5: Changes in the Structure of China's Agriculture (% china agriculture)



Source: Computed based on Ash R. (2010).

Agriculture's poverty-reduction impact in China was reinforced by a structural transformation, first within agriculture and then in the wider economy. Between 1978 and 1984 – with rapid increases in production of food crops, cash crops and livestock – agriculture shifted from a concentration on food crops to more diversified production, including cash crops and livestock. As a result, although the value of food crop production in itself was rising, it dropped as a share of total agricultural production from 80% in 1978 to 69% in 1985; the value of livestock increased from 15% to 22% over the same period (Li, 2013). The structural changes in the agricultural sector continued since then as the share of crop production further declined to around 50% by 2007, while that of livestock increased from 15% in 1978 to 32.2% in 2006, and aquatic products from 1.6% to 10.4% during the same period (Ash, 2010).

After 1985, rural enterprises and off-farm employment became increasingly important engines of growth. By 2005, 200 million off-farm jobs had been created, providing 40% of the employment in rural areas and 46% of the income of rural households (Song, 2008, cited by Li, 2013). In parallel, the share of agriculture in rural employment declined during the same period. As shown in Figure 5.4 above, the share of agriculture in rural employment declined from a little more than 70% in 1978 to 40% in 2007, while the share of agriculture in the national GDP declined from about 28% to 11% during the same period; all of which indicate the structural transformation of China's agricultural sector and economy during this period.

There also are other economic factors that affected the incentives of farmers to choose different crop mixes and modes of production which, consequently, affected the nation's productivity. First, China's agricultural economy had been steadily transforming from a grain-first sector to one producing higher-valued cash crops, horticultural goods, and livestock and aquaculture products. In the early reform period, output growth—driven by increases in yields—was experienced in all subsectors of agriculture, including grains. However, after the mid-1990s, the area sown with rice and wheat production fell, as was the domestic production of these two staple food crops (Jin, 2009). As shown in Figure 5.5 above, the growth in grain production since the mid-1990s was close to zero, while high value crops (oil crops), livestock and fishery grew by over 5.5% per annum.

The contraction in grain supply was preceded by a reduction in demand as increasing per capita incomes, rural to urban migration and a reduction in government marketing controls shifted the pattern of consumption away from staple food grains. In contrast to staple grain crops, the output of these other crops continued to grow throughout the reform era beginning in the 1980s, some at rates in excess of 5% per year. The growth in livestock and fishery output outpaced the growth in output from the cropping sector, in total and in most crop subcategories. Livestock production increased by 9.1% per year in the early reform period and continued growing at between 4.5 to 8.8% per year since 1985. Fisheries production was the fastest growing component of agriculture, increasing by more than 10% per year during 1985-2000. Today, more than 70% of the world's fresh water aquaculture production occurs in China. At the same time, the combined share of livestock and fisheries in total agriculture rose to 45% in 2005, more than double their1980 share. Dairy production also is rose extremely rapidly (Fuller et al. 2006, cited by Jin, 2009).

The geographical complexion of China is another clue to explain its transformation. The economic role of agriculture remains more pronounced in China's interior than in other parts of the country. Thus, whereas in 2006 agriculture accounted for 7 percent of GDP in eastern China, in central and western regions the corresponding figure was 15-16 percent. Similarly, the agricultural share of total employment ranged from just one-third in coastal provinces to more than one-half in their central (51 percent) and western (55 percent) counterparts. Concealed in these figures is the further finding that the growth of rural non-farm activities was faster along the coast than in the interior (NBS, 2007, cited by Ash, 2010).
A striking feature in China's poverty reduction is that the largest and fastest inroads were achieved at an early stage in the transformation of the Chinese economy. Two-thirds of China's poverty reduction in the 24 years between 1981 and 2004 happened in the first 7 years and 40% in the first 3 years. The increasing productivity and profitability of smallholder agricultural production drove rapid growth in the incomes of rural households, reducing poverty and providing the capital, labour, raw materials and demand to kick-start growth in the nonagricultural sector (Li, 2013).

This broad-based growth pattern would appear to confirm the importance of focusing on effective agricultural growth as a means of poverty reduction in countries where the rural population is dominant, as is the case in both China and in many African countries. This has also been seen in countries such as Viet Nam, and to some extent, Indonesia (OECD/FAO, 2010).

China's experience challenges the widely held notion that growth and economic transformation in poor countries automatically result in poverty reduction. Instead it suggests a more complex causality, where poverty reduction is a precondition for sustained economic development and transformation (Ash, 2010; Li, 2013).China's experience could be described as poverty reduction driven growth.

Institutional factors: Technology Development, Extension and Other Factors

As indicated in the preceding paragraphs, economic reforms were introduced in China in the late 1970s. In rural areas, the reform process started with the introduction of the household responsibility system. The initial aims of the reforms were to expand agricultural production, diversify the rural economy, improve the rural standard of living and promote the innovation and diffusion of new technologies. The major content of the reform included: a) institutional reform by introducing the household responsibility system; b) marketing reform that freed most agricultural commodities from Government control, and brought about a huge increases in the prices major agricultural commodities; and c) encouragement of rural sidelines, or non-farming activities, and allowing for labor mobility between regions and between rural and urban areas. This was accompanied by changes in the political system in rural areas (Zhan, 2011).

Though the reform shifted the Chinese economy from to a market-oriented system and towards a more open economy, the basic characteristics of agriculture still remains to be small scale farms with individual households operating the production system. An important structural difference between China's agriculture and those of developed countries and many developing countries is that the agricultural sector in China is characterized by equitable distribution of cultivated land among households. In essence, such a land tenure system provides rural households with a basic means of living, and so serves as a substitute for welfare and insurance systems in the rural areas. While such arrangements may reduce production efficiency, it is an important factor contributing to rural welfare and social stability (ibid).

On the other hand, Jin et al. (2010) identified three factors that affect the rate of change and the sources of those changes especially for productivity growth: (a) investments in the domestic agricultural R&D system and the international trade and transfer of new ideas and new technologies, (b) the performance of the agricultural extension system, and (c) other economic factors that affect the incentives of farmers to choose different crop mixes and modes of production(e.g., backyard versus commercial operations) and different technologies (e.g., greenhouse versus field operations) and technologies (Jin et al., 2010).

Technology Development/Agricultural Research

After the 1960s, China's research institutions grew rapidly, from almost nothing in the 1950s to a system that now produces a steady stream of new varieties and other technologies. China's farmers used domestically produced semi-dwarf rice varieties several years before the release and uptake of such green revolution varieties elsewhere in the world. Yields of Chinese-bred conventional rice, wheat, and sweet potato varieties were comparable to yields being achieved in some of the most productive agricultural economies in the world (Stone 1988, Huang and Rozelle 1996, cited by Jin et al., 2010).

Agricultural research and plant breeding in China are almost completely funded and conducted by the government (Huang, Hu, and Rozelle 2003). Reflecting an urban bias in most food policies, most crop breeding programs continued to emphasize small grains (specifically rice and wheat) until the 1990s. For national food security considerations, high yields were also a dominant target for Chinese research and remain so, although in more recent years quality improvement has also become a target in the nation's development plans. On the other hand, as demand for agricultural output continues to diversify and average per capita incomes continue to grow, increasing attention has been given to horticultural and livestock breeding.

After the economic reforms in the late 1970s and early 1980s, a nationwide reform in research was launched in the mid-1980s (ibid). The reforms sought to spur research productivity by shifting funds from institutional support to competitive grants, supporting research deemed useful for economic development, and encouraging applied research institutes to support themselves by selling the technology they produce. In addition, beginning in the late 1980s and early 1990s, a more open approach to the importation of new horticultural seeds, genetics for improving the nation's livestock inventories and new dairy technologies were instigated (Jin et al., 2010).

After remaining stagnant in terms of the share of agricultural gross domestic product for more than a decade (between the early 1980s and mid-1990s), investment into R&D finally began to rise in both absolute and relative terms. Government annual investment in agricultural R & D increased by 5.5% between 1995 and 2000 and by more than 15% after 2000. Funding was greatly increased for plant biotechnology, although Bt cotton is the only genetically engineered crop that has been commercialized to any significant extent (Pray, Rozelle, and Huang 1997; Huang et al. 2002; Hu et al. 2007, cited by Jin et al., 2010).

Extension System

While the pace of spending on agricultural R&D has picked up considerably in the past decade or so and the efforts to restructure and reform the institutions engaged in R&D have met with some success, the country's extension system has seen of late few if any major successes. The extension system in China was once seen as an effective agency in moving technology from the experiment station to the farm and for giving cogent advice for dealing with pests and diseases and other production-limiting problems. A publicly funded system, extension had agents at the county and township levels, supported by ties to provincial research agencies that maintained experiment stations in almost every prefecture. Most villages (or in the pre-reform socialist era, most communes) appointed one or more representatives to be liaisons between the farmers in that village and the extension system (Jin et al, 2009).

After the mid-1980s, however, fiscal pressures at all levels of government induced local officials to commercialize the extension system. In most localities this meant partially privatizing the position of extension agents. In exchange for working part of the time doing traditional extension activities, extension agents were allowed to go into business, most often selling seeds, fertilizer, and pesticides. The profits from their business activities were supposed to cross-subsidize their extension activities. Many extension agents found their salaries reduced by half or more as a consequence of these changes, and in many areas, payments from the public purse eventually ceased (but often with no commensurate change in their public extension responsibilities) (Park and Rozelle 1998, Jin et al., 2009).

As might be expected, these arrangements meant that extension agents eventually spent most or all of their time on their income-earning activities, and hence the extension system almost completely collapsed. Surveys found that most cropping farmers rarely, if ever, saw extension agents. Likewise, livestock and horticulture farmers received little support from the formal extension system. Other studies have documented extension agents "overselling" pesticides and providing farmers with inaccurate information when the emergence of new technologies (e.g., Bt cotton seeds) conflicted with their business practices, specifically the sale of pesticides (Huang, Hu, and Rozelle 2003). In fact, Jin et al. (2002) found that the greater the extension effort, the lower the productivity. A recent survey showed that dairy, livestock, and horticulture farmers received little if any support from the formal extension system (which is still staffed largely with agronomists trained during the grain-first years of China's agricultural policy).

Other Factors

There are other economic factors affecting the nation's agricultural productivity. Not least among these is the fact that China's agricultural economy has been steadily transforming itself from a grain-first sector to one producing high-value cash crops, horticultural goods, and livestock and aquaculture products. In the early reform period, output growth—driven by increases in yields—was experienced in all subsectors of agriculture, including grains. For example, between 1978 and 1984, grain production generally increased by 4.7% per year and production rose for each of the major grains, specifically rice, wheat, and corn. However, after the mid-1990s, with the exception of corn, which is now almost exclusively used for feed, the area sown with rice and wheat has fallen, as has the production of these two staple crops. Although this may concern old-time grain fundamentalists inside China, in fact, the contraction in grain supply was preceded by a reduction in demand as increasing per capita incomes, rural to urban migration, and a reduction in government marketing controls have shifted the pattern of consumption away from staple food grains.

Agriculture contributed to Chinese growth both directly, through rapid expansion of productivity, and indirectly, through the release of labor into the nonagricultural sector (Brandt et al., 2005). When the reform began real labor productivity in the nonagricultural sector was nearly six times higher than that in agriculture (RMB18,000 per man-years. RMB3,100 per man-year). This "gap" gradually declined by nearly half as a result of differential growth in labor productivity favoring agriculture. Between1978 and 2004, average labor productivity in agriculture increased at an annual rate of 6.76 percent compared to only 4.65 percent for the non-primary sector. Most of this partial convergence occurred very early in the reform process. We attribute this to the large "one-time" gains in agricultural output that followed the introduction of the household responsibility system, the early reform of marketing and pricing, and the ensuing exodus of labor out of agriculture (see McMillan, Whalley and Zhu, 1989; Lin, 1992; cited by Brandt et al., 2005).

The early rural reforms have also significant effect in relaxing the labor market barriers. There are many institutional and policy constraints that restrict movement of labor from agriculture. Barriers impeding the movement of labor from agriculture were a pervasive feature of the China's pre-reform economy.

Prior to the reform, tight restrictions limited the entry of rural workers into nonagricultural activities; their primary intent was to prevent the diversion of labor from collective agriculture (Lardy, 1983, cited by Brandt, 2005). Additional restrictions limited the sectors open to enterprises run by rural communes and production brigades. In principle, these enterprises were to serve agriculture and infrastructure investment (mainly, water-control projects) in their home localities. These limits were embedded in a broader system that severely isolated the countryside from the cities.

Although difficult to measure directly, they generally have the effect of depressing the returns to labor in agriculture relative to those in non-agriculture. In general, the labor market barriers helped to sustain higher returns to labor outside of agriculture (Brandt, 2005).

As mentioned earlier the relative shift from grain production to production of high value crops and livestock has also played its role in enhancing agricultural productivity. Like the grain sector, cash crop production in general and production of specific crops such as cotton, edible oils, vegetables, and fruits also grew rapidly in the early reform period compared with the 1970s. Unlike the grain sector (with the exception of land-intensive staples such as cotton), the growth of the non-grain sector continued throughout the reform era. For example, between 1990 and 2004, the increase in vegetable production capacity was so rapid that China was adding the equivalent of the production capacity of California every two years. Moreover, the share of cultivated area in China dedicated to fruit orchards (over 5% in 2000) was more than double the share of the next- closest major agricultural producer (e.g., the share of fruit orchards in sown area was lower in the United States, the European Union, Japan, and India) (Jin et al., 2009; Jin et al., 2010).

The growth in livestock and fisheries output outpaced the growth in output from the cropping sector in total and in most subcategories. Livestock production increased by 9.1% per year in the early reform period and has continued to grow at between 4.5% and 8.8% per year since 1985. Fisheries production had been the fastest-growing component of agriculture, increasing by more than 10% per year during the 1985-2000 period. Today, more than 70% of the world's freshwater aquaculture is produced in China. These differential growth rates are bringing about substantial structural shifts in the Chinese agricultural economy. Simultaneously with these changes, China has also experienced an explosion of market-oriented activities. While the pace of policy change was gradual throughout the 1980s and 1990s, the role of the state in China's agricultural markets has diminished. In its place there has been a rise of private traders and wholesale markets staffed by private traders (Rozelle et al. 2000; Huang, Rozelle, and Chang 2004, cited by Jin, 2009).

Thailand

Thailand's transformation took 30 years and resulted in significant structural change between and within agriculture and industry . This transformation was a relatively smooth process with stable long-term economic growth. It was led by agriculture in its early years, and was then carried by large private investments that led to the expansion and growth of export-led manufacturing. This labor-intensive, low-technology manufacturing-led growth with strong linkages to agriculture and external markets has become characteristic of Thai industrialization. While the domestic market constituted the primary target of industrial development, export oriented manufacturing, including textile fabrication and food processing, played a primary role throughout the transformation process.

With its contribution of 40 – 50 percent to gross national product and the employment of more than 80 percent of the national labor force, the agriculture was the leading sector in the Thai economy during its crucial two decades of growth in the 1960s and 1970s. While that role was taken over by manufacturing during the 1980s, the dynamics of agricultural development continued to significantly affect the industrialization process. Until 1975, agriculture accounted for more than 30 percent of GDP and employed more than 70 percent of the national labor force.

Thailand retains considerable comparative advantages in agricultural production and exports. While growth in the agricultural sector was increasingly overshadowed by the expansion of industry after the late 1970s, by international standards, agricultural growth remained remarkably rapid in the same period. For example, between 1961 and 1976, the value-added of crops, a sub-sector accounting for 74 – 77 percent of agricultural GDP, grew by 4.8 percent annually, and the overall value added in the agricultural sector grew by 5 percent over the same 16- year period.

The long-term agricultural growth in the 1960s and early 1970s was largely due to the existence of large areas of unused land suitable for cultivation, and their general ease of access. Both total farmland and the rice areas grew at an annual rate of 3.2 percent between 1961 and 1977,and at 2.3 percent between 1977 and 1984. While surplus land had existed in Thailand for centuries, the government's investment in rural infrastructure, particularly the establishment of rural road networks, made land expansion feasible beginning in the mid-1950s (Hirsch 1990: p49-50). Similar to other South and Southeast Asian governments, the Thai government invested heavily in infrastructure. Construction of highways and the rural road network made it profitable to bring new land into cultivation.

Another important factor supporting land expansion was public investment in irrigation. Between 1950 and 1984, the Thai government invested a total of US$3.6 billion (at 1984 prices) in various irrigation schemes across the country. The irrigated area more than doubled between 1954 and 1970, increasing from 0.93 million to 2.12 million hectares. By 1985, Thailand's total irrigated area amounted to 7.11 million hectares, which was almost seven-fold of the figure that existed 20 years earlier. About 18 percent of the cultivated area in Thailand was irrigated by the 1990s; however, this was a relatively low share compared with that of other Southeast Asian countries.

Thailand also gradually started agricultural intensification through the spread of improved varieties and increased use of fertilizer. Between1960 and 1970, rice yields rose by 34 percent. While this growth in yield was relatively slow compared to that of other Asian countries, it was still quite impressive given the considerable amount of new land that was brought into cultivation during this period.

Significant structural changes occurred in Thai agriculture after 1970, when the rapid economic transformation started to be led by the manufacturing sector. Beginning in the mid-1970s, the government substantially scaled up its general support to agriculture. This support went beyond investment in irrigation to include the financial sector. For example, the Bank for Agriculture and Agricultural Cooperatives (BAAC, a government agency) introduced a series of measures aimed at expanding the provision of rural credit. The Bank of Thailand provided credits for agricultural exports. Commercial banks were mandated to increase the proportion of their loans to the agricultural sector from 2 percent in 1974 to 13 percent in 1979.These measures, together with international aid received by BAAC, boosted the availability of cheap institutional credit for the agricultural sector. As a consequence, the share of formal sector loans provided to farm households increased from about 10 percent in the 1960s to almost 50 percent in the 1980s. It has been estimated that by 1990, institutional credit had reached almost 60 percent of agricultural households, compared to

15–20 percent in 1975. About 80 percent of this credit came from BAAC.

The increased availability of credit, continued infrastructural and irrigation investments from the 1950s through the 1980s, and additional investments in rural electrification schemes to cover almost all villages during the 1980s and 1990s, were the major public contributions promoting land improvement and the intensification and diversification of agricultural production. However, the rate of cultivated land expansion significantly slowed down in the mid-1970s.Beginning in the early 1980s, continuous growth in crop production was mainly driven by increases in yield through intensification and diversification of crop production.

Unlike some other Southeast Asian countries, Thailand did not implement major government programs in the 1970s and 1980s explicitly aimed at the widespread use of high-yielding varieties to substantially increase rice production. This can be mainly explained by the country's potential to continue expanding its cultivated area, which was sufficient to increase production and provide food for rising domestic demand and for exports of rice. Thus, in the 1970s and 1980s, when the average yields of most other Southeast Asian countries increased substantially, crop yield increases in Thailand were slower, resulting from a gradual intensification process. Indeed, Thai rice yields were stagnant in the 1970s.

The use of modern inputs in agricultural production only picked up significantly from the mid- 1970s onward. The application of fertilizer doubled between 1976 and 1985, and the use of other chemical inputs (e.g. herbicides and pesticides) increased more than five-fold. The most rapid increase in the use of modern inputs occurred in the 1980s. Between 1980 and 1990, the use of fertilizer and other chemical inputs increased 2.4 and 5.6-fold, respectively. Even with this rapid increase in fertilizer application, however, Thailand's rate of fertilizer use remained low compared with Asian standards. Moreover, the most substantial increase in fertilizer use occurred in the non-rice sector and was not generally aimed at yield enhancement. In many cases it was connected with the spread of contract farming, as the contractors frequently supplied a complete package. Within the rice sector, increased use of fertilizer was mainly due to the introduction of a second crop. Rice yields in Thailand finally reached more than 2 tons/ha in 1991, whereas many other Asian countries had already reached this level by the early 1970s.

In contrast, Thailand significantly outperformed other Asian countries in terms of agricultural mechanization. Obviously, the lending policies of BAAC greatly encouraged the purchase of machinery, while increases in land holding sizes created incentives for farmers to invest in machinery. Mechanization became an important factor for both agricultural expansion and intensification. The tractorization of agriculture lifted constraints on the pace of cultivated area expansion and increased the extent of cultivation, particularly for upland crops. Similarly, the adoption of rice-tillers, threshing machines and water pumps promoted the development of double-cropped rice areas.

Diversification was also an important characteristic of agricultural transformation in Thailand. The diversification process occurred both in crop production and in the broader agricultural sector.

Tables 3.7 and 3.8 are adopted from Dixon (1999) and present the structures of agricultural and crop production in Thailand in the 1980s.

Agricultural diversification also occurred among the four agricultural sub-sectors in the same period. While the crop remained the dominant sector in agriculture, its share fell by 3percent over 20 years. Livestock and fishing became increasingly more important, while forestry declined due to the expansion of cultivated land. Growth in livestock was driven by growth in poultry production beginning in the early 1980s. This growth was closely related to the rapid development of agri-businesses and various forms of contract farming. The significant increase in domestic per capita consumption of chicken and the expansion of frozen chicken exports created huge market opportunities for poultry production.

The diversification into high-value agricultural products for export or for middle-class urban markets in the Bangkok area was reported as an important source of agricultural development during the transformation process. Diversification in agriculture also helped the rapid expansion of the agro-business sector. A relatively large proportion of the exports classified as manufactured came from the processing of agricultural products; which include tinned fruits, frozen chickens and frozen and tinned seafood.

Lessons from Thailand's agricultural transformation

The agricultural sector was the leading sector in the Thai economy during its crucial two decades of growth during the 1960s and 1970s. This remarkable agricultural growth continued for quite a long period, until the early 1990s. Thailand's agricultural transformation was characterized by gradual intensification through mechanization and the adoption of new technologies and inputs. However, the country is not a typical example of the Green Revolution type agricultural development, since the yields of food crops did not grow rapidly over a short period of time.

Thailand never experienced any significant food security or self-sufficiency pressure, which explains why the role of the government was as active as it has been in other Asian countries seeking to promote high-yielding technology in food crop production. However, the government's support was an important factor in agricultural transformation in Thailand. The government's support for technical change came primarily through public investment, particularly in irrigation, research (e.g. development of hybrid maize), credit provision, and extension services. While the level of government expenditure on agriculture, especially on agricultural research, was not comparable with those in other Asian countries, heavy investments in rural infrastructure, particularly in roads during the 1950s and 1960s, contributed significantly to agricultural growth by providing easy access to farmers to both land and markets.

The private sector, including farmers, agro-businesses and traders, played a leading role in agricultural transformation. Most agricultural commodities were handled by private traders, both in domestic markets and exports, and linkages between producers and markets were developed through a well-established merchant network. This network played an important role in stimulating agricultural innovation. Middlemen frequently acted as technical, commercial and financial advisers to farming communities. Thus, it can be argued that the introduction of many new crops or new varieties, the promotion of high-value products, and the adoption of a wide range of modern inputs were all due to the responsiveness and entrepreneurship of Thai farmers, agro-businessmen and traders, rather than direct state interventions.

The development of the Thai economy in general can be characterized as a combination of agricultural growth, import substitution industrialization (in the early 1960s) and export promotion in both agriculture and manufacturing throughout the process. The main role of the government in this transformation was the provision of infrastructure and the creation of a secure and attractive private investment climate. Conservative monetary and fiscal policies maintained economic stability and, with limited modifications, dominated Thai development policy from the 1960s through the 1980s. The development of a modern industrial and agricultural sector also benefited from relative political stability during this period.

Mexico

Mexico transformed from a small, low-income country with a population of 26.5 million and a per capita income of below 200 $US in 1950, to recently being cited as the 11th largest country in the world, both in terms of population and size of the economy (Solis 1981: p189; WDI 2008). Mexico reached middle-income country (MIC) status by 1974, and per capita incomes grew seven-fold since then, reaching $7,000 in 2005.

The transformation of the Mexican economy was characterized by a gradual shift from private sector-led agricultural and manufacturing growth towards the promotion of capital-intensive industrialization, with increasingly direct state intervention in the economy. This shift was driven by an urban and heavy industry-biased strategy and implemented through the promotion of selected industrial sectors that were picked as "winners."

Three broad phases can be distinguished in Mexico's transformation process. The first phase, from 1945 to 1965, was characterized by rapid growth and transformation in both the agricultural and non-agricultural sectors. Growth was generally led by the private sector and supported by complementary government policies and investments in infrastructure. In the second phase, between 1965 and 1981, agricultural growth slowed while rapid growth in industry was driven by government interventions such as direct state investments in selected industries. This phase was also characterized by rapidly increasing inequalities in both rural and urban areas, despite the implementation of a series of transfer schemes. Finally, the third phase was known as the "lost decade," due to a series of macroeconomic instabilities that caused a severe contraction of the Mexican economy. Mexico started to recover in the mid- 1990s, but growth did not stabilize until recently and the economy still appears vulnerable to external shocks.

Mexico represents the case of a typical dual economy, both in terms of general development and agricultural transformation. However, while early industrialization in Mexico absorbed large amounts of surplus labor from rural areas, as predicted in the Lewis model (Lewis 1954), industrial growth and job creation failed to keep up with the rapid population growth seen after policies shifted towards capital-intensive industrialization. Agricultural growth decelerated and became stagnant in the middle of the transformation process, making agricultural transformation an unfinished business and leaving many small farmers marginalized. As a conclusion of the review of Mexico's transformation experience, scholars argue that the early shift away from agriculture towards state-led capital-intensive industrialization resulted in many structural and social development challenges. Many of these issues remain unresolved today and are likely to continue to shape Mexico's future development path.

Agricultural transformation: From early success to crisis

Mexico is one of the few countries in the world that showed rapid agricultural growth right after WW II. Agriculture grew faster than total GDP during the first post-war decade, at 7.5 percent per annum, and 4.6 percent between 1950 and 1965 (Solis 1971: p4). Agricultural exports grew at an average annual rate of 6.3 percent during the same period, and livestock exports increased 20-fold (Venezian and Gamble 1969: p89). This rapid growth in both output and exports, which indicates the important role of agriculture during the early period of Mexico's transformation, made the country largely food self-sufficient, fostered inter-sectoral linkages by providing inputs to the manufacturing sector, and secured enough foreign exchange earnings to support ISI policies. However, between 1965 and 1970, annual agricultural growth sharply declined to 1.2percent, which was below even population growth levels. Agricultural growth failed to fully recover thereafter, and remained volatile despite the government interventions aimed at reviving growth in the 1970s. The following sections seek to explore both the sources of Mexico's early agricultural success, and the causes of the sector's subsequent crisis.

Early agricultural success can be attributed to impetus from the land reforms that started in the 1940s, as well as complementary public investments in infrastructure and agricultural research. Mexico's initial agrarian structure was characterized by the coexistence of a few large estates descending from colonial times, along with a majority of smallholders. While land reform continuously redistributed land to Mexican smallholders, the dual agricultural structure has persisted through to the present day. Beginning in the late 1930s, the extension of the transportation and irrigation networks, combined with the redistribution of land, allowed farmers to expand their activities to previously unused land. Land use area expanded by 2.9 percent annually between 1941 and1951. Farmers used this opportunity to rapidly respond to rising national and international demand for food and agricultural commodities. While domestic demand was driven by increasing urban incomes and population growth, a comparative advantage was developed in several export goods, including cotton, sugar, coffee, melons, strawberries and cattle, which contributed up to 80 percent of the country's agricultural exports in the 1940s.

With the slowdown in land expansion after 1951, productivity increases became the major driver of output growth, especially for cotton and wheat production . In fact, Mexico experienced a Green Revolution-type agricultural transformation even before the onset of the Asian Green Revolution. The Mexican government actively supported the development and use of modern technologies (seeds), the promotion of modern inputs (especially fertilizer), and the mechanization of production. Public research institutes were the major players in the development of new agricultural food crop technologies, providing major high-yielding varieties for food crops.

The establishment of Productora Nacional de Semillas (PNS), a public seed company, played a key role in the production and distribution of the food crop seed varieties, especially for wheat and corn. As a result, the new seed varieties accounted for almost 100 percent of wheat and 5-10 percent of corn production by 1960. On the other hand, the private sector led technology development for industrial crops such as cotton and sugar cane.

The adoption of modern inputs and the mechanization of production were also made possible by increasing farmers' access to financial services. The government supported agricultural credit through three major state banks. In addition to these agricultural banks, the Guarantee and Development Fund for Agriculture, directed by the Central Bank, encouraged private sector banks to provide credit to farmers. In 1965, the credit volume from these private banks surpassed the credit provided by government banks, and total private investment increased three-fold during 1950-1965. Largely as a result of this, the share of land with fertilizer use increased from 5 percent to 15 percent between 1950 and 1960. Mechanization also grew rapidly during this period and thereafter. For example, the number of tractors per 100 hectares reached 25 by 1961 and further increased to 33 in 1970. These private investments were complemented by public investments in irrigation. Although irrigation investments slowed after 1950s, the 12.6 percent of cultivated land under irrigation in1961 increased to 14.0 percent by 1970.

However, this sector-wide perspective hides the unevenness of agricultural development within Mexico, which partly explains the stagnation of agriculture after 1965. Mexico's land reform as the most ambitious in Latin America, and two thirds of the crop land was redistributed to the reform sector (ejido) between 1917 and 1988. By 1950, about 44 percent of the land had been expropriated from plantations and redistributed to ejidos; the remaining land was farmed by private farmers not included in the ejido system (i.e. private subsistence farms and larger commercial farmers). However, the majority of small farmers, particularly those within ejidos, were largely unaffected by transformation; instead, the large commercial farmers were the major beneficiaries of government investments and policies. They were also the major producer of the nation agricultural production.

On the other hand, it is estimated that in 1970, 53 percent of farmers were subsistence small farmers with land holdings of less than 2 hectares; another 40 percent of smallholders produced cash crops with traditional technology, and the remaining 7 percent were commercial farmers who mostly farmed irrigated areas and used modern technology.

Most of the government-sponsored support for agriculture disfavored the smallholders. Rain-fed agriculture, which occupied the majority of arable land and was smallholder-dominated and received only about 10 percent of public agricultural expenditures until the 1970s. Smallholders also had less access to credit. For example, in the 1940sand 1950s, the ejido sector received only 20 percent of total agricultural credit, even though these farmers occupied 44 percent of arable land. During the same period fertilizer application among ejidos was only half the level of that seen on other private farms.

The most important factor explaining the stagnation of agricultural sector growth as a whole from 1965 onward was the unfavorable domestic terms of agricultural trade, which suffered from import substitution policies, the fixed exchange rate regime, and domestic price distortions. In addition, the government shifted public investment to other sectors, meaning that the share of agriculture in government spending declined from 20 percent to 10 percent from the 1950s through the 1960s. While this declining share of public investment in agriculture can be partly explained by the declining relative importance of agriculture in the economy, the neglect of agricultural financial services and the slowdown of irrigation expansion are regarded as major shortcomings in agricultural policies. As a result of these urban and industry-biased policies, agricultural growth decelerated, even dipping below the population growth levels for several years.

The persistence of the poverty trap was also reflected in the fact that agricultural employment remained at high levels of around 20 percent, while the share of agriculture in total GDP declined from 8 percent in 1995 to 4 percent in 1999. Limited opportunities for migrants, high marketing costs for agricultural produce, and small farm sizes (which disfavored investment) are among the main challenges making it difficult to break the rural poverty trap in Mexico.

Lessons from Mexico's agricultural/economic transformation process

Mexico's experience underlines the importance of agricultural transformation. Agriculture grew more rapidly than total GDP during the first phase of transformation and contributed significantly to broad income growth and the development of inter-sector linkages. While early agricultural growth was primarily driven by land expansion, the Green Revolution-type public investments in agricultural research supported the continuation of agricultural growth through productivity increase. Investments in irrigation, the development of seed production and distribution systems, and the provision of fertilizer and credit to farmers contributed to sustainable agricultural growth.

In terms of initializing the transformation process, political stability, macroeconomic stability, and favorable external conditions could also be considered as important preconditions. The emergence and rapid growth of supply-responsive agricultural and manufacturing sectors was initially supported by infrastructure investments (roads, irrigation) and the impetus from land reform. The early development of the manufacturing sector in Mexico was also supported by the international and domestic demands induced by both WWII and the Korean War, which created an important basis for rapid transformation during the post-war period.

However, agricultural transformation was negatively affected by an early shift of the government's attention away from this sector. This shift left a majority of small farmers, particularly those within the ejido sector, marginalized in the transformation process, resulting in a dual agricultural structure within the economy. This dual agricultural structure created a persisting poverty trap in rural areas and among small farmers.

Moreover, the agricultural sector as a whole stagnated due to deterioration of the domestic terms of trade for agriculture. This deterioration was mainly due to import substitution policies, the overvalued exchange rate, and domestic price distortions, in combination with reduced public investment in rural areas and agriculture. This agricultural stagnation hampered economy-wide growth and contributed to increasing macroeconomic imbalances and worsening income distributions. While the market-oriented domestic reforms and NAFTA in the 1990s generally improved the efficiency and competitiveness of Mexican agriculture, the dual structure of agriculture was reinforced during this period and still persists today.

Chapter VI

Ethiopian Agricultural Resources Base: Opportunities and Some Challenges

Ethiopia, situated in the Horn of Africa, has a population of a little more than 100 million[20]. In terms of agro-ecology, the country has great geographic diversity with high and rugged mountains, plateaus and deep gorges incised by river valleys and rolling plains. These physical conditions and variations in altitude have resulted from a great diversity of climate, soil and vegetation that have created a variety of agro-ecological zones based on rainfall, temperature, potential evapotranspiration, soils and land forms.

Agriculture, as is the case in much of the developing world, is still the largest sector in the Ethiopian economy contributing about 40% percent to GDP[21] and estimated to provide employment to most of the 85 percent of the country's population that reside in rural areas. It generates more than 80 percent of the export earnings, and supplies the bulk of the country's raw material requirement for its agro-based industries. Ethiopia is commonly described in terms of its physiography that marks its highland (over 1500m above sea

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[20]This is according to the latest United Nations estimates: http://www.worldometers.info/world-population/ethiopia-population/

[21]Because of exponential growth in the construction, whole- and retail-trades as well as hotels and restaurants sub-sectors, the service sector replaced the agriculture sector as the most dominant economic sector. In 2013/14, the service sector has 46% in the GDP (EEA, 2015).

level) and its lowland areas. This physiographic partition mirrors the two unique livelihoods of Ethiopians. The lowlands are located mainly in the northeast, east, and south, i.e. in the Afar and Somali regions and the Borena area of Oromiya, and make up just over half of Ethiopia's land area. The lowlands are arid or semi-arid, and are sparsely populated by pastoral communities pursuing livestock-based migratory or semi-migratory lifestyles (Kurt, 2003).

The majority of Ethiopians, however, sustain themselves through mixed rain-fed crop farming and reside in the sub-humid highland areas. The highlands accommodate 88 percent of the human population, 75 percent of the livestock population, and contain 95 percent of the total cultivated land[22]. The highlands are part of a vast mountain massif in the heart of the country, and account for about half of all the highlands in Africa (Kurt, 2003). Climatically it is predominantly sub humid and humid (Workneh, 2011).

The majority of smallholders in these areas sustain themselves by growing crops (in mixed rain-fed crop farming system), with smallholdings, often broken into several plots. Though the highland farming system is oriented mainly toward the production of a range of cereal crops, livestock is an integral part of the system and provides various services as sources of food, traction, manure, raw materials, investment, cash income, security, and social and cultural identity. On the other hand, the population in the lowlands is largely pastoral and agro-pastoral, and engaged mainly in livestock rearing.

[22]Recent expansion of large scale commercial farms in the low land areas of South Omo, Gambella and other regions like Benishangul Gumuz may affect this figure as it could raise the share of cultivated land in lowland areas.

In terms of rainfall, the national data documented over four decades show that on average the country receives a high amount of rainfall, above 1000 mm per year. However, the amount fluctuates (in terms of late onset, abnormal distribution and early stopping as well as inadequate amount of rainfall.) from year to year. This fluctuation has been very frequent in recent periods, notably after the mid-1980s implying an increasingly serious challenge to Ethiopia's predominantly rain-fed agriculture (EEA, 2005)[23]. In this section an attempt is made to illustrate the agricultural sector's huge potential of the country to show that agricultural transformation is what is needed to properly utilize the potential.

6.1 Agro-ecological Potentials

Ethiopia is a country characterized by massive diversity in altitudes, land and topography, soils, natural vegetation, rainfall patterns and climate, and settlement patterns. Various analysts (e.g. Walker S.et al, undated) note that the persistence of the subsistence nature of Ethiopian agriculture is partly due to lack of proper planning and utilization of this wide diversity in agro-ecology, which presents both opportunities and challenges for the development of Ethiopian agriculture.

Agro-ecological Zoning (AEZ) refers to the division of an area into smaller units, which have similar characteristics related to land suitability, potential production and environmental impact.

[23]Ethiopia, for instance, once again was caught in life threatening disruption of the rainfall pattern in 2015. The number of Ethiopians needing food aid has risen sharply due to poor rains and the El Nino weather phenomenon with officially reported 10.2 million people in need of emergency food aid.

Ecological conditions primarily relate to climatic parameters, such as amount of rainfall, rainfall variability, temperature or frost hazard, vegetation characteristics (types and composition) and additional whether it is natural or man-made,, and finally, soil and water characteristics which are important parameters that permit ecological differentiation (Hurni, 1988).

A number of scientific approaches have been applied in Ethiopia to determine agro ecological zones (AEZs). Ethiopia, however, has also its own traditional AEZs classification. Because of the importance of altitude in mountain systems, Ethiopian land users have traditionally classified their environment in relation to topography (Hurni, 1998). Similarly, Gemetchu (1977) indicates that elevation has a strong influence on temperature and rainfall under Ethiopian conditions. Therefore, this parameter (elevation) is the basis for traditional agro ecological divisions. These different zones are Berha, Kolla, Woina Dega, Dega and Wurch/Kur (Gemechu, 1977, see Dereje and Eshetu, 2011). This traditional denomination is, however, a relative one, although it has some absolute characteristics (Hurni, 1998) on which most Ethiopian land users would agree to.

Based on various sources, Table 6.1 below provides detailed information on the agro-climatic, livelihood and population of the five agro-ecological zones of Ethiopia. The highland area consists of the Wurch and Dega AEZs, which constitute a little less than half of the total population of the country. In terms of population, however, they accommodate close to 90% of the country's population and about 95% of the total cultivated lands. Because of these situations, access to farmland is a big challenge and farming is largely subsistence with huge implication for environmental sustainability.

In the Wurch zone, usually no rain fed crops would be expected to grow. There, frost is a frequent phenomenon, and afro alpine grasslands are the dominant land use type if altitudes are not too high even for these perennial or annual grasses. Dega usually is a zone where crops such as barley, wheat, and pulses are grown. However, no Teff and maize would be expected to grow in this belt. Within the Dega, a differentiation can be made between the High Dega belt, where only barley and sometimes potatoes are grown, but no wheat and pulses, and a Lower Dega or "Dega proper" belt, which would additionally allow planting of wheat and pulses, but still an area with relatively cold climatic conditions where no Teff or maize grown(Hurni, 1998).

The most dominant Ethiopian agricultural belt is called Weyna Dega. All major rainfed crops can be grown in most parts of this belt, particularly Teff and maize. This is a belt where both agro climatic as well as ecological conditions are highly suitable for rainfed farming. The lower part of the Weyna Dega is also suitable for cash crops such as coffee and tea, or for *enset*, another major staple crop of southwestern and southern Ethiopia. The Weyna Dega belt usually has sufficient rainfall, allowing at least one cropping season per year (Hurni, 1998).

Table 6.1: Traditional Ethiopian Agro-ecological Zones

Major AEZ	Sub-AEZs	Altitude (m)	Average Rainfall (mm) and Temperature	Land area, Major livelihood & population	Main plant species	Crops	Livestock
Wurch	High wurch (alpine)	>3,700	>1,400 <10^{0}C	- 49% of the total land area of the country, 88% population-(About 14% lives in areas above 2,400 meters (cool climatic zone), about 74 % between 1,500 and 2,400 meters (temperate zone), -95% cultivated land, - Major livelihood system: Mixed farming	Mountain grassland (*Artemisia*, *Helichrysum*, *Lobelia*)	None, Frost Limit	Sheep, cattle
	Wet wurch (Sub-alpine)	3,700-3,200	>1,400, 10-14^{0}C		*Erica*, *Hypericum*	Barley (2 Crops/ Year)	Sheep, cattle donkeys
	Moist wurch (sub-alpine)	3,700-3,200	1,400-900, 10-14^{0}C		*Erica*, *Hypericum*	Barley (1 Crop/ Year)	Sheet, goats, cattle, poultry horses, bees
Dega	Wet dega (high land)	3,200-2,300	>1,400, 14-18^{0}C		*Juniperus*, *Hagenia*, *Podocarpus*, *Arundinaria*	Barley, Wheat, Neug, Pulses (2 Crops/ Year)	Sheep, Cattle, Goats, horses, Bees, Poultry
	Wet woyna dega (mid altitude)	2,300-1,500	>1,400, 18 - 20^{0}C		*Acacia*, *Cordia*, *Ficus*, *Arundinaria*	Tef, Maize, Enset (In West) Neug, Barley	Cattle, goats, sheep, horses, mules, donkeys, bees, poultry
	Moist woyna dega (mid	2,300-1,500	1,400-900, 18 - 20^{0}C		*Acacia*, *Cordia*, *Ficus*	Maize, Sorghum, Tef,	Cattle, goats, sheep,

Major AEZ	Sub-AEZs	Altitude (m)	Average Rainfall (mm) and Temperature	Land area, Major livelihood & population	Main plant species	Crops	Livestock
	altitude)					Enset, (Rare) Wheat, Neug, Finger, Millet, Barley	horses, mules, donkeys, bees, poultry
	Dry woyna dega (mid altitude)	2,300-1,500	<900		*Acacia*	Wheat, Tef, Maize (Rare)	Cattle, goats, donkeys, bees
Kolla	Wet kola (low land)	1,500-500	>1,400	*- 51% of the total land area,* *- 12% of the population* *-Major Livelihood – pastoral & agro-pastoral*	*Millettia, Cyathea, Albizia*	Mango, Taro, Sugar, Maize, Coffee, Orange	Cattle, goats, donkeys, bees
	Moist kola (low land)	1,500-500	1,400-900, 18 - 24^{0}C		*Acacia, Erythrina, Cordia, Ficus*	Sorghum, Teff (Rare), Neug, Finger, Millet, Groundnuts	Cattle, goats, bees, donkeys, poultry
	Dry kola (low land)	1,500-500	<900, >22^{0}C		*Acacia* spp.	Sorghum (Rare), Teff	Goats, cattle, camels, sheep, donkeys, poultry
Bereha (low land deserts)		<500	<900, >22^{0}C		*Acacia, Commiphora*	Only With Irrigation	Camels, goats

Source: Alemayehu (2006) and MoA, 2000 (cited by Alemayehu, 2006).

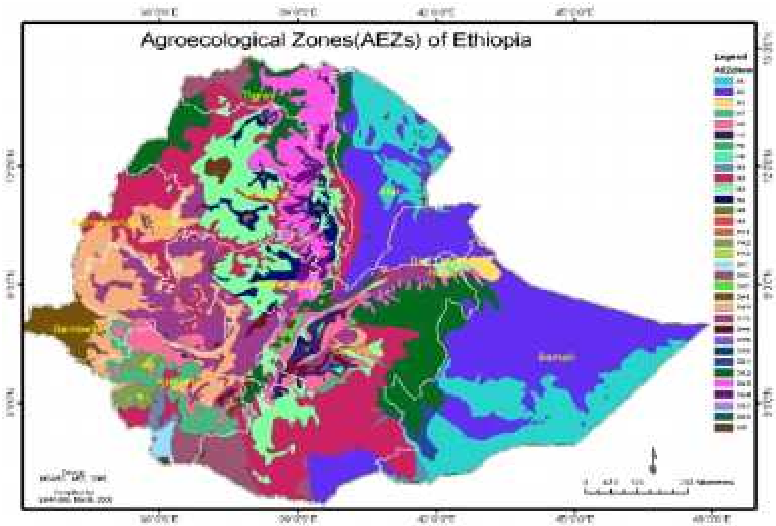
Below the Weyna Dega belt there is the Kolla belt, where there are moisture limitations for crops such as maize, potatoes, wheat and pulses. However, sorghum is a dominant crop in the Kolla belt, and Teff and maize will also be grown there if rainfall permits. It is a belt where temperature is much warmer than in the highlands, and where there is higher rainfall variability and recurring drought. Below the Kolla is the Berha Belt, where no rainfed cultivation is normally possible. Hot temperature and persistent drought render the area unsuitable for rainfed agriculture (Hurni, 1998), although large-scale irrigation systems along major rivers have been developed in some parts of Ethiopia, particularly along the Awash River. As discussed below, this part of the country, however, still constitutes a large potential for irrigation-based agriculture. This potential, however, should be matched with proper political economy, technological and institutional arrangements. The Kolla and Berha AEZs are commonly known as lowland area. They represent a little more than half of the country's land area but less than 15% of the population. The major livelihood system in these areas is pastoral and agro-pastoral, mainly livestock rearing.

The Traditional Agro Ecological Zones as indicated above provide major physical conditions that are grouped into relatively homogenous areas having similar agricultural land uses. This classification uses elevation/altitude as a major determinant of agricultural land-use options in Ethiopia due to its influence on temperature (IFPRI, 2006). This, however, provides only a very broad agro-ecological zonation and fails to capture fairly other important aspects of Ethiopia's complex agro-ecologies and agro-climate such as disparity in moisture regimes and length of growing periods.

Considering these limitations of the traditional AEZs, the Ministry of Agriculture and Rural Development (which is now renamed as the Ministry of Agriculture) developed a system of agro ecological zonation in which 18 major zones were defined to characterize the country based on both temperature and moisture regimes (CSA and IFPRI, 2006; Dereje and Eshetu, 2011). These two main factors used to characterize AEZ in the country are mainly governed by Elevation (altitude). Besides, elevation is the prime determinant of agricultural land-use in Ethiopia because it influences the temperature largely and rainfall to some extent (Dereje and Eshetu, 2011). The essential elements in defining an agro-ecological zone (or cell) are the growing period, temperature regime and soil mapping unit.

The country, however, has very diversified agro-ecologies even within limited geographical areas that may be difficult to correctly describe the agro-potential in general and mapping out the mosaic crop distribution in particular. Hence, most recently the agro-ecology of the country has been divided into 33 major zones. In this recent classification, length of crop growing period (LGP) was taken into account. The LGP generally refers to the cumulative time in a normal year when moisture conditions are adequate for plant growth. It is defined as the number of days per year that sufficient water is available in the soil profile to support plant growth. LGP captures multiple factors (rainfall, potential evapotranspiration, and soil moisture storage properties) that together define the most important dimensions of agricultural potential (Dereje and Eshetu, 2011). Figure 6.1 provides further details and descriptions on these 33 major agro-ecological zones of the country.

Figure 6.1: Map of the 33 Elaborated Ethiopian Agro-ecological Zones



Source: Dereje and Eshetu, 2011

The latest agro-ecological map of Ethiopia provides a good description of Ethiopia's extremely variable agro-climatic conditions and ecological systems that support large and very diverse genetic resources and production systems. This elaborated agro-ecological map, however, needs to improve the planning of agricultural development of the country. It should also be translated into a long-term road map for the development of the country's forestry and crop sectors as well as for livestock management and improvement. Any such uses, however, demand good policies and institutions backed by skilled manpower. Policies and institutions should be far-sighted, respect local communities' existing right as well as benefits associated with the resources in the respected agro-ecologies.

Environmental sustainability should also be a major factor in any effort of translating such ecological maps into development programs.

6.2 Agricultural Land and Soils: Availability and Dynamics

Ethiopia's surface area (excluding area under inland water bodies) is estimated at about 1.1 million square kilometers (110 million ha). The Ethiopian highlands represent about 36% of the total land area, while the balance is in the lowlands (below 1,500 m. a. s. l.). The bulk of the human and livestock population, about 85% and 70%, respectively, resides in the highlands (Tekie, 2006). Of the total land area, 65% (about 71 million hectares) is believed to be suitable for agricultural purposes (Kindie, 2014, MEDaC, 1999, cited by Tekie, 2006)[24].

Agricultural land in Ethiopia was last measured as 356,830 sq. km in 2011. According to the World Bank, agricultural land refers to the share of land that is arable, under permanent crops, and under permanent pastures. Arable land includes land defined by FAO as land under temporary crops (double-cropped areas are counted

[24]According to FAO, agricultural land or agricultural area means the collection of arable land (aka cropland), permanent cropland and permanent pasture lands. Similarly, arable land defined to refer to land producing crops requiring annual replanting or fallow land or pasture used for such crops within any five-year period. On the other hand, permanent cropland refers to land producing crops which do not require annual replanting. Permanent pastures are natural or artificial grasslands and shrubs to be used for grazing livestock.

once), temporary meadows for mowing or pasture, land under garden crops and fallow lands.

Table 6.2: Agricultural Land and Land Use in Ethiopia

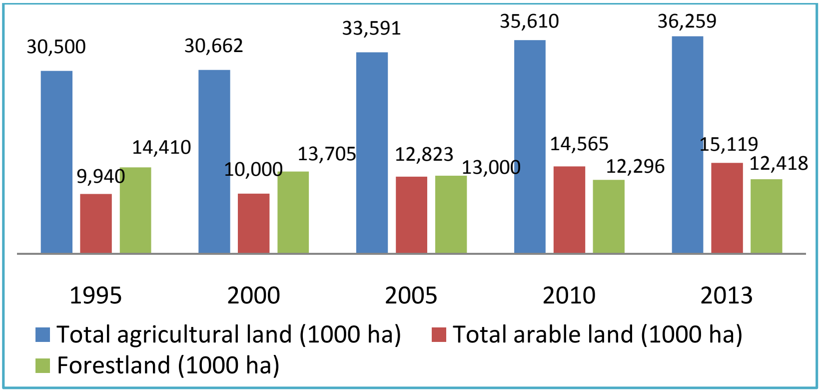
	1990-2000
Agricultural land (sq. km) in Ethiopia	306620.0
Agricultural land (% of land area) in Ethiopia	30.7
Arable land (hectares) in Ethiopia	10,000,000.0
Arable land (hectares per person) in Ethiopia	0.2
Arable land (% of land area) in Ethiopia	10.0
Permanent cropland (% of land area) in Ethiopia	0.7
Forest area (sq. km) in Ethiopia	137050.0
Forest area (% of land area) in Ethiopia	13.7

Source: World Bank Indicators - Ethiopia - LAND USE http://www.tradingeconomics.com/ethiopia/agricultural-land-sq-km-wb-data.html

According to international sources about 36% of the country's land is considered as agricultural land and currently under agricultural uses as arable, permanent cropland and permanent pasture land (Figure 6.2). It is also important to note that lands considered as agricultural land currently include a great deal of land not actively or even presently devoted to agricultural use. This is mainly associated with the inclusion of permanent meadows and pasture land (which accounted about 55% of the reported agricultural land (or 20 million hectares of land) in the definition of agricultural land[25].

[25]This land is usually considered as potential agricultural land. This, however, seems a great simplification of the reality as turning land classified as 'suitable' for agricultural purposes from one uses to another is not only an economic issue, but other factors like cultural, environmental, political and socio-economic as well as historical and institutional (both traditional

Figure 6.2: The Dynamics of Agricultural and Forest Lands in Ethiopia



Source: ADBG PORTAL (http://ethiopia.opendataforafrica.org)

6.2.1 The Dynamics of Agricultural Lands in Ethiopia[26]

According to data obtained in 2013 (the latest year for which data is available) arable land occupies about 42% of the estimated 36.2 million hectares of agricultural land (Figure 6.3). Of the total 15.1 million arable lands, cropland (temporary annual crops) accounted 12.5 million hectares. The remaining 2.6 million hectares is fallow land and temporary meadows and pasture lands, which accounted for 0.7 and 1.9 million hectares, respectively. Permanent cropland which includes land actually under tree crops such as coffee or fruit

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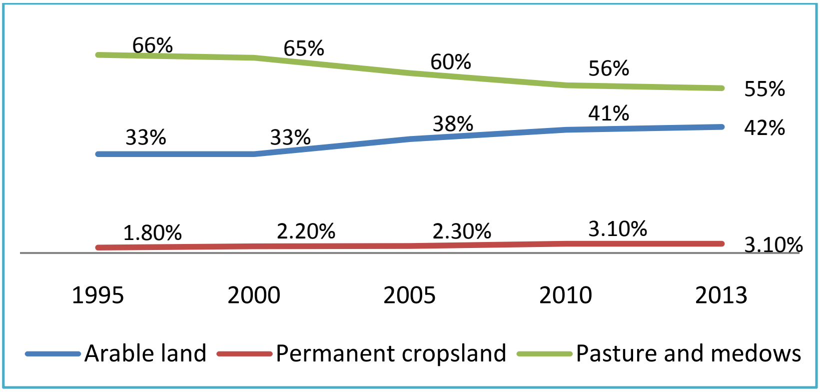
and modern) issues at community levels where these potential lands exist play significant roles in any endeavor of turning these lands from their existing use into agricultural use

[26] All data discussed in this section obtained from African Development Bank Portal/website (http://ethiopia.opendataforafrica.org).

constitutes about 3.1% (or about 1.1 million hectares) of the reported agricultural lands.

Figure 6.3: The Dynamics of Agricultural Land Utilization (percent of total agricultural land)



Source: CSA 2013/14

In terms of changes over time, the share of agricultural land (in total land area of the country) increased by 6 percentage points between 1994 and 2012. During the same period, the percentage share of arable land also increased by 5.4 percentage points from 9.9% to 15.4% (Table 6.2). In other words, the size of arable land increased by 5.2 million hectares over the past two decades (between 1995 and 2013), indicating a 2.0% annual growth during the same period. The growth rate, however, is relatively faster in recent years especially since 2000 when the size of arable land has expanded by 3.4% annually[27].

[27]Despite such expansions in arable land, per capita availability of arable land remains unchanged at about 0.17 ha per person, indicating a corresponding high population growth during the same period.

Table 6.3: Evolution of Agricultural Land in Ethiopia

	1994	1999	2004	2009	2010	2011	2012
Agricultural land (% of land area of the country)	30.47	30.68	31.61	34.51	34.99	35.68	36.49
Arable land (% of land area)	9.93	10.00	10.93	13.61	13.95	14.57	15.35
Arable land (hectares per person)	0.18	0.16	0.15	0.16	0.16	0.16	0.17
Agricultural irrigated land (% of total agricultural land)			0.38	0.48	0.44	0.51	
Permanent cropland (% of land area)	0.54	0.68	0.68	0.91	1.04	1.12	1.14

Source: Resource Statistics - Land, December 2015

The expansion of permanent cropland is even faster. As indicated in Table 6.3, permanent cropland grew by 3.2% and 4.5 annually between 1990 - 2000, and 2000-2012, respectively. This increased the share of permanent (in total land area of the country) from 0.54% to 1.14% during the same period. In parallel with expansion of arable and crop lands, forested land has decreased by about 1% annually since 1990[28].

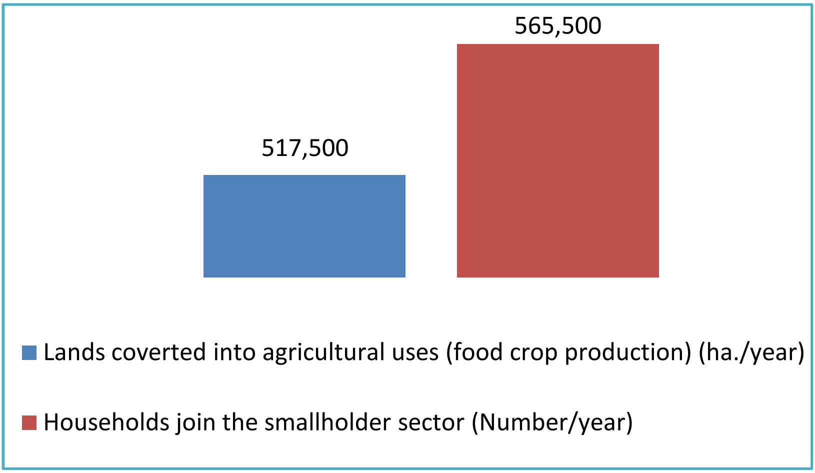
6.2.2 Smallholders and Agricultural Lands: Access and Dynamics

According to EEA (2015), the number of small food crop producers has increased yearly on average by 566,000 over the past four years (EEA, 2015). Similarly, grain cropland has expanded by about

[28]Recent official statistics, however, indicates increase in the national forest coverage over the past decades or so.

517,500 hectares annually, of which close to 248,160 hectares (48% of the new land) is allocated to cultivation of annual food crops. Following temporary food crops, most farmers allocated their new land to feed their livestock and to plant permanent crops and tress, which accounted for 25%, 7% and 5% of the new land, respectively.

Figure 6.4: Expansion of Agricultural Lands and Agricultural Livelihoods (over the past four years



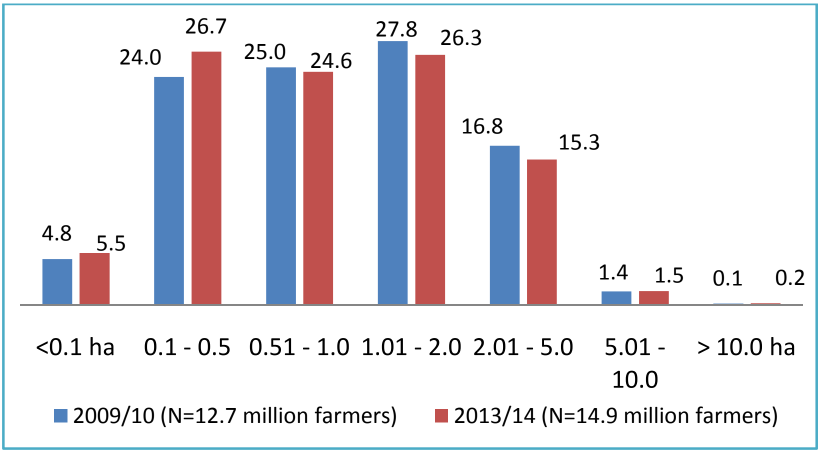
Source: EEA (2015).

This growth suggests an agricultural development strategy that encourages production increases, among others, through expansion of cultivation into previously unused areas. Yet, there is some debate over the amount of unused land that actually exists in areas where the majority of Ethiopia's smallholders reside - in the highland regions.

- **Changes in Farm Structures**

Official data indicates that over the past four years, close to 2.3 million farmers joined the smallholder sector. During the same period, farms cultivated by the small farmers expand by 2.07 million hectares. Consequently, this has led the average farm size to shrink further and forces the majority of smallholders cultivate an even minuscule farms. As shown in Figure 6.5 below, between 2009/10 and 2013/14, the percentage share of farmers who cultivated farms less than 0.1 ha, for instance, increased from 4.8% to 5.5%; while those who managed to cultivate farms between 0.1ha and 0.5ha increased from 24% to 26.7% respectively. On the contrary, farmers who cultivated relatively larger farm sizes declined during the same period. The share of farmers who cultivated farms between 0.51ha and 1 ha, 1.01ha to 2.0 ha, and 2.01 and 5.0 ha declined by 0.4%, 1.5% and 1.4%, respectively, in four year period.

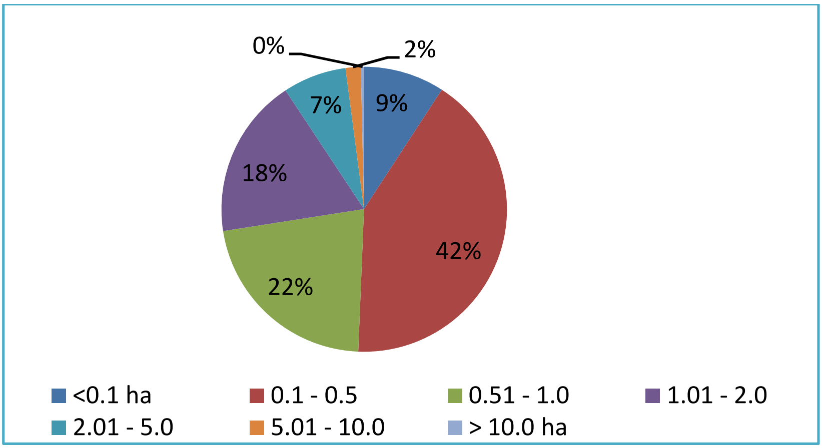
Figure 6.5: Changes in Farm Structure among Small Farmers (Percent).



Source: Computed based on CSA reports

As reported by ATA part of this increase in grain-land could be explained by expansion of existing farms (by existing farmers) into marginal lands and protected areas (ATA, 2013). This could be associated with the relatively high shortage of farmlands among new entrants (farm households). As indicated in Figure 6.6 below, the majority of the new farmers cultivate farms too small to lead even a subsistence livelihood. CSA statistics indicate that a little over 50% of the 2.3 million farmers that joined the smallholder sector between 2009/10 and 2013/14 cultivated farms less than 0.5 ha. Another 22% of the new entrants managed to cultivate farms between 0.5 and 1 hectare. On the other hand, farmers who managed to cultivate farms between one and two hectares and above two hectares constitute only 18% and 9%, respectively, of the new entrants who joined the sector over the past four years.

Figure 6.6: Farm Structure among New Farm Households (percent of the 2.3 million new farmers joined the sector over the past five years)



Source: Computed based on CSA reports

In addition to the high population growth in rural areas, other factors like access to appropriate technology and know-how as well as other institutional/political factors which hinder labor mobility are expected to play a role in the continuous dwindling of farm sizes in Ethiopia.

6.2.3 Agricultural Soils and Land Degradation

The type of soils and soil fertility are equally important in affecting farmers' demand for farmlands. A variety of soil fertility issues have historically constrained the potential of Ethiopia's smallholder farmers, compounded by lack of up-to-date and comprehensive information on the status of the country's soil conditions and fertility. This is especially very important as Ethiopia's arable soils are amongst the oldest in Africa and are highly degraded by the continued problems of water and wind erosions[29].

The wide ranges of topographic and climatic factors, parent material and land use have resulted in extreme variability of soils (EEA, 2005). In different parts of the country, different soil forming factors have taken precedence. According to the Ministry of Agriculture, about 19 soil types are identified throughout the country. The big

[29]All forms of land degradation occur in Ethiopia: water and wind erosion; salinization (and recently acidification); and both physical and biological degradation of soils. More than 85% of the land in Ethiopia is moderately to very severely degraded, and about 75% is affected by desertification (The Global Mechanism, 2007). Soil erosion, with its associated loss of fertility and rooting depth, water resource degradation and loss of bio-diversity (Eyasu Elias, 2003, see Samuel et al, 2015), is a key problem that undermines land productivity in the highlands of Ethiopia. Soil erosion is particularly serious in the high and low potential cereal zones of the north-central highlands.

proportion of the country's landmass is covered by lithosols, nitosols, cambisols and regosols in order of their importance. Complexes of soil forming factors have primarily influenced the distribution of the soil types (MoA, 2000, cited by Alemayehu Mengistu (2006).

In addition to soil erosion which has become the main manifestation of Ethiopia's landscape with formation of gullies in many areas, other soil productivity related problems include: water logging, acidity and alkalinity. Because of these and farmers' practices like removal of crop biomass from the fields and use of less farm yard manure, crop productivity has been low, and the cereal yield national average is still less than 2t/ha (ATA, 2013)[30].

The quality of soil on which crops are cultivated remains to be an important determinant of yield. There are two aspects of soil quality: soil depth and nutrient content. Based on soil depth, the quality of the Ethiopian Highlands is shown in Table 6.3. Most studies take a 100 cm of soil depth as the critical level beyond which yield is compromised (Bojo and Cassels, 1995, cited by Tekie, 2006). Based on a study conducted two decades ago, Tekie (2006) indicates that about 30% of arable farm lands have soils with 30 cm or less depth which implies a high degree of land degradation. Similarly, a study by Eyasu (2003) and Kidanie (2008) indicates that in regions such as Wolo, Tigray and Harerghe 50% of the agricultural lands have soils with depths of less than 10 cm, which make them unsuitable for farming (see Samuel et al., 2015).

[30]Other studies put the impact of soil erosion in a more comprehensive way. A study by Shibru and Kifle, 1998, for instance, estimates the annual loss in grain production due to soil degradation at 40,000 tons in 1997, which reached 170,000 tons in 2000 (EEA, 2005).

The costs of land degradation, which has been going on for centuries in Ethiopia (Kidane, 2008) are substantial and include both direct and indirect costs. Direct costs include costs of soil nutrients lost with topsoil erosion (or the replacement costs of these nutrients), lost production due to nutrient and soil loss, costs of forest removal and loss of livestock carrying capacity. Loss of environmental services, silting of dams and river beds and increasing irregularity of streams and rivers and reduced groundwater capacity constitute the indirect costs. Other indirect costs relate to social and community losses due to malnutrition, poverty and migration, while poverty is compounded by the lack of economic marketing structure (Berry, 2003).

Table 6.4: Distribution of Soil Depth Classes for Cultivated Land (in cm)

Soil depth	Percent
>150	47
100-150	22
50-100	20
25-50	7
<25	3

Source: Sutcliff as cited in Tekie (2006).

There is, however, greater awareness on the impact of land degradation as a number of development programs by donors and the government that include community-development programs financed by the PSNP program have tried to address the problem. There is also a major initiative by the government and its donors (in particular FAO and UNDP) to map Ethiopia's agricultural soils and align soil fertility interventions of the Ministry of Agriculture with actual fertility status of smallholders' soils. The Land Use Planning and Regulatory Department (LUPRD) of the MoA, for instance, has compiled Ethiopia's soil resource base and mapped it at a scale of 1:2000 000 (FAO, 1985: see EEA, 2005). The available information indicates the existence of 18 major soil associations in Ethiopia and presents the chemical properties and the soil profiles of these major soils in the Ethiopian highlands.

There is limited information on the fertility status of the various soils. Research showed that Potassium, Nitrogen, Cation Exchange Capacity (CEC) and organic matter contents of most Ethiopian highland soils are generally high by international standards (EARO, 1998), whereas their phosphorous content is low to very low. Compared to the African standard most soils in the highlands of Ethiopia are fertile (FAO, 1984c). Contrary to most other African soils, the majority of Ethiopian highlands soils remain relatively fertile at depth. However, most highland soils are deficient in important nutrients and require fertilizer to sustain crop yields. Research has indicated that Ethiopian soils are generally low in available nitrogen and phosphorous and cannot produce high crop yields unless these are supplied (Alemayehu, 2006).

The most detailed and comprehensive initiative, however, was launched only in 2012 by the Ethiopian Government's Agricultural Transformation Agency (ATA). The project named the Ethiopian Soil Information System (EthioSIS) uses remote sensing satellite technology and extensive soil sampling to provide high-resolution soil mapping for each region. In addition, Woreda level soil collection and mapping has led to a survey of 438 Woredas (63% of the agricultural Woredas in the country), including the whole of the

Tigray, Amhara, SNNP and Harari Regions as well as the Dire Dawa Administration (ATA, 2013).

Consequently, the soil fertility atlas and fertilizer recommendations have already been published for Tigray, with data collection completed and analysis is in progress for Amhara and SNNP (ATA, 2013). In parallel with specific solutions on soil mapping and fertilizer recommendation, the EthioSIS has established fertilizer blending plants in various parts of the country. These plants are expected to provide access to an expanded range of blended soil nutrients to farmers operating under different agro-ecologies and soil conditions.

Though EthioSIS is a milestone in Ethiopia's history of soil fertility analysis with a good potential to change fertilizer use around the country, we have to wait to see the actual impact and sustainability of EthioSIS services to millions of smallholder farmers.

6.3 Water Resources and Irrigation Potential[31]

Throughout the history of mankind, from the era of ancient civilization of the Nile banks, Persia & the Far East to modern times, water resources has been the prime factor influencing the development of agriculture & rural areas. More recently, technical progress & modernization of farming systems have allowed countries of the developed world to become net exporters of agricultural products, mainly due to sound policy on water resources that combine technological advancement with competent

[31]This part of the report largely originated from EEA (2005).

policies. These policies put together harmonious development that presupposes not only purely economic driving forces but also considers and embraces socio-economic aspects such as food self-sufficiency & environmental protection. Despite their enormous potential, the water resources of Ethiopia have not contributed their share to the national economy. They have not been properly utilized to narrow the ever increasing gap of food demand & supply, among others, caused by the periodical *Elnino* related drought.

There is, therefore, a need for a sound framework for planning & executing a water resources-centered agricultural development in which irrigation is one of the most decisive factors. The river basin/valley framework is the most convenient & powerful method particularly for developing the Ethiopian water resource potential. The next section, however, discusses first the role of water resources for development and agricultural transformation; and the discussion on the water potential of the country and the progress and challenges for implementation are discussed in subsequent sections.

6.3.1 Water Resources Development for Agricultural Transformation

6.3.1.1 Water resources for food security

Irrigation is a crucial activity in the country's food security and agricultural development efforts. There is a marked difference in yield response and water requirements between irrigated and non-irrigated agriculture. Irrigated crops produce better yields than rain-fed crops because of their higher water consumption even if those rain-fed crops get optimal inputs. The water consumption for-rain fed agriculture stops at 5,500 m^3/ha as it is impossible for 'typical' rain-fed crops to consume more water. The corresponding yield is estimated to be 5000kg/ha whereas the irrigated crops' water consumption could go up to 6500m^3 /ha with a corresponding yield of over 7500kg/ha. In irrigated agriculture, water taken up by crops is partly or totally provided through human intervention. Irrigation water is withdrawn from a water source (river, lake or aquifer) and led to the field through an appropriate conveyance infrastructure. To satisfy their water requirements, irrigated crops benefit both from more or less unreliable natural rainfall and from irrigation water. Irrigation provides a powerful management tool against the vagaries of rainfall, and makes it economically attractive to grow high-yielding seed varieties and to apply adequate plant nutrition as well as pest control and other inputs, thus giving room for a boost in yields (FAO, 1996).

Most of the expansion in irrigated land can be achieved by converting land used for rain-fed agriculture or land with rain-fed production potential but not yet in use as irrigated land. Experience shows that very high dependence on rain-fed agriculture has led to either food insecurity or high food price that also challenge the transformation of the Ethiopian economy. Hence, it is high time now to be engaged in irrigation development to ensure food security in the country.

6.3.1.2 Water resources for creating employment opportunities

Agriculture is the dominant source of employment in the rural economy. The means of production; mainly the land resource, does not receive vital inputs such as irrigation, at the same time, it is progressively fragmented, in an effort to accommodate the ever increasing high unemployment level. This coupled with the problem of natural resource degradation and lack of alternative employment make rural areas more vulnerable to social & economic problems. This situation can be and has to be reversed through a long-term sustainable development framework.

Irrigation, supported by inputs such as high- yielding varieties, nutrients and pest management, together with a more extended agricultural season, higher cropping intensity and a more diverse assortment of crops, can generate more rural employment. The productivity boost provided by irrigated agriculture results in increased and sustained rural employment thereby reducing the hardship experienced by the rural and urban population. Growth in the incomes of farmers and farm laborers creates increased demand for basic non-farm products and services in rural areas. These goods and services are often difficult to trade over long distances. They tend to be produced and provided locally, usually with labor-intensive methods, and so have a great potential to create employment and alleviate poverty. Studies in many countries have shown a multiplier effect (of such development strategies) ranging from two (in Malaysia, India and the United States) to six in (Australia) (UNDP, 2003).

6.3.1.3 Developing water resources for poverty reduction

Developing water resources can be a remarkably effective measure in poverty reduction. Experience from India shows that in non-irrigated districts, 69 percent of the people are poor, while in irrigated districts, the number is only 26 percent. The availability of water gives opportunities to individuals and communities to boost food production, both in quantity and diversity, to satisfy their own needs and to generate income from surpluses. Irrigation has a land-augmenting effect and can therefore narrow the difference between extreme poverty and the satisfaction of the household's basic needs. Nevertheless, it is generally recognized that in order to have an impact on food self sufficiency, irrigation projects need to be integrated with an entire range of complementary measures, ranging from credit, marketing and agricultural extension advice to improvement of communications, health and education infrastructure.

6.3.1.4 Water resources for drought mitigation

Disasters due to drought and hence lack of food security have become increasingly the concerns of countries like Ethiopia where drought is significantly exacerbated by backward or negligible natural and water resources development. The cumulative effect has been total loss of food production with severe social and economic implications. An integrated approach to the study and exploitation of water resources has to be intensively pursued if we are to break the vicious cycle of drought, partial or total crop production failure. Drought mitigation strategies may aim at reducing the vulnerability factor by, for example, altering land use and agricultural practices, or may modify the severity of the drought by providing irrigation from reservoirs, wells or water imports from areas unaffected by the drought.

An important requirement is, therefore, to identify and establish water centered strategies that enable communities to cope with droughts, including revival of traditional customs for cultivation and livestock. Relocation of population considering resource bases in a basin planning framework is another possible long-term measure.

6.3.2 The Water Resource Potentials of Ethiopia

The agricultural production system, being the major component of the Ethiopian economy, influences almost all development activities to a large extent directly and in some instances indirectly. Agriculture is, however, highly influenced by the central and most critical element, moisture. Moisture required for agricultural production is derived from surface or ground water bodies. The efficient and sustainable use of these water resources requires a systematic and rational successive, adapting planning that is backed by public and private investment.

Ethiopia is endowed with ample natural resources especially of land and water whose potentials for development are enormous. Based on its river basins, Ethiopia is divided into twelve parts within longitudes $33^0{}_E$ to $48^0{}_E$ and latitudes $3^0{}_N$ to $14.5^0{}_N$ (see Table 6.5 and 6.6). The top four big size basins are Wabi-Shebelle (200,214 km^2) in South Eastern, Abbay (199,812 km^2) in Western, Genale-Dawa (168,100 km^2) in Southern, and Awash (110,000 km^2) in Eastern parts of the country. The size of the other five basins varies from 86,510 km^2 to 64,380km^2 while the least three, namely Rift Valley

Lakes, Mereb, and Ayisha have 52,000 Km^2, 5,893 km^2 and 2,223 km^2, respectively. Concerning the regions falling within a particular basin, three basins fall entirely within one region while others are encompassed by more than one region (MWR, 2001, cited by EEA, 2005). The resource base is reasonably high to foster development and to bring about fundamental changes in the existing agricultural production system. The data shows that the water resources provide potentially irrigable 3.5 million hectares of agricultural land.

Table 6.5: Basins Resource Potential in Ethiopia

Basin	Water Resource (billion m^3)	Potential		
		Hydropower	Irrigation in ha	Forestry in (ha)
Abbay	52.62	55,000 Gwh/Yr	1,700,000	227,623
Tekeze	8.20	4,231 Gwh/Yr	69,061	1,052,617
Mereb	0.65		29,465	
BaroAkobo	23.24	4.146MW	600,000	2,200,000
Omo Gibe	17.6	2.583MW	90,394	1,070,000
Awash**	4.9	1.574 Gwhh/Yr	205,400	
Rift Valley lakes	5.68		50,000	245,000
Genale-Dawa	6.10	670MW	423,000	1,061,800
Wabi Shebelle	3.16	5.400Gwh/Yr	204,000	na
Danakl	0.86	-	90,000	118,635
Ogaden	-	-	-	7,514,600
Ayisha	-	-	4,300	
Total	123.01		3,465,620	

Source: Profile of Basin Master plan studies (MWR), 2001 (quoted from EEA, 2005); na = Data not available.

6.3.3 On-going Irrigation Projects in Ethiopia

Irrigated agriculture is a priority of the agricultural transformation and food security strategy of the Ethiopian Government. Increased availability of irrigation and less dependency on rain fed agriculture is taken as a means raising food production and enhancing self-sufficiency of the rapidly increasing population of the country. In line with this development policy regional states and NGOs promote irrigation development so as to increase and stabilize food production in the country. Under the irrigation development subprogram of Ethiopia's 15- year Water Sector Development Program (WSDP), a total of 1606 small-scale irrigation schemes[32] are planned to be implemented mainly for the provision of food requirements (Ministry of Water Resources, 2001, quoted by W. Loiskandl1 et al, undated). Foreign governments and multi-lateral agencies are expected to co-operate with the government of Ethiopia and Non-Government Organizations (NGOs) to foster this program.

The focus of this update on ongoing or planned irrigation projects is largely on large irrigation schemes, which are usually implemented in the 12 major basins (that include 9 river basins, one lake basin and three dry basins). Based upon the various river basin master plans and land and water resources surveys, the aggregate irrigation potentials of Ethiopia in these river basins have been estimated to be 2,523,000 million hectares, net. The gross irrigation potential would be about 3.7 million hectares (MW&E, 2016).According to

[32]Small-scale irrigation scheme indicates irrigation schemes of 200 ha or less.

the Ministry of Agriculture, however, the potential irrigable land in Ethiopia is between 3.7 and 4.3 million hectares (AG Water, 2010).

From such potential irrigable land, the country identified and prepared irrigation development plans/programs for 665,750 hectares of land in 40 different sites for immediate implementation about a decade and half ago. Latest data obtained from the website of the ex-Ministry of Water and Energy also shows that 12 large scale irrigation projects that could irrigate over 355,000 ha are on-going across the country. The status of these projects as well as changes made on them at the various stages of the project, however, are difficult to know. Based on information from the Ministry of Agriculture and Rural Development, AG Water (2010), for instance, estimated the actual irrigated area at just 7-10% of this. Of this area approximately 55% is traditional irrigation schemes, 20% is modern small-scale, and 25% is medium- and large-scale irrigated commercial farms (private and state-owned). Field assessments in small-scale irrigation projects indicate, however, that some irrigation schemes are not functional due to shortage of water, damaged structures and poor water management (AG Water, 2010).

If one considers the rapid increment of the area under traditional irrigation as well as some medium and large-scale irrigation schemes implemented in recent periods, total irrigated area in the country is not expected to exceed 500,000 ha, which is still less than 15% of the potential. The contribution of water resources for rural development & agricultural transformation, however, continues to be a very central issue. The water sector has a lot to offer to the transformation process. If the water resources are properly developed and exploited it is possible to alter the existing situation significantly with respect to food security, employment generation, poverty reduction and drought mitigation. Because of the potential as well as the importance of Ethiopia's water resources, the next section deals with river basin water resource development planning tools which suit the agro-ecological conditions of the country.

6.3.4 Constraints on Water Resources Development

Ethiopia has not yet achieved the full potential of its surface and groundwater resources. In fact, it is estimated to have achieved less than 15% of the potential. The country, however, has developed a number of policies that recognize, and try to address, the severity of the consequences of erratic rainfall and frequent occurrence of droughts, for example the Rural Development Strategy of Ethiopia and the Water Resources Management Policy. The goal of the policy is to enhance efficient, equitable, and optimum utilization of water resources for socio-economic development on a sustainable basis. The Policy prioritizes human and livestock needs, and development of small-scale irrigated agriculture. It stresses the use of water for irrigation as a means to arrest food insecurity and provide water for livestock and household consumption. Consequently, the current policy environment looks conducive to the improvement of AWM systems (FAO 2005, quoted by AG Water, 2010) as:

- irrigation is being integrated within the ADLI;
- fairness and transparency are being promoted in the management of irrigated agriculture;

- a reasonable share of the GDP is intended to be committed to the development of irrigation; and
- user-based management of irrigation systems is encouraged, especially considering the needs of rural women.

The Ethiopian Water Sector Strategy has created an enabling environment in the areas of financing of water resources management and development; trans-boundary river management; stakeholder participation and gender mainstreaming. As part of the Strategy, water harvesting, small-scale irrigation development and reclaiming wetlands are emphasized (AG Water, 2010).

The development and transformation of the national economy as well as the challenge to food security that is seriously exacerbated periodically as in the 2014/15 drought, calls for an integrated planning & execution of the natural resources by putting water resources at the center of the agricultural development. Considering water resource as the basis for intensive & enhanced agricultural development requires a proper identification of the availability of the resources and their distribution as well as the prevailing opportunities of development. Although the water policy of the Ethiopian government states that the hydrologic boundary or basin is the fundamental planning unit, not much has been achieved with regard to proper utilization of this resource. The proper utilization of the water resource potentials is constrained by a host of factors.

6.3.4.1 Inadequate and inappropriate policy and strategy

The government of the Federal Democratic Republic of Ethiopia issued a National Water Resources Management Policy and

National Water Sector Strategy in 2001. However, there remains a lot in terms of improving the policy framework as well as translating and customizing basin-level master development plans/strategies into attainable programs, projects, and interventions that demand the active participation of the private sector. This could include support in terms of enhancing access to finance and appropriate technology and know-how to joint-programs and making joint risk sharing arrangements to guarantee/insure (non-commercial loss). All these, however, depends on the country's capacity in terms of translating the prevailing policy & strategies, as well as basin master plans into feasible, marketable development programs that could sufficiently attract potential investors/farmers and serve the purpose of the national and local (i.e. project areas) socio-economic development.

6.3.4.2 Lack of proper/strong river basin institutional setup

Proper institutional arrangement plays a decisive role in promoting the development goals at minimum cost and time. Irrigation development also requires an effective planning and institutional arrangement. The best way of tackling irrigation development would be by employing river basin/valley planning framework. This framework presupposes the establishment of river basin development institutions whose task will be ensuring that comprehensive planning & implementation is put in place.

Irrigation water use is one of the major consumptive uses of water resources and due to its social & economic dimensions needs a particular emphasis on how it should be planned & implemented. Under the Ethiopian context, there is no holistic water resources development-planning framework, which considers river basin as the basic planning & implementation unit. As a result of this, the efforts made so far especially with respect to large and medium scale irrigation schemes are not comprehensive, sustainable & focused.

Ethiopia should learn the cost of poor and inconsistent irrigation institutions from its experience of abandoned or suspended large and medium-scale irrigation schemes some two decades ago. These projects, with a total area of 44,050 hectares, were either under construction or at their final stages during the previous government but were suspended by the present one until a decade ago when revival measures on some them like the 10,000 ha Alwero Dam were undertaken. Although no updated data on their current status is available, some of these are under reconsideration and utilization due to the shift in emphasis by the government. Among these the use of Belbela and Wedecha by floriculture, the Meki-Zeway, Lower- Omo and Alwero partial development by the private sectors are notable examples (Awulachew, S. B. et al, 2007).

6.3.4.3 Inconsistent operational arrangements and strategic efforts

The planning and implementation of small, medium & large-scale irrigation developments and implementation is currently the mandate of the Ministry of Water Resources and Energy, although regions and the Ministry of Agriculture are also involved in small-scale irrigation & livestock development. To date there is no defined/streamlined irrigation extension service that covers all existing small-scale irrigation schemes. Thus, it is time to focus on setting targets of agricultural output by giving due attention to the constraints, one of which is operational arrangement.

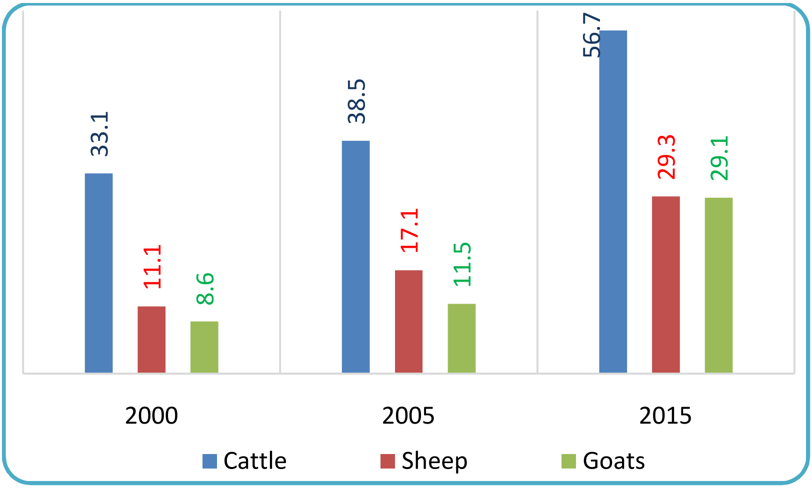
Inconsistencies in terms of strategic efforts of irrigation development have also been major constraints on the development of the sub sector. Many of the pond "water harvesting programs" implemented in the country have overlooked the basic principles of engineering & economies of scale by deploying a lot of resource in a manner which was biased against a holistic development that should link & integrate all irrigation development efforts in a given river basin/Valley framework (EEA, 2005).

6.4 Livestock Resources: Population, Genetic Diversity, Production and Constraints

The livestock sector is an important part of Ethiopia's economy in terms of its contributions to both agricultural value-added and national gross domestic product (GDP). Ethiopia's livestock population is the largest in Africa. In 2014/15, Ethiopian sedentary private holdings were estimated at about 57 million heads of cattle, 29 million heads of sheep and goats each, and 56 million poultry (CSA 2014/15). These livestock population estimates exclude the livestock population for pastoral areas, as there are no official statistics for those areas[33]. Ethiopia has also a large genetic diversity in its livestock resources.

[33]Some rough expert estimates indicate that pastoral areas account for about 20 percent of cattle, 40 percent of sheep, and 40 percent of goats in the country (Hurissa 2007, cited by Negassa et al., 2010). Thus, including

Figure 6.7: Trends in size of major livestock types (millions)



Source: FAO websites (for 2000 and 2005 data) and CSA (for 2014/15 data).

6.4.1 Livestock Production Systems

Ethiopia has huge livestock genetic resources. Despite this major repository of livestock resources and genetic diversity, little has yet been done to describe them other than in superficial terms, which merely indicate that they are indigenous to and synonymous with particular regions. "Breeds" are recognized by morphology, or more often by the name of an ethnic group or locality. Much still needs to be done at the genetic level to gain a fuller understanding of the relationships among types, classes, breeds and populations (Alemayehu, 2006).

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these rough estimates for the pastoral areas, the estimates of national livestock populations for 2014/15, was 68 million cattle, 41 million sheep and goats, each.

Ethiopian livestock production systems can be classified into three broad categories:

- subsistence crop related livestock production,
- purely pastoralist production, and
- the private commercial or parastatal production.

In the first two systems enterprises are mainly small holdings, while the last includes medium to large-scale market oriented production units. Parastatal and commercial livestock production systems with more intensive animal production are mostly found around peri-urban and urban areas and to a lesser extent around previous farmers' co-operatives and a few private rural sites. Dairying and fattening of oxen and small ruminant are the most popular activities. A study by Alemayehu (2006) describes Ethiopia's livestock production systems into the following categories:

- **Small-Scale Subsistence Production**. In this system where food and cash crop growing is the main agricultural activity, farm size ranges from 0.5-1 hectares. This could be described as an integrated crop-livestock production system where cattle play an important role by supplying draught power, while equines are the highland beasts of burden. In addition to drought power, livestock are used for seasonal milk and meat production and a source of food and income. Cattle are the main stock. This mid-and highland production system could also incorporate small ruminants and poultry as the main source of cash and family consumption. Feed resources are natural pasture, crop residues and to lesser extent improved pasture and forages. Milk yield is on average 1litre/day, and the average land area is 0.25 hectares per animal.

- **Medium Scale Intensive Dairying and Fattening**. Farmers use all or part of their land to grow improved pasture and forage, some buy agro-industrial by-products and use their land for food and cash crops. Manure is used on crops. Milk is the main source of income and farmers use family labour and sometimes hire help for dairying and fattening. Feeds are from improved pasture and forages and purchased concentrates. Milk production is continuous from crossbreed animals (Local Zebu crossed with Friesian), ranging from 5-8 litres/day; a crossbred animal occupies 0.5 to 1 hectare, on holdings of 1-2 hectares. Major inputs include crossbred cows, artificial insemination, credit, veterinary extension and training.
- **Peri-Urban Commercial Dairying**. This occurs around cities where demand for milk is high. The main feeds are agro-industrial by-products (concentrates), purchased bush hay, improved pasture and forages and crop residues. Milk, often sold directly to consumers, is the main source of income. High-grade crossbred cows, are fed on purchased concentrates and roughages; the enterprise is commercial. Milk production is continuous and yield per crossbred cow ranges form 10-15 liters; a cow is held on between 0.25-0.5 hectares. Inputs include concentrates, roughages, grade stock, credit, extension, training and veterinary services.

6.4.1.1 The pastoral system of livestock production

The Extensive Pastoral System is usually practiced in arid or semi-arid lowland (i.e. below 1,500 meters) areas. Pastoralists exploit grazing land and livestock rearing is the mainstay of people, and livestock and livestock products provide subsistence, either directly as milk, milk products, meat and blood, or indirectly in the form of purchased cereals through sales of animals; crop production is limited.

Among the most notable pastoralists areas in Ethiopia are the Borana, Somali and the Afar located around the southern, Eastern and North-eastern part to the country respectively. The pastoral population is estimated at 12-15 million. They have no permanent home and move with their herds within their traditional territory and use livestock for subsistence and seasonal milk production. Yield per cow per day is 0.5-1 liter. The average land area per animal is from 5-10 hectares. Livestock include: cattle, sheep, goats and camels. Inputs include veterinary (supply of drugs and vaccines) services, water and road development. These areas sell young bulls to highland farmers (for traction) through exchange for cereals (mainly maize). They also contribute the highest number of animals for export.

This production system is extensive; feed and water supply are obtained through either constant or partial herd mobility. A strong traditional built-in system or social laws maintain a sustainable resource management, and govern this system. The pastoral lands of Ethiopia are in the border regions and the ethnic groups are often trans-boundary. For example, Afar pastoralists are found in Eritrea, Ethiopia, and Djibouti; Somali pastoralists of eastern Ethiopia are also found in Djibouti, Somalia, and Kenya, and the Borana homeland is between Ethiopia and Kenya (Alemayehu, 2006).

Pastoralists maintain livestock under environmental conditions of risk and uncertainty using traditional strategies. Such strategies in Ethiopian nomadic and semi nomadic systems include:

- Maintenance of multi-species herds and supplementation of pastoral resources with agricultural by-products;
- Herd splitting into spatially appropriate units to minimize the effect of localized overgrazing and over-browsing, disease, and other environmental vagaries.
- Establishment and maintenance of social systems for sharing, borrowing, giving, and conservation of common resources. There are well-defined and extensive institutional frameworks for sharing resources and rehabilitation of members' herds after a time of crisis;• Maintenance of as large herds as possible to minimize the chance of losing all and maximize the chance of having some left over after hazards.
- Reduction of the number of household members during bad times, such as severe drought and disease outbreaks, by sending away all able-bodied people, not required in the system, to work in agro-pastoral and other agricultural areas.

Pastoralists experience strong seasonal fluctuations in feed availability and quality. An increasingly popular practice is the establishment of a special enclosure where standing hay is surrounded by thorn-bush fence to be used in the dry season for feeding immature stock and lactating cows. In addition to feed storage, this allows optimal plant growth and helps the pasture to flourish as it allows both seed setting and plant re-growth. During good rain years, feed is most available in the rainy season and then markedly declines in the dry season, and so haymaking is becoming common, especially by partially settled pastoralists. Crop residues are also used in areas where there is cultivation.

According to Mengistu (2006) pastoralists widely use the following grazing management rules: conservation of grazing area, moving animals during dry periods, demarcation of grazing lands and settlement areas, division of the herd into mobile grazing ('fora') and home-based grazing ('warra') groups, migration of family members, bush control (burning), and shifting cultivation.

6.4.2 Livestock Genetic Resources Diversity[34]

The genetic diversity in livestock is manifested in the population numbers, varieties of sub-populations and variability within populations of livestock. Genetic diversity is highly relevant in Ethiopia where specific adaptive attributes of indigenous animal genetic resources are vital, and where the production systems depend not on external inputs, but rather on the capacity of genetic resources to thrive under unfavorable environment, like the extremes of climate, disease challenge, and poor area of nutrition. The low-input and risk-averse production strategies of poor farming communities means that higher yields are obtained from a mixture of species, breeds, etc., each specifically adapted to the specific needs, rather than by using modern technology. Many of the existing breeds are, however, declining in number due to indiscriminate crossbreeding and gradual replacement by a few exotic and supposedly more productive breeds. Moreover, it is not only these genetic resources and the production systems that they support that are under threat but also the accompanying local knowledge, skills and culture of the communities.

[34]Most part of this section comes from EEA (2005). Literature cited in this part of the report also appeared in the same document.

In the broader sense, for many farming communities, diversity means security, be it social, cultural or economic. Farmers have managed and utilized genetic resources for as long as they have cultivated crops and raised livestock. Genetic diversity provides security for the farmers against pests, diseases and unexpected climatic conditions. It is particularly relevant to smallholder farmers for sustaining agricultural production in the highly variable environments. But the rising demand on natural and cultivated resources to feed and sustain human life has led to a serious depletion in the diversity of plant and animal life forms (agro-biodiversity) in both developed and developing countries.

Ethiopia has the largest number of indigenous cattle breeds/strains, and a substantial diversity in its sheep, goat, donkey, dromedary, horse and chicken populations in Africa. The existence of the large livestock diversity in Ethiopia is due in large part to its geographical location which is near the historical entry and intermingling point of many livestock populations from Asia as well as North Africa, its diverse topographic and climatic conditions, the huge livestock population size and the wide ranging in production systems. Specifically, the central highlands of Ethiopia are considered as the ‘melting pot’ of farm animal genetic resources, especially cattle of Africa and the center of diversity (Rege, 1999, cited by EEA, 2005). For example, it is believed that a large majority of cattle breeds in the Horn of Africa were derived from interbreeding between cattle domesticated in Africa (African *B. taurus* and *B. indicus)* brought into Africa from Asia about 700 A.D. This interbreeding occurred principally in present day Ethiopia. Although not much has been done to document the extent of diversity in these species, evidence emerging from comprehensive molecular genetic diversity studies of indigenous cattle (Hanotte et al., 2002) and goats (Tesfaye, 2004) in the country indicate that many indigenous breeds are under threat.

However, livestock diversity in Ethiopia has suffered considerably due to the cyclical famines, numerous wars and civil strives. Growing transhumance and migrations in the lower altitude areas have resulted in massive interbreeding between traditionally isolated livestock populations. In the highlands, government sponsored crossbreeding programs have severely compromised the sustenance of genetic diversity in indigenous livestock, especially cattle (Ababu, 2002), goats (Workneh et al., 2003), sheep (Kassahun, 2001) and poultry (Tadelle, 2003). Yet not much has been done to document the existing indigenous livestock breeds and the impacts of agricultural development, increasing human populations and the booms and bursts in livestock population numbers associated with periodic good years and bad (drought) years mainly in the lowlands. The national effort in Ethiopia towards systematic characterization and documentation of livestock biodiversity has been negligible, let alone planned interventions to curb the continuing threat of loss of genetic diversity.

6.4.3 Cattle Genetic Resources

As documented in published and grey literature, there are a total of 23 recognized indigenous cattle breed types in Ethiopia, that fall into 5 distinct breed groups (DAGRIS, 2004). Nearly half of these are in the group of Small East African Zebu, found widely distributed throughout the country, both in the high and lowland areas. Three other breeds (the Ethiopian Boran, Murle and Arsi) are classified in the group of Large East African Zebu. The Sanga group of cattle comprises the Danakil and Raya Azebo from northern and north-eastern Ethiopia and Anuak and AliabDinka in the far south-west lowlands of the country. Three other breeds (Horro, Fogera and Arado) from central highlands are classified under the group of Zenga (sanga-zebu interbreeds). There is only one a representative of the Humpless Shorthorn group of cattle in Ethiopia – the Sheko - in the mid-altitude south-west of the country.

Only six of the 23 breed types have a fair description of their physical appearance, indications of their levels of production, reproduction and genetic attributes. These breeds have been the subject of recent research and development interventions from research, academic and extension institutions in the country. For the rest, there is either little information in any of these categories of characterization information, or nothing is known about them. A well-established fact is that the Sheko breed is known to be engendered of extinction due to neglect and interbreeding with neighboring cattle breed types, although it is widely believed to have economically important trypanotolerant and good dairy attributes for use in the trypanosomosis-endemic southwest of the country (Takele, 2005). The Fogera is also declining and under heavy pressure (Zewdu, 2004).

Only seven of the recognized breed types have at least one estimate of their population sizes, and even these are either outdated or based on crude assessments. Close investigation of cattle genetic resources reveals that the indigenous breed populations are indeed on the decline under pressure from market-induced migration, restocking following heavy drought spells, well-intended but poorly managed crossbreeding programs and neglect (Ababu, 2002; Zewdu, 2004; Dereje, 2005; IBC, 2004; Takele, 2005).

Out of these, the Ethiopian Boran, Ogaden zebu, Jigjiga zebu, the Hammer and Horro are known for good performance in beef production, and the first three are preferred for the export market. On the other hand, the Fogera and the Ethiopian Boran have proven ability as better milk producers. The latter plus the Arsi and Horro have been used in most of the crossbreeding programs for dairy improvement. In addition, the Sheko is known to have good trypano tolerance and milk production capacity in the warm and humid environments. The Anuak and to some extent the Horro are believed to have some level of trypano tolerance. The Sheko and Anuak therefore are promising breeds to promote in the large trypanosomosis-endemic areas of southwestern and western Ethiopia. Very little comparative production data are available on the other breeds.

Despite this genetic diversity, Ethiopia does not benefit from it. Policy decisions need to be taken to take lead responsibility for genetic improvement and conservation of the respective breeds. The current status of previous ranches established, among others, for breeding programs is not known. Studies (e.g. Ababu, 2002), however, showed that the large-scale crossbreeding involving exotic breeds at ranches (that aim crossing the indigenous breeds with exotic breeds like Holstein-Friesian and Jersey) did not result in sustainable outcomes. Any future programs, however, should base on clearly stated deliverable outcomes to serve the needs of dominant cattle production systems.

6.4.4 Sheep Genetic Resources

There are six recognized indigenous sheep breed types in the country. These fall into three breed groups: the fat-tailed hair sheep (3 breeds), the fat-tailed coarse wool sheep (2 breeds) and the fat-rumped hair sheep (1 breed) (DAGRIS, 2004). None of these recognized breed types have population estimates, and their status as breeds is not known. A good deal of trait-level (physical, production, reproduction, genetic) characterization information is available in the published literature on the Horro, Menz and Blackhead Somali sheep mainly because of the research interest on these sheep by the previous Institute of Agricultural Research (IAR), ILCA, ILRI and the previous Alemaya College of Agriculture. In addition to these, there are at least three important sheep populations that are not yet recognized as breeds at the national level. These are the Washera of West Gojjam (Adet, Quarit and Jiga area), the Bonga of south-western Ethiopia (Bonga area) and the Abergelle sheep of south-western Tigray, in the Tekeze valley. These appear to have good potentials for mutton from their different natural habitats.

The indigenous sheep of Ethiopia are fat-tailed coarse hair type, with the exception of the fat- rumped hair type sheep that inhabit most of the eastern, southeastern and southern rangelands of the country. Unlike others, the Afar sheep manifests a tail attribute intermediate between the true fat-tailed and fat-rumped types of sheep, which may be the result of interbreeding between the two populations. The export trade mostly used the Blackhead Ogaden and Afar sheep. But recently some highland sheep were exported from Wollo and Bonga. The Washera and Abergelle sheep are also promising.

Though the study does not have data on the current status, most previous sheep breeding ranches set up for research purposes at Bako, Sheno, Amed Guya and Melka Werer areas, did not produce sustainable outcomes. EEA (2005) indicates that none of these had functional linkages with traditional sheep flocks of at least the surrounding farmers. Any future government intervention and policy decisions in this respect needs to draw adequate lessons from past experience, and should be launched with clearly stated deliverable outcomes. Priority should also need to be given to serve the needs of dominant sheep production systems.

6.4.5 Goat Genetic Resources

There are a total of 11 recognized indigenous goat breed types in Ethiopia under the group Short-eared Small-Horned and another one in the Lop-eared group. Because of the unprecedented nation-wide comprehensive survey of indigenous goat breed types in Ethiopia (and Eritrea) implemented in collaboration between FARM-Africa (a UK based NGO), Alemaya University and ILRI, much more balanced phenotypic characterization information has been documented on the 12 recognized breed types (FARM-Africa, 1996), than is the case for cattle or sheep. However, little is known of other categories of trait-level information, particularly on genetic parameters. This survey has also come up with crude estimates of the breed populations, based on available breed distribution information and district-level goat population data. Despite the large population sizes, the breed status of all these breed types is critical mainly because of neglect and extensive interbreeding between adjacent breed populations as human populations, migrate for resettlement, move for marketing and struggle to restock their goat holdings after heavy drought-related goat losses (Workneh et al., 2004).

Almost all indigenous goat types in Ethiopia fall under the general group of Short-eared Small-horned goats found throughout eastern, central and southern Africa. They inhabit all agro-climatic zones and production systems in these areas. There is only one breed (the Barka) from another breed group, and it comes mainly from Eritrea.

Traditional suppliers of export goats have been the Short- and Long-eared Somali and the Afar areas as well as the Hararghe highland. Recently, the Woyto-Guji and Central Highlands were also included. As will be discussed in Chapter 4 of this report, goats have become the focus of live animal and meat export in recent years, and new export-standard private abattoirs are purchasing these goats from their home areas. The Barka, Hararghe Highland, Long-eared Somali and Arsi-Bale are particularly good for milk production.

6.4.6 Other Animal Genetic Resources

The major livestock species that merit similar treatment here are chicken, horses, donkeys and camels, none of which has ever been surveyed or documented at the national level. Some comprehensive characterization information has recently been generated on indigenous chicken (Tadelle, 2003). This particular study surveyed the chicken resources by dividing the country into five major agro-ecological zones and ten market-sheds and identified five distinct indigenous chicken ecotypes: Tilili, Horro, Chefe, Jarso and Tepi. These ecotypes were then characterised in terms of physical, production, reproduction and molecular genetic attributes. More exploratory on-farm studies have been undertaken on camel than on the equines, and these mainly came from graduate studies and research programs of Alemaya University. The current level of research interest on equines is very low (Mengistu, 2004). Unpublished reports (IBC, 2004) mention four indigenous breed types of donkey: the Jimma, Abyssinian, Ogaden and Sinnar; the phenotypic and genetic identify of these is yet to be established. Two breed-types of horses are known in this country: the Oromo and the Dongola. There is no documented breed specific characterisation information on camels; however, unpublished reports (IBC, 2004) refer to four distinct breed-types of camels: the Afar, Borana, Anfi and Somali (Ogaden).

6.4.7 Livestock Feeding Systems

Due to high population density and expanded cultivation, grazing areas for livestock production are reduced to lands unsuitable for cropping, or fallows, waterlogged land and steep slopes. The feed situation in this system is precarious and a challenge to the development of both the resource itself and food grain production. Livestock mainly feed on natural pasture, weeds of arable land, fallows and crop residues left after harvest. Bottomlands are set aside for hay to be used for severe dry periods. In the highlands farmers' fence small areas of pasture, which are grazed by oxen at the time of ploughing and used to feed young calves. Most stock graze on hilltops, swamps, forest margins, roadsides and stony or unfertile lands.

Fallows and crop residues are grazed in the morning and evenings as cattle are taken to and from daytime grazing areas. Small calves, which cannot go to distant areas, graze fallows and crop residues. Cut and carry feeding and dry season feed supplemented with crop residues and agro-industrial products are common in the mid and high altitude mixed farming systems.

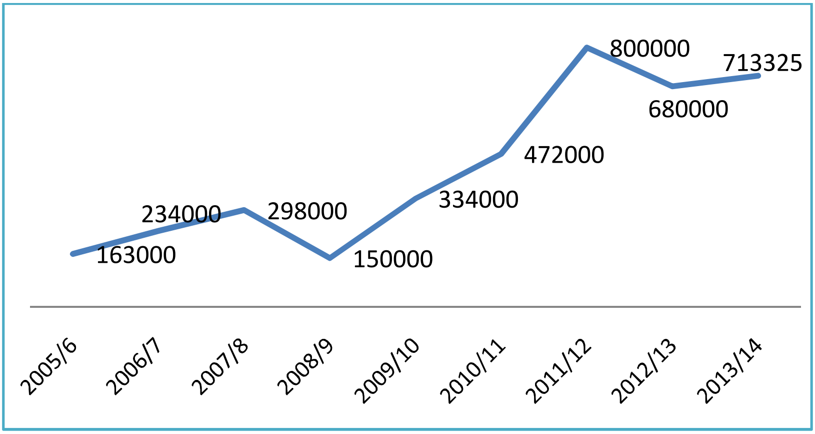
In high potential areas dairy farmers grow improved pasture and forages, mainly fed on cut and carry, and hay. Dairy associations have started silage making for their milk cows. Farmers involved in small-scale fattening do cut and carry and hay (from natural pasture and crop residues) feeding. Residues of local grain by-product and beverages are mixed with salt and given to milking cows, plough oxen and fattening animals. In the lowlands (pastoral areas) livestock graze and browse.

6.4.8 Livestock Exports

Production from cattle has been estimated to be 620,000 tons of meat; 244,000 tons of milk; 24,000,000 tons of manure; and 2,400,000 hides annually (FAO estimates). Ethiopia exports a significant amount of livestock and livestock products mainly to Middle East countries. Ethiopia's exports consist of live cattle, sheep, goats and camels, as well as chilled goat meat and mutton, which are mainly sourced from pastoral areas (Aklilu and Catley, 2014). As shown in Figures 6.8 and 6.9, over the past decade the export of live animals and chilled meat grew by over 400% and 200%, respectively.

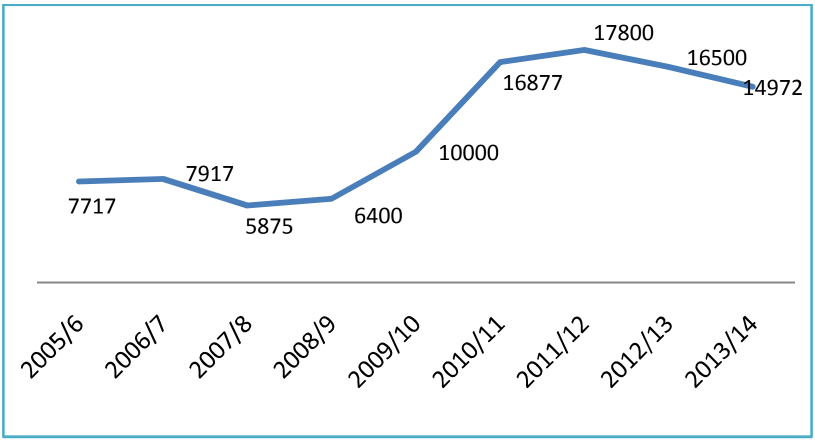
All these figures indicate the importance of the pastoral system to the national economy, alongside its role as the main livelihood source to the many communities who depend on it, and its contribution to the local economy of surrounding areas.

Figure 6.8: Number of Livestock Exported over the Past Decade



Source: computed based on (Aklilu and Catley, 2014).

Figure 6.9: Amount of Meat Exported over the Past Decade (in tons)



Source: computed based on (Aklilu and Catley, 2014).

6.4.9 Challenges in Livestock Development[35]

It has been long recognized that the limitations to livestock development (increasing production and productivity) in Ethiopia are multidimensional. Constraints can be grouped into, namely socio-economic and technical limitations. Socio-economic constraints encompass policy, land tenure, institutional, marketing and budgetary issues. Major technical constraints include health, feed and genetics. The following are the most important limitations and problems for livestock in general and ruminant livestock development in particular (Alemayehu, 2006),

Socioeconomic Challenges: The following are the major socio economic related challenges:

- **Policy related issues**: Livestock is an integral part of the national resource. There is need for an environment policy for natural resources to be used in ways which allow sustained production in the long term. Livestock and natural resources management are influenced by many aspects of government policy, ranging from economic and social to political issues. Though the recent established Ministry of Livestock and Fishery can be expected to address some of the policy and other technical problems listed below, the major policy issues that are relevant to ruminant livestock production include absence of livestock policy, pricing policy, community organization and participation as well as land tenure that supports for the emergence and expansion of private livestock farming.

[35] Most of this section is drawn from a paper by Alemayehu (2006).

- **Infrastructure:** Despite the recent improvements in rural infrastructures especially road infrastructure across most part of the country, marketing of live animals and meat is still constrained by inadequate infrastructure and transport facilities. When stock are trekked, the absence of stock routes, resting areas, watering and feed points result in substantial weight losses before they reach destination or market areas. Also, inadequate input distribution systems and credit facilities contribute to the poor performance of the livestock sector. Lack of educational infrastructure for training and extension is another important issue that needs to be addressed.
- **Services:** As important as the infrastructure is agricultural services. Inadequate services and livestock technology packages emanating from the weak link between extension and research, absence of beneficiary participatory planning and agricultural training to the changing needs of the country are some of the major institutional constraints.
- **Finance**: Inadequate recurrent expenditure in government services for the livestock production sector as well as lack of private sector credit and finance for producers are among the major constraints.
- **Marketing**: Marketing of livestock is not determined on the basis of the weight and quality of animals, but by direct tiresome bargaining between buyers and sellers. Due to these unfavorable marketing systems and the discouraging price, for producers are not encouraged to improve the quality and the off-take of their animals.

Technical Limitations: Ethiopia's livestock productivity is below the African average. Total herd off-take is estimated at 7 percent annually for beef and at 33-36 percent for sheep and goats, with corresponding carcass weight of 100-110 kilos and 8-10 kilos, respectively. Cows do not reach maturity until 4 years of age, calves every second year, and produce only 1.5 to 2 liters of milk daily over a 150 to 180 lactation days. As a result per capita consumption of meat and milk is low. Poor health, feed shortage and low genetic potential are the main constraints to increased livestock productivity in the country (ILCA, 1991 and MoA- NLDP, 1998; cited by Alemayehu 2006).

- **Pests and Diseases:** Animal disease is a major constraint limiting the production of indigenous stock, by restricting the introduction of more productive animals, new technology and constraining the country from entering the high priced export market. There are epidemics of infectious diseases with high rates of mortality, which could be controlled by vaccination; there are also parasitic, and vector born diseases. Thus, livestock diseases on their own and interacting with nutritional and productivity problems cause high mortality, morbidity and restrict production in potentially productive areas.
- **Feed quantity and quality:** Available grazing is on the decline, in part due to the need to feed the increasing human population by continuous cereal growing. Feed shortages and nutrient deficiencies become more acute in the dry season in both the highlands and lowlands. Studies have indicated that there is a deficit of about 12,300,000 tons of dry matter in Ethiopia. For various reasons, crop residues and agro-industrial by-products are not adequately utilized. Cultivation of forage is not widely adopted and commercial feed production is not developed.

- **Livestock Breeds:** The genotype of Ethiopian livestock has evolved largely through natural selection influenced by environmental factors. This has made the stock better able to withstand feed and water shortages, disease challenges and harsh climates, but the capacity for high levels of production has remained limited. The non-market oriented subsistence animal production is incompatible with the farming system of most agro-ecological zones. Crossbreeding and breed substitutions have been done for a more rapid increase in milk production in high potential areas. However, their applicability in the low potential areas, where the ability to survive is the major concern, needs more detailed studies. There are some important indigenous breeds of livestock with a remarkable feature; the lowland breed of cattle (e.g. Boran) and Sheep (e.g. Somali black headed) are often regarded as superior in terms of size, durability, and productivity and/or consumer preferences. However, there are few detailed studies on these and other indigenous breeds.
- **Recurrent Drought and War**: recurrent drought and the previous prolonged civil war hampered programs and projects. The recurrent droughts including the El Nino related drought of the 2015 production year greatly affected the livestock population and livelihood of livestock dependent population especially in the pastoral areas where the impact is more severe and drastic.

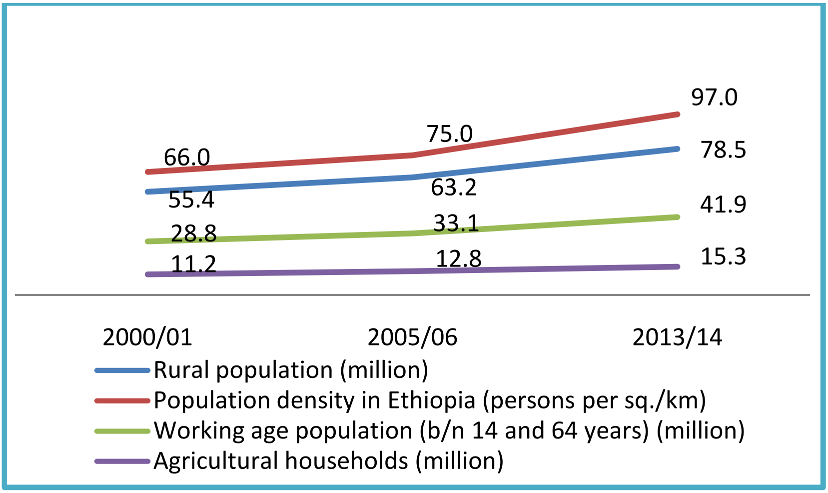
6.5 Labour Force Resource and Agricultural Employment

Of the total population (which is estimated at about 100 million), about 83% is estimated to live in rural areas. Another important feature of the Ethiopia population is that most (more than 60 percent) is under 25 years old and 70 percent under 30 (EEA, 2015). Ethiopia's population is projected to grow to 160 million by 2050 (Josephson et al., 2014).

The distribution of Ethiopia's population is related to altitude, climate, and soil. These three physical factors explain the concentration of population in the highlands, which are endowed with moderate temperatures, rich soil, and adequate rainfall. About 14 percent of the population lives in areas above 2,400 meters (cool climatic zone), about 75 percent between 1,500 and 2,400 meters (temperate zone), and only 11 percent below 1,500 meters (hot climatic zone), although the hot zone encompasses more than half of Ethiopia's territory[36]. In general, localities with elevations above 3,000 meters and below 1,500 meters are sparsely populated, the first because of cold temperatures and rugged terrain, which limit agricultural activity, and the second because of high temperatures and low rainfall, except in the west and southwest (Thomas and Berry, 1991).

[36]The low land which makes up 61% to 65% of the land mass only supports about 11% of the population; on the other hand, close to 89% of the population lives in mid- and highland areas which occupies 35% to 39% of the land mass of the country.

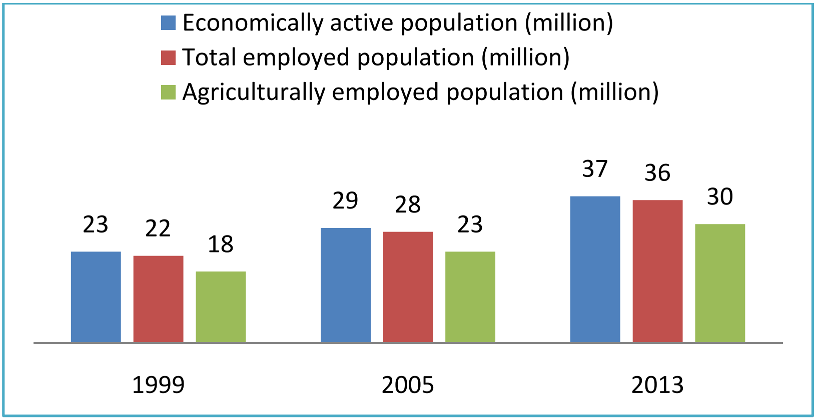
Figure 6.10: Trends in Agricultural Population over the past few years



Source: CSA, 2014c (2005& 2013 data), and CSA, 1999 (quoted in Shumiye Abuhaye, 2003)

In addition to the skewed distribution of population and natural resources, the high growth of population is a critical challenge facing Ethiopia. The rural population accounted for 82% (or 78.5 million) of the total. (2013/14). As shown in Figure 6.10 above, over the past thirteen years, the rural population increased annually by 1.8 million persons. In other words, the rural population added about 23.1 million persons between 2000/01 and 2013/14. Similarly, rural working age population (i.e. persons between 14 and 64 years old) grew by 13.1 million during the same period. All this pushes up the population density (the number of persons living per square kilometer) significantly. Between 2000/01 and 2013/14, population density grew by 47% or 31 persons per square kilometer and reached 97persons/km^2.

Figure 6.11: Trends in Rural and Agricultural Employment over the past decades



Source: CSA, 2014c (2005 & 2013 data), and CSA, 1999 (quoted in Shumiye Abuhaye, 2003)

Over the past fifteen years the number of economically active population in rural areas grew from 23.3 million in 1999 to 36.7 million in 2013[37], which indicates an average annual growth rate of 3.9% per annum. The implication of this rapid growth on rural labour in agricultural employment, however, was moderate. While the number of economically active population increased by a little over 950,000 every year, the number of total employed persons was reported to increase slightly by close a million (per annum) during these periods. This is, however, not surprising as the rural unemployment rate was reported to decline from 5.1% to 2.6% between 1999 and 2005 and then to 2.0% between 2005 and 2013,

[37]All persons aged 10 years and above who were productively engaged or available to be engaged are considered (in Ethiopia) as economically active population.

as reported in CSA's three national labor surveys in 1999, 2005 and 2013 (CSA, 2014c)[38].

Table 6.6: Employment Status of Rural Population over the Past Three Decades

Employment type/status		Economically active population (million) in the years		
		1999	2005	2013
Rural population (million)		55.4	63.2	78.5
Economically active population (million)		23.3	28.7	36.7
Total employed population (millions)		22.2	28.0	36.0
Unemployment rate (% of economically active population)		5.1%	2.6%	2.0%
Number employed in Agriculture	Number (million)	17.7	22.5	30.0
	Percent	79.6%	80.2%	83.2%
***Status on employment in rural Ethiopia** (percent of employed persons)*				
Employer		0.8%	0.6%	0.4%
Self employed		43.7%	41.0%	40.3%
Employee, paid worker		4.3%	3.6%	3.9%
Unpaid family worker		51.0%	54.6%	55.0%
Others		0.2%	0.2%	0.4%

Source: CSA, 2014c (2005 & 2013 data), and CSA, 1999 (quoted in Shumiye Abuhaye, 2003)

The majority of economically active people in rural areas make unpaid family labour (see Table 6.5). Compared to any form of

[38]Unemployment rate is used to describe the proportion of unemployed population from the total labor force or the total number of economically active population. The measurement of unemployment was done based on the following three criteria that must be satisfied simultaneously: "without work", "currently available for work" 'and "seeking work" (ILO, 1983, quoted by CSA, 2014c).

employment, the share of unpaid family labor has also increased over the past decades, indicating the difficulty of getting employment outside own family farms. The share of unpaid-family work increased from about 51% to 55% in 2013. The second most form of employment is self-employment, though its percentage share declined from 59% in 1984 to 40% in 2013 while the share of unpaid family workers increased by 32% during the same period[39]. On the contrary, the share of paid workers as well as employers declined over the past decades. All these indicates the weakening trend of agriculture (as the single most important employer in rural areas) to provide employment, among others, due to the declining trend of farm sizes and increasing population pressure.

6.6 Challenge of Population Pressure, Agricultural Intensification and Productivity[40]

Ethiopia is still relatively land abundant in purely agro ecological terms, largely because of the under-populated, high-rainfall western lowlands, as well as some substantial irrigation potential in otherwise arid lowland areas. However, from an economic rather than an agro ecological perspective, whether the lowlands offer significant opportunities for the expansion of smallholder farming is quite unclear (Heady et al., 2014) –from technological, political as well as socio-cultural perspectives.

[39]For statistics on 1984, please see EEA (2005).
[40]This part of the report extensively utilizes facts and findings from an important study on the influence of population density on agricultural intensification and productivity: Josephson A. L., Ricker-Gilbert J., and Florax R. J. (2014). How does population density influence agricultural intensification and productivity? Evidence from Ethiopia. Science Direct Food Policy journal 48 (2014) 142–152.4 Elsevier Ltd.

The challenge of population growth and high population density is exceptionally high and largely a phenomenon of highland areas where over 85% of the total population resides in an area that just make up under half of Ethiopia's land area. As indicated earlier, population density in rural highland areas grew by close to 50 percent between 2001 and 2014, and reached at 97 persons/km^2 in 2014. This has greatly affected smallholders' access to farmlands in rural areas. A number of studies (e.g. Heady et al., 2014) indicate the impact of this high population growth but its effect on migration as low. They show that farm sizes in Ethiopia are very small by international standards, at 0.96 ha per holding, and correlate closely with population density. Nationally, the average farm sizes declined from an estimated 1.4 ha per holding in the 1977 agricultural census to around 1.0 ha in the 2001/2002 census (Heady et al., 2014)[41].

A study by Josephson et al., (2014) also generates evidence that Ethiopia's already small farm sizes have been declining quite rapidly and that young farmers cultivate substantially less land than previous generations did. After netting out the effect of confounding factors[42], the difference in farm sizes is significant. Farmers below the age of 38 have farm sizes that are almost 0.2 ha smaller than

[41]Using data from the annual CSA's Agricultural Sample Survey data, the same study indicates that this trend has been reversed in recent years. Since the 2001/2002 the average farm size has shown a slight increase in average farm holdings. But this is still very low both from international perspectives and economic significance of the actual farmland.

[42]The study considered both community variables (EA farm size, agro ecological potential, market access) and household variables (wealth, education, and family size) as confounding factors. They first regressed household cultivated area against these variables, and then the residuals (i.e. the residuals of average farm size per holder) as an indicator of farm sizes net of confounding factors.

farmers aged 50 years and about 0.3 hectare smaller than those aged 60 years (Heady et al., 2014; Josephson et al., (2014).

In light of the continued rural population growth the implication of such research findings is somewhat worrisome. The value of land-based rural livelihoods has increasingly been eroded. Traditionally, land is the primary means for generating livelihood (for rural youths) as well as the main vehicle to invest and accumulate wealth. It is also transferred between generations. But this has been eroded gradually and consistently because of high population pressure, and the failure of the Ethiopian economy to absorb excess rural labor and/or policy related factors that discouraged migration from rural areas[43].

The effect of the growing population pressure is, however, not limited to the size of average farms, but also to other nationally important policy goals such as agricultural intensification, productivity and food security; and by implication to the country's effort to transform its agriculture.

This report highlights this issue to remind policy makers that unless the country designs policies and long-term strategies that can address short-term and long-term problems associated with high population pressure, the effort to transform the agricultural sector sustainably will be seriously compromised.

The overall picture that emerges from Josephson et al. (2014) study shows that high rural population density creates a situation where farmers are unable to sustainably intensify staple crop production.

[43] There are long-standing perceptions that government regulations, the Productive Safety Net Program (PSNP) and land tenure institutions indirectly discourage rural–urban migration (Heady et al., 2014).

Moreover, farm size was found to correlate positively with net farm income, suggesting land shortages as an important source of poverty in predominantly agrarian based society like Ethiopia. In general, given the constraints to expand farm sizes (in highland areas), the situation could exacerbate rural poverty (and diminish agriculture's potential to transform itself and the national economy) unless measures are taken to improve agricultural labour productivity and expand alternative non-farm employments both in rural towns as well as urban areas.

Hence, absorption of a large rural labour force into productive employment remains the major challenge of Ethiopian smallholder agriculture. Existing policies should be reviewed in terms of their outcomes in providing incentives for migration (to less populated areas) as well as alternative non-farm based employment.

In summary, although Ethiopia is endowed with abundant agricultural resources and sufficient amounts of rainfall and is characterized by diverse physical features the performance of the agricultural sector has been so far disappointing. Ethiopia has also an estimated area of 112million hectares, of which 65 percent is suitable for some form of agriculture and possesses one of the largest and most diverse genetic resources in the world. The flora of Ethiopia is very heterogeneous and has rich endemic elements which make it suitable for apiculture development. Ethiopia has rich soil and diversified climatic regions suitable for the production of over 146 types of food crops. Despite the country's high potential, the production from this sector could not commensurate with the size and growth of the population. Hence, the main path to alleviate poverty, attain food security, and bring about transformation of the entire economy lies in the transformation of the agricultural sector.

Chapter VII

Agricultural Policies, Strategies and Institutions in Ethiopia

7.1 Agricultural Policies and Strategies

Agriculture, as is the case in much of the developing world, is still the largest sector in the Ethiopian economy contributing about 40% percent to the GDP and providing employment to most of the 85 percent of the country's population that reside in rural areas. It also generates more than 80 percent of the export earnings. It is well known that as an economy grows agriculture accounts for a decreasing share of both GDP and employment. The fact that agriculture comprises close to half of the GDP suggests that agriculture's direct impact on economic growth is substantial. In the long run, however, agriculture's indirect contributions to economic growth through its catalytic effect on non-agricultural growth may be of even greater importance (Block, 1999, see Samuel, 2003). Thus, the case for agriculture as the main focus of economic growth must rely on identifying a set of intersectoral linkages through which agricultural growth contributes to the growth of non-farm sectors. The nature of the relationship agriculture has with the environment is also affected by its ability to reduce rural poverty and provide farmers' decent living conditions which are essential for sustainability environment and surplus generation for the development of the national economy.

The importance of sound agricultural policy has been recognized in helping agriculture to achieve such policy objectives, though there has been disagreements on what good policy (for a given country) is or what makes up a good policy. A book by Norton (2004) on agricultural policies and strategies also indicates that successful strategies and policies for agricultural growth and poverty alleviation must arise out of each country's own context, though this has been easy to implement in the present-day globalized world. In spite of globalization, conditionality of international agencies, the exigencies of world trade agreements, and the role of transnational corporations, considerable space for creative policies exists in each country. Examples from elsewhere can stimulate the policy process and suggest new avenues of thinking, but in the end the solutions have to be tailored to each country's circumstances (Norton, 2004).

7.1.1 What is Agricultural Policy, Strategy?

Agricultural policy describes a set of laws relating to domestic agriculture and imports of foreign agricultural products. Governments usually implement agricultural policies with the goal of achieving a specific outcome in the domestic agricultural product markets. Outcomes can involve, for example, a guaranteed supply level, price stability, product quality, product selection, land use or employment[44].

[44]This definition on agricultural policy is obtained from Wikipedia (https://en.wikipedia.org/wiki/Agricultural_policy)

Policy reforms are often made individually, addressing a single issue at a time. However, because each issue has implications in other areas, reforms are sometimes more effective if they are designed and implemented jointly as part of an integral package, or strategy, for the sector. A *strategy* constitutes both a vision of what the sector should look like in the future and a 'road map' showing how to fulfil this vision. Its point of departure is the current situation of the sector and the issues that it faces.

The development of an agricultural strategy may be motivated by a number of factors related to existing *strengths and opportunities*. It also needs to clearly identify the constraints to be overcome in order to realize the opportunities. A strategy that does not offer a vision of a better future, backed up by concrete policies for realizing such a vision, cannot motivate the rural population to participate in its implementation. At the same time, the more realistic it is, and the better its analytic underpinnings, then the greater the chances of attaining its objectives. Whatever the motive for developing a strategy, it usually needs the support of the principal actors in the sector, i.e. the farmers, if it is to be successful.

In view of such theoretical understanding of policies and strategies, the following section briefly reviews Ethiopia's agricultural policies and strategies. It will also examine the policy setting within which Ethiopia's agricultural sector and the externalities it generates have evolved over the past few decades. It is, however, important to underline the fact that the two (policy and strategy) as well as their intended outcomes are sometimes mixed-up and poorly differentiated especially in recent policy documents.

7.1.1.1 Agricultural policies and strategies in the 1990s[45]

After the change of government in 1991, Ethiopia launched a new Economic Reform Program (ERP) in 1992 to address Ethiopia's structural and other economic problems created during the 17-year (1974-1991) socialist command economic policy. Subsequently, the government declared around mid-1994 that its major development strategy was Agriculture Development Led Industrialization (ADLI). The adoption of the ADLI can be considered as a central plank of the EPRDF government's development program until recent years (Diao, 2010). ADLI focuses on productivity growth on small farms as well as labour-intensive industrialization. The strategy viewed agriculture as the engine of growth, on account of its high share in GDP, employment and export as well as its potential superior growth linkages, surplus generation, market creation for products of domestic industries, and provision of raw materials and foreign exchange (Gebreselassie, 2003).

Consistent with ADLI, in the mid-1990s, public investment in agricultural extension increased and an extensive extension program called the Participatory Demonstration and Training Extension System (PADETES) was implemented. Through this system, the government delivered off-the-shelf packages of fertilizer, improved seed and credit, as well as information on input use and better agricultural practices to a vast majority of smallholders in the

[45]Unless otherwise cited, most of the discussion in this section is based on 'Diao X. (2010). Economic Importance of Agriculture for Sustainable Development and Poverty Reduction: The Case Study of Ethiopia. Global Forum on Agriculture 29-30, OECD Headquarters, Paris.

rural areas[46]. Despite strong-handed promotion of the credit-fertilizer packages, agricultural output, however, continued to fall behind population growth during this period (Diao, 2010).

7.1.1.2 Agricultural policies and strategies in the 2000s

Acknowledging the limited success of PADETES, the government revisited the program and formulated an integrated rural and agriculture development strategy in 2002. The new development strategy, which is officially known as 'Sustainable Development and Poverty Reduction Program (SDPRP) broadened its policy objectives as poverty reduction became the principal goal (MoFED 2002, cited by Diao, 2010). In line with this program, the government introduced a range of institutional reforms that include fiscal decentralization, judicial and civil service reform, and public sector capacity building. After the continuing evidence of widespread food insecurity in the drought of 2002/03, the government also initiated a strong focus on safety nets, programs to build the assets of food insecure households, resettlement, and soil and water conservation (especially water harvesting).

In 2005/6 the government drafted and implemented its second poverty reduction strategy, titled 'Plan for Accelerated and

[46]The promotion of the credit-fertilizer package was accompanied by a further liberalization of the fertilizer market. By 1997, fertilizer subsidies were completely removed and retail prices were fully liberalized, which also resulted in higher fertilizer prices; but government agencies tried to provide credits for fertilizer purchase and minimize transaction costs through confining fertilizer distribution mechanisms through public agencies and farmers' cooperatives.

Sustained Development to End Poverty (PASDEP). Once again agriculture received policy attention but the content and the focus changed. The agricultural growth agenda set by PASDEP consisted of the following elements: shift to higher-valued crops; promoting a niche high-value export crops; a focus on selected high-potential areas; facilitating the commercialization of agriculture; support the development of large-scale commercial agriculture where it is feasible; and better integration of farmers with markets – both locally and globally (MoFED 2005).

The instruments to achieve these in the context of PASDEP include (i) constructing farm-to-market roads, (ii) development of agricultural credit markets, (iii) specialized extension services for differentiated agricultural zones and types of commercial agriculture, (iv) the development of national business plans and tailored packages for specialized export crops (such as spices, cut flowers, fruits and vegetables), (v) expansion of irrigated lands through multi-purpose dams, (vi) measures to improve land tenure security, and to make land available where feasible for large-scale commercial farming[47], and (vii) reforms to improve the availability of fertilizer and seeds.

Though the strategies were comprehensive, there were critical concerns relating to programs implementation and sustainability. In terms of implementation, the two major concerns were the extent to which priorities were set on the basis of decent diagnostics, and

[47]This policy focus on large scale commercial farms was implemented in sparsely populated low lands and regions where 'unutilized' or underutilized land is available.

the feasibility of some of the ambitious targets in light of resource and institutional demands as well as the incentives structures required for their implementation (Diao, 2010).

On the other hand the livestock sector particularly the one in mixed-farming area was also reported as a specific area that was either neglected or poorly incorporated within the economic policy sphere of this period (Ibid).

7.1.1.3 Agricultural policies and strategies since 2010

The year 2015 marked the beginning of the second phase of the Growth and Transformation Plan (GTP) of Ethiopia with due emphasis given to the manufacturing industry. The year 2015 also observed another reminder of the century long prime challenge of the Ethiopian agriculture - drought, food insecurity and threat to famine – which are still lingering. Thus, the role of agriculture in Ethiopian gets renewed attention not only for the transformation of the economy but also in terms of its crucial role in national food security and food self-sufficiency. The GTPs (both the GTP I and GTP II) intend to achieve both of these development goals.

The GTP I, which was intended to be implemented between 2010 and 2015 put special emphasis on agricultural development. It promised rapid agricultural growth as well as to shift agriculture to a high growth path in order to meet the food security needs of the country, curb inflationary pressures on agricultural products, and broaden the export base of the country. The sector was expected to serve as the spring board for structural transformation by adequately supplying the inputs necessary for industrial growth (MoFED, 2010/11).

GTP I focused on intensification of smallholder agriculture. It intended to scale up the best practices in order to raise the productivity of the average farmers closer to that of the best farmers (who are reported to produce two to three times of the average producers). The plan focused on accelerating growth in production of traditional crops. During this period grain production was reported to grow by 33% to reach 27 million metric tons (CSA reports) which had to be done by promoting the adoption of improved technologies by smallholder farmers, and by increasing investment in rural infrastructure, particularly for irrigation and improved watershed management. It further emphasized the need to ensure food security across all sections of Ethiopian society (ATA, 2016).

The GTP promised to promote the commercialization of smallholder farming and to make it the major source of agricultural growth. It also promised attractive support for private investments in large commercial farms, especially in lowland areas. Regarding pastoralists, the GTP gave priority to water and infrastructure development, Resettlement of pastoralists on a voluntary basis was considered in the GTP, in particular, in areas suitable for irrigation

Following the conclusion of GTP I in 2015[48], the government drafted and launched the second version of the GTP (GTP II which is intended to be implemented between 2016 and 2020. While accelerated growth in agricultural productivity continues to be an important area of focus in GTP II, the plan intends a gradual shift in

[48] Regarding the performance of GTP I, readers could refer to EEA's 2015 report on the performance of the Ethiopian economy.

emphasis towards high value crops and livestock production. This is reported to be complemented by the establishment of a market system that benefits farmers and non-farm rural actors. Similarly, natural resources development also continues to be an important area of emphasis.

GTP II is also committed in promoting sustainable farming practices and conservation of indigenous biodiversity resources as well as livelihood diversification into natural resources-based activities (forestry, rehabilitation of lands, water resources, etc.). A third area of emphasis is food security that continues to be challenging to the Ethiopian economy.

Finally, specific focus is given to build institutional capacity for implementing and monitoring agricultural development through new kind of structures like the Agricultural Transformation Agency/ATA which is discussed further below. An underlying principle of the GTP II for agricultural development is maintaining environmental sustainability, promoting climate change adaptation and mitigation and making growth broad based and inclusive, with a particular focus on engaging women, youth and poor households.

7.2 Review of Specific Agricultural Policies and Institutions

7.2.1 Agricultural Land: Policy and Institutions

Rural land is a public property in Ethiopia. It has been administered by the government since the 1975 radical land reform. The change of the government in 1991 did not bring much in the land tenure system. Land continued to be "public property" where land users are entitled to usufruct right but land marketing and permanent land transfers (except through inheritance) are prohibited. These rules were further consolidated in 1995 when they were incorporated in the constitution (supreme law of the land).

Ethiopia's national land policy has been further clarified by Proclamation No. 89/1997, "Rural Land Administration." This law defines the scope of individual land use rights and states that such rights can be leased and bequeathed. The land rights themselves cannot be sold or exchanged, but private property improvements to the land can be sold or exchanged. The Rural Land Administration Proclamation of 1997 delegates responsibility for land administration to regional governments—including the assignment of holding rights and the distribution of landholdings. It also provides important general guidelines that regional governments must follow in crafting regional laws. In order to protect their rights, the proclamation declares that farmers' landholdings should be registered and user certificates should be given to them (ARD, 2004).

Again in 2005, a new proclamation on rural land administration and land use proclamation (proclamation No. 456/2005) was enacted by the federal parliament. This proclamation, among other things, provides rules relative to acquisition and use of rural land by peasant farmers or pastoralists, transfer of rural land use rights, distribution of rural land, resolution of disputes, restrictions on the use of rural land; and defines responsibilities of the Federal Ministry of Agriculture and Rural Development and Regional governments (FDRE, 2005). One of the notable features of this proclamation is its recognition of the adverse effects of frequent land redistribution practiced in some regions. It limited forced land redistribution to only irrigation development areas (Holden and Yohannes 2001, cited by USAID, 2013).

Reviewing federal level legislations and the various land laws enacted by different regional governments, Ethiopia's rural land laws are characterized by the following salient features:

- There will be no further redistribution of land[49].
- The user rights are lifelong[50] and can be transferred through inheritance.
- It allows land rentals by holders.
- Certificates of title have been introduced to reduce conflicts over land boundaries and use rights, and ease temporary transfer of land use rights.
- Land irrigated through the construction of new dams will be reallocated according to regulations developed to take account of the needs of all households affected.
- Land to be leased to commercial farms or made available for voluntary settlement will be identified through a land use planning study.

[49] However, this general policy will not prevent individual peasant associations from re-dividing land if their councils deem it necessary (ARD, 2004). The likelihood of implementation of this proposition, however, is very remote, among others, as holdings are already so small that it would reduce them even further below subsistence levels. There was also no redistribution at least over the past one and half decades.

[50] According to Belay (2016) this refers to Tigray region, but the author expects that this could also be true in the major regions governed by the EPRDF, the ruling party.

The laws still put a range of restrictions on some of these declared rights. Landholders are not allowed to rent all of their holdings, and the lessee must dwell in the rural area and be engaged only in farming. Some regions allowed inheritance only to those children who are dependent on their parents and who live in the rural areas (Tigray and SNNP regions). The Oromia Regional Land Use and Administration Proclamation 56/2002 explicitly grants lifelong user-rights and forbids any further redistribution of granted plots, subject to three extenuating conditions: irrigated lands and lands needed for irrigation infrastructure such as pump houses and dams and the right of the government to expropriate land for more important public uses (Crewitt and Korf 2008, cited by USAID, 2013).

Regional land laws also impose restrictions on both rental arrangements and inheritance. Small scale farmers who have land use rights in perpetuity, for instance, are given the right to rent their land for a short term (2–5 years for traditional farming and 15–20 years if modern technology in the form of improved seeds, fertilizer, and machinery is used). However, they are not allowed to use their use rights as collateral for loans[51] (USAID, 2013).

In pastoral and agro-pastoral areas of the country the customary land tenure system has been recognized under Proclamation 31/1975 by the *Derg Regime*; and under the 1994 Constitution during the EPRDF regime. Pastoral lands in Ethiopia are largely managed by customary authorities using rules and regulations that have evolved over a long period of time (USAID (2013). However,

[51] Commercial farmers that rent land are given longer term leases (25–50 years) and are allowed to mortgage their land use rights (USAID, 2013).

there has been considerable pressure and interference on customary management of pastoral lands in Ethiopia, particularly in those pastoral lands that contain river basins in which the State has initiated irrigation developments since the mid-1950s. These interventions have removed large areas of dry season grazing from pastoral landholdings, reducing their capacity to maintain their livelihood in the face of increasing population and occurrences of drought (USAID, 2013).

7.2.4 Agricultural Input Policy

7.2.2.1 Fertilizer and fertilizer policy

Ethiopia follows a state-led fertilizer policy. During the socialist regime (1974 to 1991), fertilizer import as well as distribution was conducted by government parastatals and agricultural cooperatives. Progress was made in the early 1990s, when the new EPRDF-led government seemingly liberalized fertilizer import and distribution. The Agricultural Input Supply Corporation (AISCO), now the Agricultural Input Supply Enterprise (AISE), a government parastatal, lost the monopoly of fertilizer trade in the country and all fertilizer subsidies were removed. The private sector responded rapidly to these reforms. By 1996, several private firms were reported to be importing fertilizer, and 67 private wholesalers and 2,300 retailers had entered the market and assumed a significant share of the domestic fertilizer market (Spielman et al, 2011; Matsumbo and Yamano, 2010, See AGRA, 2014). However, shortly after liberalization, studies revealed that because of trading policies that were heavily biased in favor of government-affiliated companies and parastatals, private fertilizer firms could no longer compete and quickly exited the market. Available data suggests that the market share of private firms engaged in fertilizer import declined rapidly, from 33 percent in 1995 to zero in 2009. Similarly, the public sector's share of distribution soared to over 70 percent, while that of private dealers was drastically reduced to only 7 percent of sales nationwide in the same period.

Once again the AISE is in complete control of the fertilizer market and the sole importer of fertilizers in Ethiopia[52]. AISE, in collaboration with the cooperative unions and the regional governments, has a monopoly on importing fertilizer and is supported by a government-guaranteed credit scheme and loans from commercial banks. The efficiency and effectiveness of the public sector in terms of fertilizer procurement/import and distribution and the implication this has on the economic and financial cost to the public (and the benefit to farmers), however, need to be investigated and compared with the situation that would have been had the private sector been allowed to take part in the market.

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[52] Reasons abound for the apparent exclusion of the private sector, including difficulties private firms face in obtaining the required import licenses from the government of Ethiopia. Import licenses are usually allocated through a tender process and require that fertilizers be imported in lots of 25,000 metric tons—which costs between US$5-10 million. Given that the government of Ethiopia would require private importers to deposit 100 percent of the value of fertilizers to be imported when the line of credit is opened and for an import license to be issued, it's no surprise there was no local private importer of fertilizer in Ethiopia during this period (AGRA, 2014).

- **Fertilizer market system and the dynamics of fertilizer use**

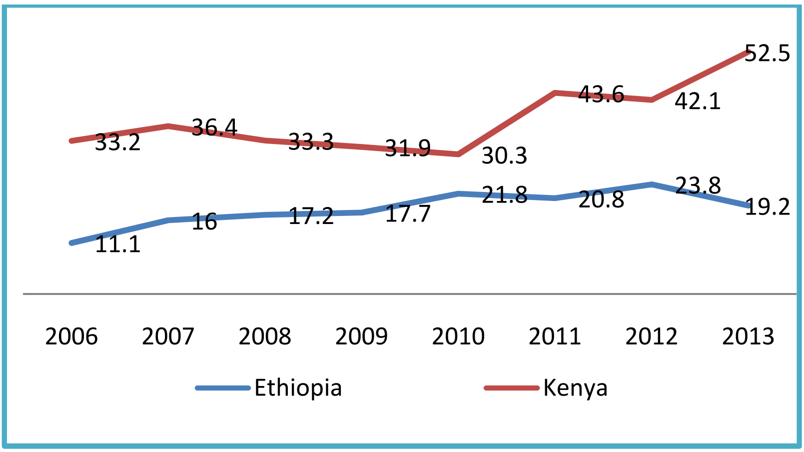
Comparing the evolution of fertilizer consumption in Ethiopia and Kenya, two countries that use two different fertilizer trade and distribution policies, we can see that different marketing arrangements could provide important lessons. Because of the difference in the farming sector as well as the relative strength of the private sector in the two countries, it is inappropriate to deduce the difference in the evolution of fertilizer use among Ethiopian and Kenyan farmers to the fertilizer market model implemented by the respective countries[53]. But it could at least show that private sector engagement in the fertilizer market is not an obstacle for enhanced fertilizer use especially from the long-term perspectives. It is also important to note the relative advantage or strength of the private sector in terms of resilience (for external and internal shocks) and establishing wide-and-flexible distribution channels, and other multipliers associated with the operation of well-regulated private agro-dealers.

As shown in Figure 7.1 below, Ethiopia made a commendable progress in raising fertilizer consumption especially between 2006 and 2011 when fertilizer consumption almost doubled. However, as

[53]It is also important to understand this trend in the two countries in the context that the public import and distribution of fertilizers in Ethiopia could help smallholders in Ethiopia to get fertilizer at lower prices. A recent report by AGRA claims an indirect fertilizer subsidy in Ethiopia. Although the Government of Ethiopia claims there are no subsidies in the procurement and distribution of fertilizers, there are hidden subsidies in form of lower interest rates on finance provided to AISE to import fertilizers, costs of personnel, logistics costs, and investment in infrastructure required to import fertilizers (AGRA, 2014).

indicated by World Bank data fertilizer consumption (measured as the quantity of plant nutrients used per unit of arable land) remains unchanged since then. In contrast, despite some fluctuation or marginal decline in pre-2010 period, consumption of fertilizer in Kenya has been growing especially since 2010. In 2006, the consumption of fertilizer on a hectare of arable land in Kenya was three times the level applied in Ethiopia. By 2013, this ratio declined only to 2.74, indicating still a hectare of arable land in Kenya gets 2.74 times fertilizer than the level applied in Ethiopia. The consistent growth in fertilizer consumption in Kenya shows that a good network of agro-dealers is among the key ingredients in increasing fertilizer usage among smallholders.

Figure 7.1: Evolution in Fertilizer Consumption (kilogram per hectare of arable land)



Source: World Bank (http://data.worldbank.org/indicator/AG.CON.FERT.ZS?order=wbapi_data_value_2012%20wbapi_data_value&sort=asc)

Note: Fertilizer consumption measures the quantity of plant nutrients used per unit of arable land.

Based on a the recent IFPRI fertilizer study (2013), the Alliance for a Green Revolution in Africa (AGRA) also recommends to the Ethiopian government to allow the private sector to participate in the domestic fertilizer markets alongside cooperatives. The study claims that such arrangements will help the government to reduce or avoid the cost of subsidies implicit in the current distribution system, and the problem of high levels of fertilizer carryover at the cooperative level (AGRA, 2014).

Instead of revisiting the policy to facilitate participation of the private sector in the fertilizer trade or/and import, currently Ethiopian policy makers put high priority for domestic production of fertilizer and national fertilizer blending programs, both of which are expected to reinforce the public sector in the fertilizer sector.

- **National fertilizer blending programs and domestic production**

Ethiopia has updated its soil maps in recent years. Based on these new soil maps which identify target missing nutrients in specific locations, the ATA, the Ministry of Agriculture (MoA), and the Ethiopian Institute of Agricultural Research (EIAR) have developed six fertilizer blends that can be adjusted according to the location of four major cereal crops grown in Ethiopia—maize, Teff, wheat and barley. These blends can include up to six different nutrients. This approach intends to change the nation’s decades-old reliance on the two types of fertilizers – DAP and Urea - which only supply Nitrogen and Phosphorus to the soil (Addis Fortune, 2013)[54].

[54]The chief executive officer of the ATA even indicates that smallholder farmers will not only have access to an expanded range of soil nutrients,

Some experts believe that the limited response to fertilizer application in Ethiopia may indicate the right fertilizers are not being applied in the correct amount or to specific soil types (AGRA, 2014).

This initiative on national fertilizer blending is expected to be a game changer in enhancing Ethiopia's food crop production and food security especially if it is aligned with other initiatives that help to raise farmers' productivity and investment. The sustainability and dynamics of such initiatives also demands properly regulated but active participation of the private sector – at one or more stages of the value chain in the market.

The Ethiopian government has also invested massively to produce chemical fertilizers. Investment in fertilizer manufacturing is a new venture that the government has been engaged as per its five-year economic growth plan, the Growth and Transformation (GTP I), which ended in 2015 (Capital, 2013). Quoting sources at the Ministry of Industry, a report by World Bulletin News Desk also indicates that Ethiopia has been building five fertilizer plants at a total cost of over $2.8 billion in Yayu district of Oromia regional state. Each of the plants will have the capacity to manufacture 300,000 tons of fertilizer annually (World Bulletin, 2014)[55]. The factories are expected to begin production in 2017 and raise

but they will also be able to request custom blended formulas tailored to their specific soil needs(Addis Fortune, 2013).

[55] Yayu Fertilizer Factory lies on 54,000sqm and will be a multi complex factory consisting two Urea manufacturing plants, one DAP manufacturing plant, a coal mining and chemical manufacturing. The major contractor for these plants is reported to be the Metal and Engineering Corporation (METEC) of Ethiopia, a state-owned engineering complex, in collaboration with domestic and international companies (Capital, 2013).

fertilizer consumption by Ethiopian smallholder farmers while saving a lot of hard-currency.

7.2.2.2 Seed and Seed Policy

Most Ethiopian smallholder farmers still rely primarily on local seeds. The government, however, has been working to change this and help farmers use improved seed varieties through a range of interventions both at supply and demand levels. The National Seed Policy of Ethiopia, currently focuses on increasing smallholder use of certified seed in three ways: first, to increase the production of certified seeds from pre-basic and basic seeds; second, to emphasizes the production of certified seeds at prices affordable to farmers; and finally, to enhance the availability of certified seed so that farmers can access them whenever they need them (AGRA, 2014).

Improved seeds as a commodity and the seed industry, however, presents, unique features and challenges to policy makers. From a conceptual perspective, seed systems and markets are subject to at least three unique constraints—three market failures—that complicate early stages of seed market development. These constraints are contestable property rights relating to the improvement of cultivated varieties (cultivars); absence of institutions in the market for improved cultivars; and information asymmetries in the exchange of seeds between buyers and sellers (Gisselquist and Van Der Meer 2001; Hassan et al. 2001; Morris 1998; Tripp and Louwaars 1997, cited by AGRA, 2014).

Despite the ongoing small program of direct marketing of certified seed by seeds producers to farmers across 31 Woredas (districts), currently improved certified seeds are supplied to Ethiopian smallholders primarily through regional state-run extension, and input supply systems that operate with a degree of guidance from the Federal Ministry of Agriculture and Forestry. This regional system is made up of regional bureaus of agriculture, their *woreda* (district) offices, and extension agents (termed as "development agents" in Ethiopia) working at the *kebele* (peasant association) level. These organizations collaborate closely with farmers' cooperatives and regional credit and savings institutions in both supplying inputs and disbursing credit (Spielman et al., 2011). The pricing and marketing policy in the Ethiopian seed system is highly centralized.

- **Seed marketing and problems in Ethiopia**

For farmers, buying improved seeds through the formal system has not always been reliable. Sometimes seeds are delivered too late for the planting season or the wrong type of seeds are delivered; often there are seed shortages, and the seed quality can be low. "Farmers have limited options to access improved seeds beyond their primary cooperative in their *kebele* (district) (McMullan, 2014).

The other major problem in the Ethiopian seed marketing system is related to the demand and supply of improved seeds. Estimates of market demand for improved seeds are based entirely on official projections. The responsibility of responding to these demand estimates lies primarily with the state-owned Ethiopian Seed Enterprise (ESE) (AGRA, 2014). Seed distribution is usually managed by farmer cooperative unions which usually pick the seeds from the Zonal warehouses and deliver them to the *woredas* and *kebeles*. An important implication of this seed system is the lack of agro-dealers as the seed distribution is organized via government-controlled large distribution channels.

The process of government policy to estimate demand and supply of seed aggregates from "demand estimates" produced by *Woreda* and regional bureaus probably mask the growing demands for improved or certified seeds and for quality maize seed throughout Ethiopia. So supply of certified/improved seeds may be consistently falling short of demand. Lack of "unbiased estimates" of quantities demanded and supplied is the core reason for shortcomings in seed quality and timeliness of delivery in the country (AGRA, 2014).

This, however, reveals only part of the problem in the Ethiopian seed industry. Contrary to the farmers' complaints about the inaccessibility of improved seeds especially in some high potential regions, the amount of seeds, which is left from distribution, has been increasing significantly during the last four years (Addis Fortune, 2015).

A news story which appeared in a weekly business newspaper clearly depicts the scale of the problem regarding the mismatch between demand and supply of improved seeds in Ethiopia. The paper, for instance, indicates that the Federal Ministry of Agriculture projected to distribute 3.6 million quintals of improved seeds in the 2014/15 crop year but it received a demand of only 2.2 million quintals from regional bureaus of agriculture[56]. On the other hand,

[56]The gap could be explained partly by the amount of unsold seeds (but stored at seed stores of cooperatives) from the previous years.

the actual use of improved seeds in 2013/14 was estimated to be 414,717 quintals, which was only about 17% of reported demand for improved seeds in that year (Addis Fortune, 2015). The amount of seeds that was not distributed to the farmers in 2010/11 fiscal year was 270,476qt but it increased to 378,216qt the following year. The figure became even higher in 2012/13 reaching 759,454qt but slightly declined to 549,474qt during the last fiscal year (Addis Fortune, 2015).

To overcome some of these challenges, in 2013, the Bureaus of Agriculture in the regional states of Amhara, Oromia, and Southern Nations, Nationalities, and Peoples of Ethiopia supported a program of direct marketing of certified seeds by seed producers to farmers across 31 Woredas (districts). Under the direct seed marketing program, seed enterprises, both public (parastatal seed enterprises) and private, were authorized to sell seeds, primarily hybrid maize seeds, directly to farmers in the selected Woredas (McMullan, 2014).

This is a small step in the right direction, but the seed sector is still confronted with many problems. All Ethiopian seed companies – public and private – get their pre-basic seeds from public research institutes. Only the two international seed companies operate with their own varieties. This has great implication as getting pre-basic seed from national research institutes comes with a contract entailing a clause that obliges the companies to sell all produced seeds back to the government – at prices to be determined by the government and often announced on short notice (EEA, 2015). Government control over foundation seed production leads to inadequate seed quantities for multiplication. Seed companies cannot get sufficient basic seeds to multiply. This limits investment in seed multiplication and seed companies' use of certified seed growers (AGRA, 2014).

Other problems include unreliable basic seed supply, limited access to breeder seeds, insufficient robust seed certification, and public domination of seed commercialization (e.g., branding, pricing, and distribution) (Bill and Melinda Gates Foundation, 2010, cited by EEA, 2015).

7.2.4 Agricultural Extension and Research

7.2.3.1 Agricultural Extension

Agricultural extension is one of the policy instruments a government can use to stimulate agricultural development. According to Vanden Ban (1996), a government invests in extension if it believes that the extension service has value as a policy instrument to achieve such goals as increasing food production, stimulating economic growth, increasing the welfare of farming communities, and promoting sustainable agriculture (Vanden Ban, 1996, cited by EEA, 2005).

An effective agricultural extension service helps farmers identify and overcome production, management, processing and marketing problems by facilitating the exchange of technical information and inputs, and the introduction of new technologies, management and capacity.

Despite these clearly defined functions of agricultural extension systems, studies on the history of agricultural extension in Ethiopia have indicated that the system has suffered from some key problems including lack of clearly defined and prioritized responsibilities, lack of long-term vision and strategy which is attributed, among others, to the frequent restructuring of extension institutions and programs. In the past 30 years alone (1974 – 2005) the Ministry of Agriculture passed through at least ten major restructuring processes (Kassa, 2005), indicating one major restructuring every three years.

The restructuring has continued since then, and the Ministry of Agriculture and Rural Development was renamed as the Ministry of Agriculture and Forestry. This recent restructuring is different from many of its predecessors as it also marks the birth of an independent ministry for livestock and fishery sector which had undergone many restructuring previously but within the same ministry.

A comprehensive study conducted by Kassa (2005) finds weak evidence to justify Ethiopia's frequent restructuring of its agricultural extension institutions. They were not based on independently commissioned studies, nor were there any measurable performance indicators suggested to monitor the performance of new structures and programs. The study finds that the organization of extension services kept on changing largely because of leaders' own intuitions, but not based on an independent evaluation and thorough assessment (Kassa, 2005).

Such too frequent changes, however, affect continuity of programs and staff stability and will continue to do so in the future unless corrective and timely measures are taken. What makes this extreme institutional and program instabilities and discontinuity difficult to comprehend is that it has been taking place in a Ministry that has over hundred years of experience[57]. This, however, has not much helped the Ministry to develop an internal mechanism (monitoring and evaluation) to keep its institutional stability through dynamic and continuous business restructuring and internal adjustments. It is also important to see if the system allows farmers (i.e. its clients) to play a pivotal role in determining its course.

7.2.3.1.1 Agricultural extension since 1991

The period since 1991 is considered as a new era in the history of agricultural extension in Ethiopia in terms of institutional pluralism and decentralization of the system of service delivery[58]. The country has undergone a process of regionalization as part of the decentralization process. With regionalization the roles of the Ministry of Agriculture at central/federal and regional levels have changed accordingly.

At present, extension services provision is entirely the responsibility of regional agricultural bureaus. The extension division of the Federal Ministry of Agriculture is mandated to coordinating inter-regional extension work, providing policy advice on nationwide agricultural extension issues, advising regional bureaus of agriculture in the areas of extension management and administration, developing extension training materials and organizing training

[57] Formal agricultural extension service and government efforts to modernize the agricultural sector began a hundred years ago with the establishment of the then "*Yersha Mesriabet*", which later became the Ministry of Agriculture in 1908 (Kassa 2005).

[58] This, however, does not help to bring to halt the frequent restructuring of agricultural institutions.

programs in agricultural extension for regional extension personnel. The regions are given full autonomy in the planning, execution; monitoring and evaluation of their extension programs (EEA, 2005b).These changes are good in terms of easing the level of bureaucracy in the extension institutions and their relationship with farmers and their associations.

Empowering farmers to actively participate in the development process primarily requires establishing friendly relationships (with farmers) based on equality. This will be greatly facilitated if smallholders are organized in farmers' organizations. With the exception of supply of improved inputs and commodity trade in some export crops (notably in coffee), the extension system has not given due attention to farmers' organizations. As Ethiopian agriculture is overcrowded with millions of farmers who cultivate farms too small to lead viable progressive farming livelihood, farmers organizations are important both at production as well as marketing levels. They could progressively take the responsibility of sharing some of the duties of the public extension system at village levels and beyond. Farmers' associations are also important to enhance the bargaining power of smallholders and their economies of scale in use of technologies and machineries if they decide to put their tiny farms under one management unit.

Farmers' organizations need to be supported more by able extension workers. In addition to the low emphasis at policy/implementation levels, inadequate training of agricultural field experts at college or while in-service could be the reason for this limited participation in farmers' organizations. Though it is from the past, a report by the Ethiopian Economics Association, for instance, indicates the training agricultural experts especially those working at field levels with farmers did not equip themselves with the necessary knowledge and skills in social sciences and communications that influence the frequency, nature and degree of interaction with farmers (EEA, 2005b).

The Ethiopian agricultural extension system, however, has seen a new kind of intervention with the establishment of the Agricultural Transformation Agency/ATA. The ATA is created to help Ethiopia to replicate the agricultural transformation seen in many Asian countries during their first phase of development. In particular, the agency is reported to strive to (i) introduce new technologies and approaches that can address systemic bottlenecks & catalyze transformation of the sector, and play an inspiring role to support partners to effectively execute agreed upon solutions (many of which may not be new) in a coordinated manner.

The ATA has many peculiarities the Ethiopian national agricultural extension system has never seen before:

- The ATA was not created to replace existing agricultural actors and interventions, but rather to enhance the capacity of key stakeholders to achieve agricultural transformation.
- The ATA is a time-bound organization that aims to fulfill its mandate within a 15-20 year lifespan. Within this time frame, the ATA is expected to sufficiently catalyze transformation, help build capacity in critical areas, and handover ownership of the activities that will bring about sustainable change to other partners. The Agency's four-phase lifespan was formulated to

contribute to the agricultural targets set forth in Ethiopia's national strategic policies.

- The ATA is governed by the Agricultural Transformation Council, chaired by the Prime Minister which consists of relevant Ministers and head of regional agricultural bureaus as members. The ATA is generously funded by a range of intentional donors with significant autonomy and privilege in operation and finance, and capacity to hire foreigners, the Ethiopian diaspora and experienced Ethiopians working in the sector for long periods of time.

It is only time that proves the success of the ATA in transforming Ethiopian agriculture. Existing development programs and interventions of the ATA, however, largely reflects ATA's conception of smallholders' problem in Ethiopia significantly as a technical and resource/capacity related problem. If that is the case, it has to broaden its focus to the less emphasized policy and institution related challenges and constraints that are equally important in affecting the development and transformation of the sector.

7.2.3.2 Agricultural Research and Technology Generation

Agricultural research and technology generation have been an important aspect of government efforts for the development of Ethiopian agriculture for the last several decades. It is now over five decades since agricultural research activities were institutionalized. The Ethiopian Institute of Agricultural Research was established in 1966 which was then called Institute of Agricultural Research (IAR). In 1997 it was renamed as the Ethiopian Agricultural Research

Organization (EARO). At the moment the institute is designated as the Ethiopian Institute of Agricultural Research (EIAR)[59].

Currently, there are many institutions at various levels that engage in agricultural research and technology generation activities. But the EAIR remains the primary agricultural research agency. The EIAR is a federal institution mandated to design research policy and strategies, assist in capacity building, coordinate national research activities and undertake researches. It manages 16 research centers across the country. EIAR's mandate is broadly defined to include generation, adaptation and support of the dissemination of technologies and management related to crops, livestock, fisheries, forestry, and other natural resources. Over the years, some centers have been separated from EIAR while some others have been added to it. Some sub centers were also upgraded to create new centers, and others were merged. In general, the institutional structure of Ethiopia's agricultural R&D system has undergone numerous rounds of restructuring over recent periods.

Currently the EIAR reports to the Ministry of Agriculture and Forest Development (Flaherty, et al., 2010, EEA, 2005b).On the other hand the regional agricultural research institutions (ARIs) are accountable to their respective regional governments or bureaus of agriculture.

[59] Prior to the establishment of the IAR, agricultural research was conducted by different agricultural colleges in general and the then Alemaya College of Agriculture. The Oklahoma College of Agriculture and Mechanical Arts in collaboration with the Alemaya College initiated agricultural field experiments in Ethiopia in 1953. Founding experimental sites were at Jimma, Shashamene, and Addis Ababa. Consequently an independent entity was established to run agricultural research activities.

- **Research Organization and Funding**

Agricultural R&D investment and human resource capacity have both grown in Ethiopia since the early 1990s. Agricultural research spending doubled between 1993 and 2000, and then doubled again during 2000–01. Nevertheless, despite the growth in expenditure of the 1990s and early 2000s, by 2008 investments had contracted to levels similar to those recorded in 2000 (Flaherty, 2010).

Table 7.1: Key Facts on Capacity and Investment on Ethiopian Public Agricultural Research

Key indicators	2000	2008	2011
Total number of public agricultural researchers	744	1410	1877
Total number of public agri. researchers, (per 100,000 farmers)	3.09	4.68	5.79
Spending,			
• total (million Birr constant 2005 prices)	107.7	145.4	156.9
• total (million birr per 100,000 farmers, constant 2005 prices)	0.45	0.48	0.49
• total (million PPP dollars constant 2005 prices)	47.8	64.5	69.6
• total (million PPP dollars per 100,000 farmers, constant 2005 prices)	0.20	0.22	0.24
Spending, total (as a share of Ag GDP, %)	0.30%	0.24%	0.19%

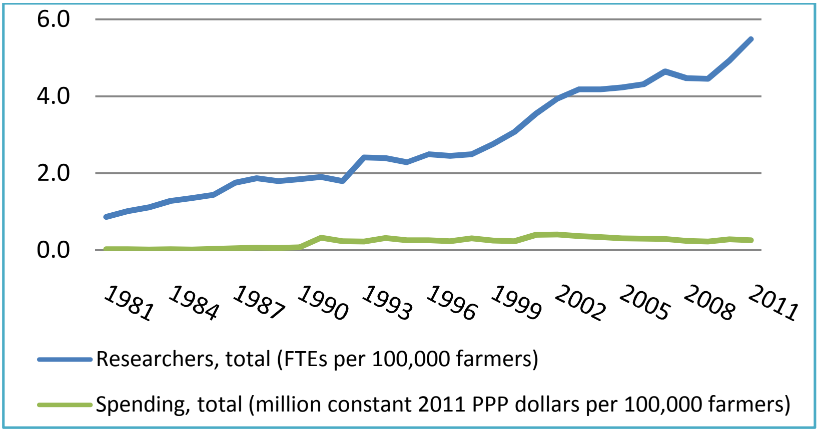
Source: Beintema et al. (2014).

Note: Number of farmers used to compute the various indicators indicate the total number of adult persons in farming households who reported to be engaged in farming activities of their households.

- PPP(s) Purchasing power parity (exchange rates)
- FTE(s) Full-time equivalent (researchers)

A study by Beintema, et al. (2014) indicates that public agricultural research spending increased from 107.7 to 145.4 million Birr between 2000 and 2008 and then to 156.9 million (all constant 2005 prices) by 2011. This indicates a 35% growth between 2000 and 2008, but a mere 8% growth since then[60].In sharp contrast, the number of public agricultural researchers grew by 90% and 33%, respectively, in these two periods (Beintema, et al., 2014) indicating the mismatch in the growth of human and financial capacity of research institutes.

Figure 7.2: Number of Agricultural Researchers and Research Spending



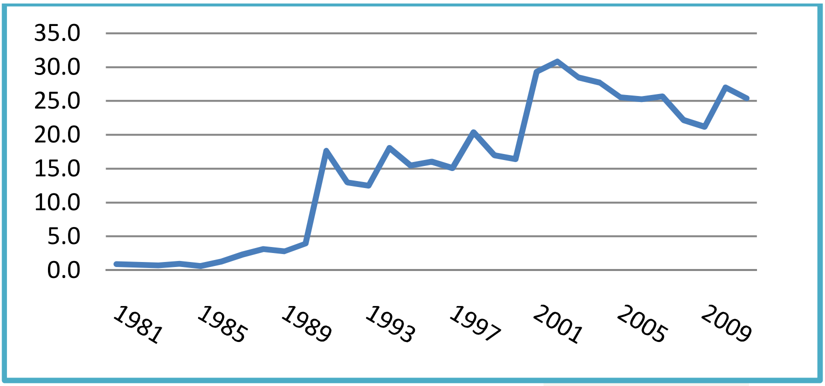
Source: Computed based on data generated from IFPRI's Agricultural Science and Technology Indicators (ASTI) program
http://www.ifpri.org/program/agricultural-science-and-technology-indicators-asti

[60] Despite the relative decline in public spending on agricultural research in recent years, it is important to note that this relative decline in recent years will have a different picture if we extend the analysis to the early 1990s. Data indicates that between 1990 and 2000, public spending on agricultural research was increased four-fold, from 66.6 million Birr to 277 million birr (both in 2011 constant prices) (Data obtained from IFPRI's Agricultural Science and Technology Indicators (ASTI) initiative website, http://www.asti.cgiar.org/Data retrieved on 22/3/16 12:31.

Note: Total agricultural R&D spending (excl. private for-profit sector) includes salaries, operating and program costs, as well as capital investments for all government, non-profit, and higher education agencies involved in agricultural research in the country. Expenditures have been adjusted for inflation and are expressed in 2011 prices.

The agricultural research intensity ratio, or total public spending on agricultural R&D as a percentage of agricultural GDP, is a common indicator of comparative agricultural R&D spending across countries. Ethiopia's ratio rose sharply in the 1990s, reaching $0.30 in 2000. While this level is still comparatively low, it reflects the country's increased spending on agricultural R & D at that time. By 2011, however, the ratio had returned to the pre 1990s levels. In 2011, for every $100 of agricultural output, $0.19 was invested in agricultural R&D (Table 7.1), which is very low compared with other countries, such as Kenya and Tanzania whose ratios that year (in 2008) were $1.43 and $0.50, respectively (Flaherty, et al., 2010).

Figure 7.3: Total Spending for Agricultural Research in Ethiopia (millions, constant 2011 US $)



Source: Computed based on data generated from IFPRI's Agricultural Science and Technology Indicators (ASTI) programhttp://www.ifpri.org/program/agricultural-science-and-technology-indicators-asti

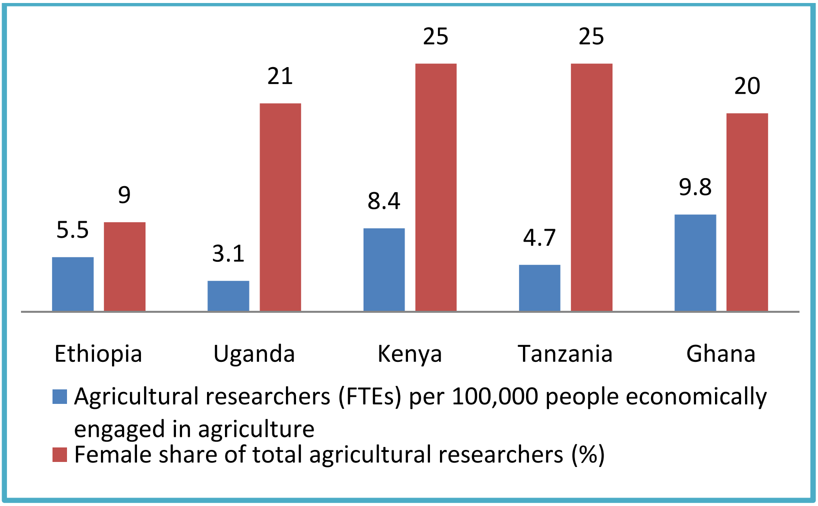
Note: Total agricultural R&D spending (excl. private for-profit sector) includes salaries, operating and program costs, as well as capital investments for all government, non-profit, and higher education agencies involved in agricultural research in the country. Expenditures have been adjusted for inflation and are expressed in 2011 prices.

- **Progress on Research Staffing and Funding**

Higher and consistent levels of government support are needed, along with a stronger alignment of external (donor and development bank) funding with national priorities. The number of agricultural researchers in general and the ratio of the number of agricultural researchers per million farmers in particular is another criterion for measuring government commitments to the sector. As indicated in Figure 7.2 above the number of agricultural researchers rose more steadily in Ethiopia after the 1990s, reaching 58 full-time research staffs (per million farmers) in 2011 from about 31 decades ago in 2000 (Beintema et al., 2014).Despite such improvement in research staffing, Ethiopia has one of the fastest-growing, but youngest and least-qualified pools of agricultural researchers in Africa. As of 2011, more than half of the country's agricultural researchers (in FTEs) held only B. Sc degrees, and 48 percent were under 31 years old. Ethiopia's agricultural research staffing is among the least qualified in Africa in terms of postgraduate degrees, and female participation is also comparatively low (Flaherty et al., 2010).

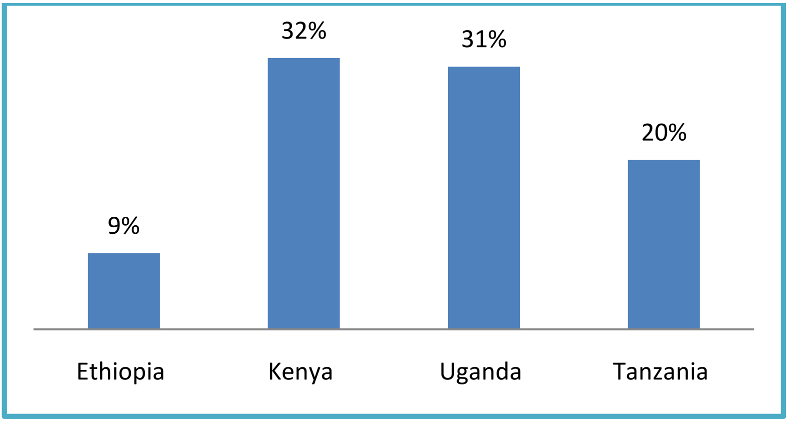
Ethiopia has also the lowest number of agricultural scientists with PhDs in East African countries (Figure 7.5). A minimum number of PhD-qualified scientists are generally considered fundamental to the conception, execution, and management of high-quality research to effectively communicate with policymakers, donors, and other stakeholders, both locally and through regional and international forums; and for increasing an institute's chances of securing competitive funding. of 37 countries for which a complete set of degree-level data was available, five countries recorded shares of PhD researchers of more than 40 percent (Benin, Burkina Faso, Madagascar, Senegal, and Swaziland), whereas five countries reported shares of PhD researchers of 10 percent or lower (Ethiopia, The Gambia, Guinea-Bissau, Lesotho, and Mozambique) (Beintema and Stads, 2014).

Figure 7.4: Number of Agricultural Researchers and Share of Female Researchers in 2011: Ethiopia versus neighboring African Countries



Source: Computed based on data from IFPRI (2016).

Figure 7.5: Share of PhD Researchers, 2011 (FTEs) (% of all researchers)



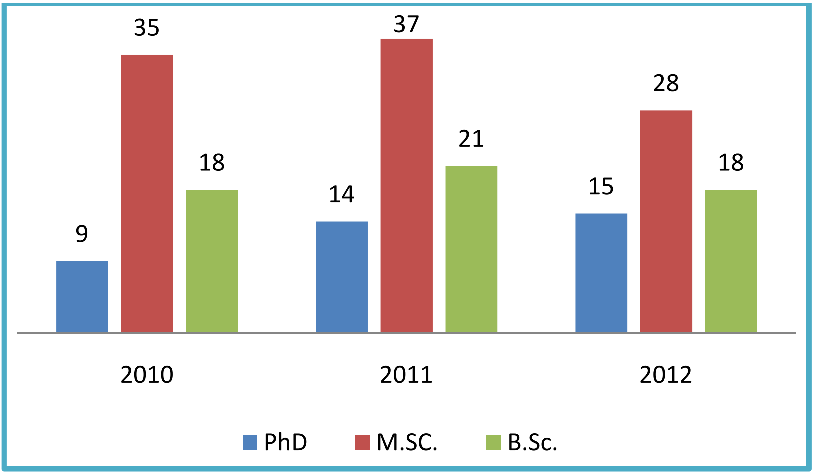
Source: Beintema et al. (2014).

In addition to the low number of PhD-level research staff, a high number of staff turnover is also a key problem of Ethiopian research institutes. As indicated in Figure 7.16 below, the EIAR lost 62, 72 and 61 research staffs in 2010, 2011 and 2012, respectively. The loss, however, is growing fast among PHD-holders (who are also considered as senior staff). In 2010, 9 PhD-holders were reported leaving the EIAR, and this number grew subsequently to 14 and 15 in 2011 and 2012 respectively[61]. Ethiopia's agricultural research

[61] In efforts to improve efficiency, the Ethiopian government implemented a restructuring process (affecting both government and higher education agencies), which led to the departure of 200 researchers and support staff from EIAR in 2008. Some staff left in response to the inherent uncertainty of the process, whereas others were laid off or chose to accept early retirement. Regrettably, some staff members were laid off by mistake, and even though all the staff who had been let go are currently being reinstated to their original positions, many long-serving researchers have continued to leave EIAR in pursuit of better remuneration and conditions elsewhere.

staffing is also among the least qualified in Africa in terms female participation. Female researchers constituted 6 percent of agricultural research staff at EIAR in 2008, representing little change since 2000 (ASTI 2009–10; Beintema and Solomon 2003, cited Flaherty et al., 2010).

Figure 7.6: Loss of Researchers from EIAR, 2010-2012 (FTEs)



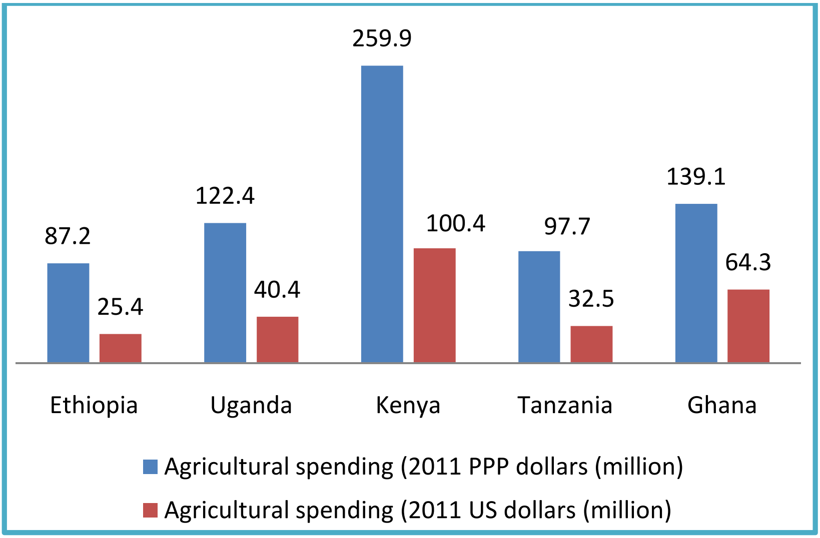
Source: Beintema et al. (2014).

Ethiopia's investment on its agricultural research (R&D) is also very low when compared to other neighboring African countries. Though Ethiopia's agricultural research spending doubled between 1993 and 2000, and then doubled again during 2000–01 (Flaherty, 2010), Ethiopia's spending for agricultural research in 2011 was only

Further moves to improve researchers' salary packages have been initiated, but whether these actions will be sufficient to halt the high rate of staff attrition remains to be seen (Beintema et al., 2014).

34%, 63%, 71% and 89% of the level of spending in Kenya, Ghana, Uganda and Tanzania, respectively (all measured in 2011 PPP dollars) (see Figure 7.7).

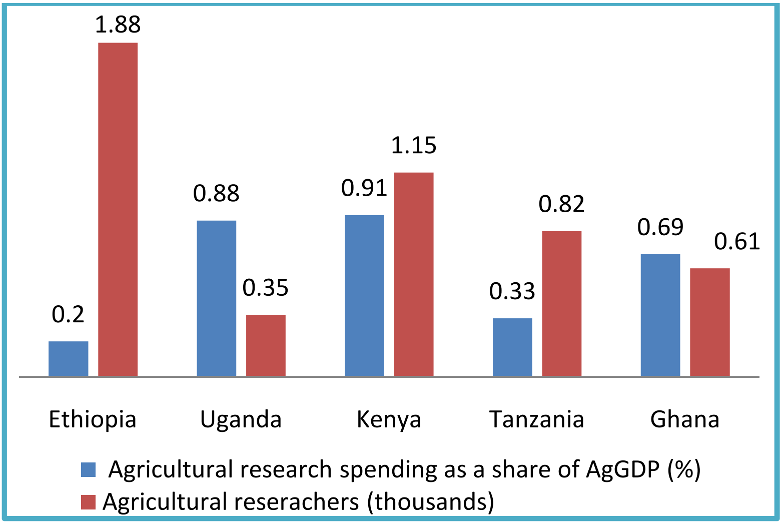
Figure 7.7: Spending for Agricultural Research: Ethiopia versus neighboring African Countries



Source: Computed based on data from IFPRI (2016)

Ethiopia's low spending for agricultural R&D is even more pronounced if one compares the figures taking in to account the relative weight of agriculture in the respective economies. Agricultural research spending as a share of AgGDP in Uganda and Kenya exceeds the level in Ethiopia by over 4-folds. Similarly, Ghana and Tanzania spend 3.5 and 1.6, times, respectively, the level Ethiopia spends. The disparity in terms of the number of agricultural researchers, however, is not much between Ethiopia and most of these countries, indicating Ethiopia spends also less in terms of expenditure per agricultural researcher (see Figure 7.8).

Figure 7.8: Agricultural Spending as Share of AgriGDP and Number of Researchers in 2011



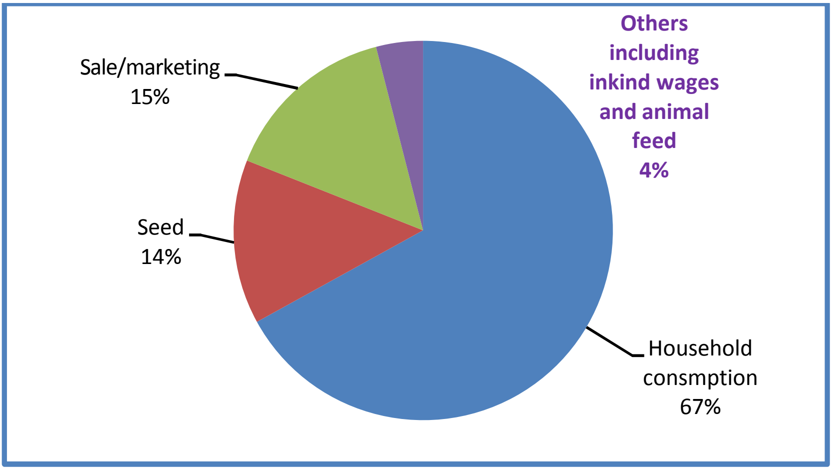
Source: Computed based on data from IFPRI (2016).

Agricultural research, whether adaptive, basic or any other kind, is essential in providing technologies and knowledge required to transform the sector. This demands Ethiopia to reverse the declining trend and increase spending and investment for agricultural R&D. Moreover, the country's fragmented research system requires greater coordination. The draft NARS reform document proposing the establishment of the Ethiopian Agricultural Research Council is a positive first step (Flaherty, 2010).

7.2.4 Agricultural Output Markets

Agricultural output markets are important for smallholders. They are the largest provider of food both for rural and urban residents of the country. On an average year, 5 to 6 million tons of grain (about a fifth of total production) is estimated to pass through a range of supply chains and markets operating at different levels (at village, district, regional levels) a until they reach the end consumers, which includes a significant portion of small farmers.

Figure 7.9: Cereals Utilization among Small Farmers in Ethiopia - 2014



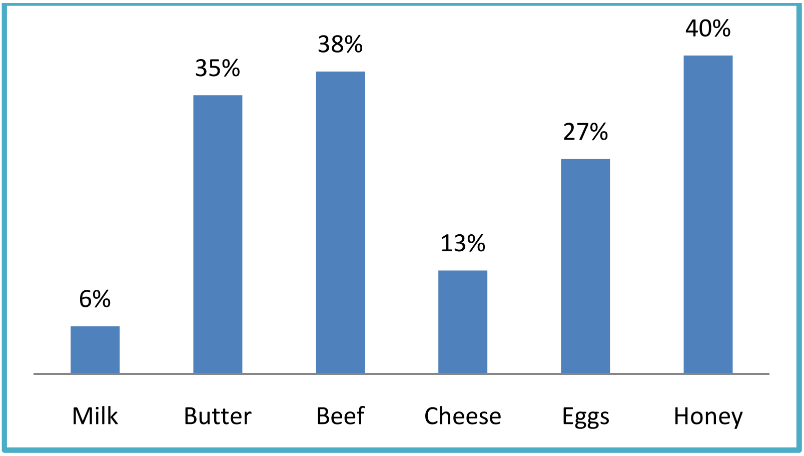
Source: CSA (2013/14).

Because of the subsistence nature of smallholders' production, most of agricultural produce like grain crops are not marketed; instead they are retained by the farmers themselves and used for their own consumption, seed and other uses. For instance, government statistics indicate that 67% of cereal crops produced in 2014 was used for home consumption by the producers themselves (Figure 7.9). The volume of cereal crops sold by small farmers in 2013/14 amounted to 3.5 million tons, which represents only 16% of the production. The marketing share is a little higher in pulses (22%), and far higher in oil seeds (47%) (CSA, 2013/14).

Smallholders' market participation in livestock and livestock products is not much different. According to CSA statistics, only a little greater than 40% of eggs and milk produced by smallholders entered the market or value-chain of these products. The market of live animals is far less than this. From over 56 million cattle estimated to be managed by the smallholders (in 2014/15 year), only 10% of was sold in 2014/15. This percentage point will decline substantially (to 3%) if one considers the net-outflow (i.e. if we considered the number of cattle purchased by smallholders in the same year).

The agricultural development strategy of the government is market-led, but the level of smallholder commercialization is extremely low and this will affect the effort to transform the sector. Despite the general low level of commercialization, there is a wide disparity in terms of market participation among different farm households, for instance, among wheat producers.

Figure 7.10: Livestock Products Marketed by Smallholders (percent of total production)



Source: Negassa et al. (2011), for poultry CSA (2013/14).

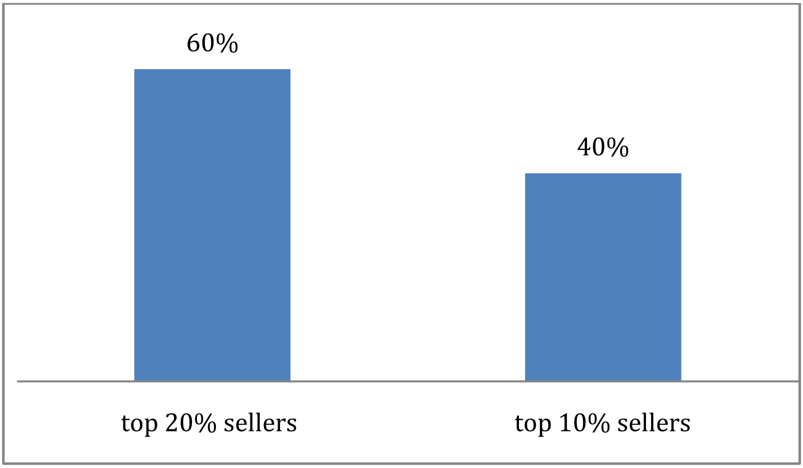
- **Wheat market participation among wheat producers**

Wheat is the fourth largest cereal crop produced in Ethiopia and accounted for about 15 percent of the per capita calorie intake (FAO). About 20% of the estimated 4.04 million metric tons of wheat produced in 2014 could be considered as marketable surplus. Wheat is produced on 1.61 million hectares of farm lands by a little over 4.7 million smallholder farmers, indicating an average 0.34 hectare per wheat grower (Minot et al, 2015).

However, most wheat in Ethiopia is not marketed; instead it is retained by the farmer and used for their own consumption, seed, and possibly other uses. According to the 2013/14 Agricultural Sample Survey, just 18 percent of wheat output was sold. The proportion was somewhat higher (25 percent) in the 2012 IFPRI-

ATA Baseline Survey (Minot et al, 2015). At household level, on average, wheat farmers produce 751 kg of wheat and sell 189 kg, so the marketed surplus is 25 percent. The share of wheat production that is sold, however, varies widely across households.

Figure 7.11: Share of Domestic Wheat Market among Wheat Producers (percent of all wheat marketed)



Source: Minot et al (2015)

Over half of the estimated 4.7 million wheat growers, for example, produced only for own domestic consumption. Based on a national representative data, a study by Minot et al (2015) indicates that about 54% of wheat producers do not sell any of their wheat output, which implies that few producers supply the bulk of wheat marketed in the country. The top 20 percent of wheat sellers account for 60 percent of wheat sales. Just 10 percent of them sell more than 40 percent of their harvest while 5 percent sell more than half[62]. The transformation of the agricultural sector seems difficult under such situation where over 50% are out of output markets. Before any meaningful transformation of the sector, the country needs first to transform subsistence agricultural production into commercially oriented systems.

The study by Minot et al (2015) identifies a lot of features that are peculiar to wheat growers who sell a large share of their output. They indicate that male-headed households produce more wheat on average but sell a somewhat smaller share of the total compared to female-headed households[63]. On the other hand, wheat production per farm is also found to be smallest among the poorest households and rises steadily across expenditure quintiles. Not surprisingly, the quantity of wheat sold per farm also rises with expenditure category. The marketed share is just 9 percent for the poorest quintile of farmers, but it rises to 37 percent among the richest farmers. As a result, 40 percent of the marketed surplus of wheat is produced by the richest 20 percent of farmers.

A similar pattern appears when we examine marketing patterns by farm size. The smallest farms (those with less than 0.5 hectares) sell just 9 percent of their harvest, on average, while those with more than 5 hectares sell on average about 39 percent of their wheat. Only 3 percent of farmers fall into this category; however, they

[62]This statistics did not consider any wheat imported by the government or any other agencies.

[63]This may be a result of the fact that female headed households have fewer members, so their consumption needs are smaller; or they might be very poor which forces them to sell wheat to buy less expensive food crops.

contribute about 12 percent of the total marketed surplus of wheat. On the other hand, farmers with 2-5 hectares of land sell a smaller share (28 percent) but account for more than half (55 percent) of wheat marketed in Ethiopia because they are more numerous (about 34% of the wheat producing farms) (Minot et al., 2015).

- **Institutional arrangements and policies affecting agricultural output markets**

Agricultural output markets are important elements both to enhance the commercialisation of the sector as well as for its overall transformation. As discussed earlier a significant portion of Ethiopian smallholders produce for their own consumption and operate at subsistence or semi-subsistence levels. Only a fifth of the total grain produced in the country reaches markets. On the other hand, those who succeed to produce for the market need efficient markets that provide incentives to expand production, and help producers make informed decisions on what to produce and at what quality standards, as well as where and when to sell their outputs.

The price of agricultural outputs is the final outcome of an exchange process involved in the market. If the process of exchange is transparent and fast, the probability of the market to serve the interests of the two key stakeholders in agricultural markets - producers and consumers - will be high. Three critical determinants of an efficient process of exchange (market) are infrastructure, institutions and flow of information (Assefa and Rashid, 2006).

On the infrastructure and information flow Ethiopia has made huge progress over the past two decades. Over the past decade road networks – that include both main and rural feeder roads - have been substantially improved across the country. Similarly, mobile networks as well as ownership of radio and televisions have been expanded. This progress is expected to improve both market integration and access to information which are expected to help producers both by enhancing market efficiency and competitiveness among others via narrowing the gap between producers' and consumers' price and volatility in annual and seasonal prices. As discussed earlier, however, the progress in impacting these key market variables is very limited, indicating the need for further intervention by policy makers.

Though government interventions in pricing and public procurement are mostly motivated by food security considerations which aim stable and relatively affordable/low price for consumers, relatively high farm prices (in real terms) are advantageous for smallholders. For any sustainable transformation of the sector, agricultural price should be sufficiently high to stimulate on-farm investment. Though the availability of food at affordable prices is an important policy goal, government policies in countries like Ethiopia should also have to focus on making the price of staple foods affordable for consumers while ensuring attractive prices for producers which imply the adoption of dual pricing policy.

Ethiopia has experimented with a whole spectrum of agricultural pricing policies, ranging from parastatal-centric control through production quota and trade control during the Derge regime, to a dual pricing approach during 1992-99, to total liberalization (except security reserve and safety nets) with ad hoc interventions since 1999. As a first step toward liberalization, the transitional government undertook substantial reforms in agricultural marketing in 1992, which included elimination of wheat subsidies, closing of all eight regional Agricultural Marketing Corporation (AMC) offices, and a reduction in the number of branch offices from 27 to 11 and of grain procurement centers from 2013 to only 80 (Gabre-Madhin and Mezgebou 2006, cited by Rashid et al., 2007). Since then there have been five important government proclamations that highlight the shifts in policy objectives over time, three points about which are worth noting (Rashid et al., 2007).

According Rashid et al (2007) the Ethiopian Grain Trade Enterprise (EGTE) is a downsized version of the former AMC, indicating more similarities than differences when compared to its predecessor, AMC. The mandates of EGTE in any case included (1) stabilizing prices with the objectives of encouraging production and protecting consumers from price shocks, (2) earning foreign exchange through exporting grains to the world market, and (3) maintaining a strategic food reserve for disaster response and emergency food security operations.

Many question the participation of the EGTE in export market – both from theoretical/rationality as well as economic perspectives. Rashid et al, for instance show the three mandates are conflicting. Their argument is that any profit motivated objective is inconsistent with objectives such as price stabilization. The policy, for instance, turned counter-productive in 1997, when EGTE exported 48,000 tons of grain at a subsidized price only to face the daunting challenge of managing domestic price hikes a few months later. The export transaction turned out to be unprofitable for EGTE, as the export price was 15 percent lower than the domestic sales price

(Bekele 2002, cited by Rashid et al., 2007). As data indicates, export of grain, however, continued since then, though on ad hoc and small volume basis[64].

Despite the 1997 export experience, the policy of export promotion continued as a central mandate of EGTE. In a 1999 proclamation (No. 58/1999), another public enterprise, Ethiopian Oilseeds and Pulse Export Corporation (EOPEC), was merged with EGTE to consolidate public export functions into one agency. Although the private sector dominates exports of oilseeds and pulses, EGTE continues to have a large export share, despite having much larger marketing costs than the private sector (Rashid et al., 2007).

On the other hand, food price stability continues to be a formidable challenge to EGTE as well as Ethiopian policy makers. Though the situation has improved especially over recent years, authors like (Rashid and Assefa, 2006; Rashid et al., 2007) indicate weak food price stabilization in Ethiopia's grain output markets and the inconsistency or ad hoc pricing policy of the EGTE in terms of sending mixed signals to the producers. Two recent examples can substantiate this statement. Two consecutive years of bumper crops resulted in a precipitous 80 percent decline of producer prices in early 2002. As the ratio of input prices to maize prices increased from 1.7 in 2000 to 9.0 in 2002, maize production became a highly

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[64]News from Walta Information Center, for instance, indicate that EGTE generated 635 Million Birr from coffee export, and another 400 Million Birr from the export of oil seeds, cereals and pulses, including coffee beans in 2014.http://www.2merkato.com/news/alerts/2978-ethiopia-egte-earned-1892-million-birr-from-coffee-export.

unprofitable business. This led farmers to abandon their maize crop in the field and reduce their fertilizer use by up to 20 percent. Due to low rainfall, maize production in the subsequent year dropped dramatically and prices skyrocketed. The second example is more recent. In January 2006, at the time of Ethiopian Christmas and other religious festivals, cereal prices went more than 20 percent higher than the previous months and the government announced a ban on exports for an indefinite period of time.

To summarize, while there have been extensive reforms to dismantle the policies of the central planning regime, a large public agency continues to operate with conflicting mandates. Export promotion, in most cases of non-tradable[65], continues to be an important mandate for EGTE even in the most recent government proclamations. This is very different from the rural/agricultural development policies adopted elsewhere in developing countries, where food self-sufficiency came before export promotion and the policies focused, among other things, on ensuring price stability and giving proper incentives to farmers to adopt best-practice technology (Rashid et al. 2005, World Bank 2006, Byerlee et al. 2006, cited by Rashid et al., 2007).

It is, therefore, important for Ethiopian policy makers to consider an independent agency with the sole objectives of food price stabilization with the objectives of providing adequate and guaranteed incentives to producers while contributing to stability of the macro economy. While the agricultural sector also faces other

[65] As the gap in FIB-CIF grain prices made cereals non-tradable (often if not always), they can be exported only with subsidies (Rashid et al. 2007).

structural problems, any interventions on increasing the efficiency and effectiveness of agricultural marketing systems need to accompany other interventions that target other structural constraints of the sector such as access to farm lands, agricultural finance and insurance as well as private sector participation in agricultural input and technology markets.

Ethiopia does not only have huge agricultural potentials but also good policies and strategies. With the aim of promoting agricultural development in Ethiopia, the Ethiopian government has also formulated various conducive policies and strategies as well as several institutional arrangements over the last several years to modernize the sector. Unfortunately the sector still remains subsistent and is still unable to provide food for the growing population as well as raw materials for the expanding industry. It is in view of this reality that the issue of agricultural transformation is being raised in this report.

Chapter VIII

Patterns of Transitions in the Ethiopian Crop Agriculture

8.1 Introduction

In the literature of development economics, structural transformation involves dynamic interactions of accumulations, high income growth, and structural change in production, consumption, and trade. It also involves geographic relocations of economic activities usually resulting in urbanization and demographic changes. An important driver of such dynamics is a change in productivity as economic activities shift from sectors of low productivity to sectors of high productivity [Chenery 1960; Chenery, 1988; Syrquin 1988; Syrquin and Chenery, 1989].

Similarly, stylized facts show that agricultural capabilities, rising agricultural (rural) income and changes in the composition of agricultural production such as staple crops and high value cash crops tend to explain the level of agricultural transformation. According to Hayami and Ruttan (1971), agricultural output per male worker increased at annual average rate of 4.7 per cent in developed countries while it expanded at a small rate of 1.4 per cent in developing countries between 1960 and 1965. Agricultural output per hectare of land was nearly the same for both developed and developing countries. Land area per male worker increased at a rate of 2.6 per cent in developed counties but declined at a rate of 0.4 per cent in developing countries. Improvements in the land – labor ratio in developed countries due to rising demand for labor in the nonagricultural sector helped labor productivity to rise in the agricultural sector. In contrast, a declining land – labor ratio in developing countries as a result of low demand for rural labor force in the nonagricultural sector resulted in low growth of labor productivity.

Another important insight of Hayami and Ruttan was the association of differences in labor and land productivity with differences in agricultural capabilities. In developing countries where land productivity dominated, growth of application of fertilizer was higher than growth of use of machineries. In those countries, fertilizer per hectare increased by 10.9 per cent per annum between 1955 and 1965.Iin developing countries, machinery per male worker increased by 6.4 percent during the same period. On the other hand, in countries which transformed their agriculture, machineries per male worker and fertilizer per hectare of land grew at rates of 9.8 per cent, and 5.1 per cent, respectively. For intermediate countries, machinery per worker, and fertilizer per hectare of land increased at rates of 15.8 per cent, and 5.8 per cent, respectively. Thus, increase in output per worker was primarily driven by mechanization in developed countries.

Finally, transformation of agriculture is associated with an overall structural transformation within the economy. In particular, countries which opt to industrialize managed to transform their agriculture than countries which relied on increasing agricultural productivity alone. "*Despite great differences in climate, technology, and output mix, it seems apparent that the major variations in land and* *labor productivity among countries are associated with differences in the levels of industrial inputs which ease the constraints imposed by the inelastic supply of the primary factors. … [Growth] in agricultural productivity is essentially a process of adaptation by the agricultural sector to new opportunities created by the advances in knowledge and by the process of inter-industry division of labor which has accompanied industrialization*." [Hayami and Ruttan, 1971: 74].

As it has been indicated in the literature review part, while differences in labor productivity explain the difference in agricultural development, the differences in labor productivity in turn are explained by differences in resource endowments, technical inputs, and human capital. According to Hayami and Ruttan (1971), significant gaps in labor productivity across countries are explained by differences in technical inputs and human capital.

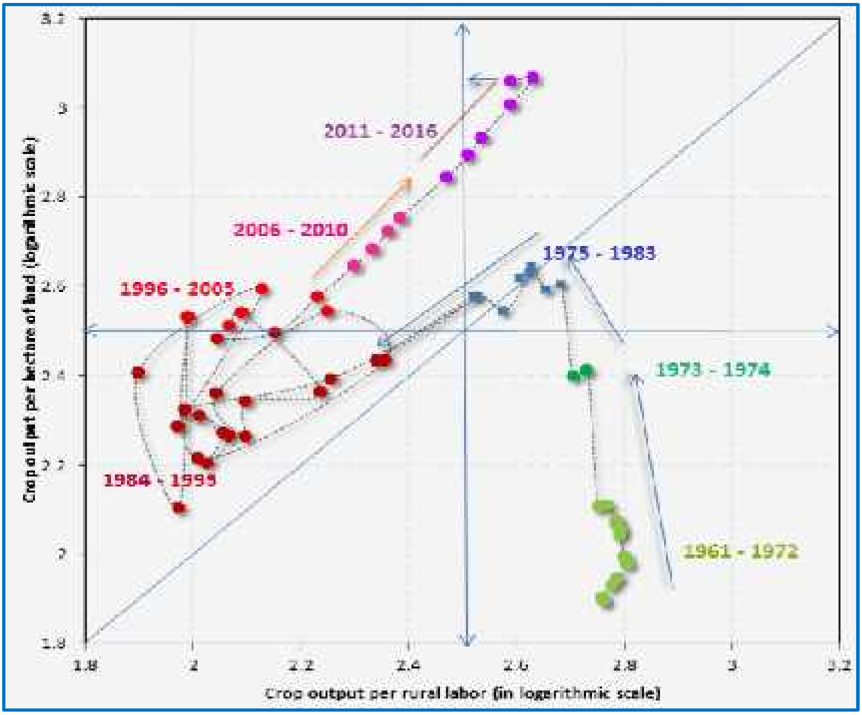
The purpose of this section is to evaluate the performance of the Ethiopian agriculture, in particular the crop sector, over the last five decades, determine the current relative position of the sector in terms of productivity that underlines agricultural transformation in light of the documented stylized facts.

8.2 Patterns of Land and Labor Productivity in the Ethiopian Crop Agriculture (1961 – 2016)

Ethiopian crop agriculture exhibited different paths of productivity between 1961 and 2016. There were in general four episodes of agricultural performances in the country based on labor and land productivities. The period 1961 to 1974 was characterized by a relatively higher productivity of labor with better average rural income. The period between 1975 and 1983 saw a shift towards more balanced productivity levels of labor and land probably due to the land redistribution that followed the famous rural land proclamation of the 1975. The third episode that lasted between 1984 and 2005 represented the worst performance of the agricultural sector with low labor and land productivities. It oversaw three major droughts that occurred in 1985, 1993 and 2003. The fourth period that spanned the years between 2006 and 2016 represents an episode of rising agricultural income mainly due to increase in land productivity.

The relatively higher labor productivity that has been observed during the late 1960s and early 1970s is associated with the higher land – labor ratio. Innervations by Food and Agriculture Organization (FAO) in the countrywide fertilizer trial program, the major package programs under the Third Five Year Development Plan of the Imperial Government of Ethiopia which focused on use of fertilizer, seed, and extension services are believed to have had positive impact on labor productivity probably due to expansion of activities to new arable lands. The introduction of first agricultural minimum package program in 1970 as an offshoot of the previous projects with the assistance of Swedish International Development Authority with the scaling up of the major package seemed to have increased both labor and land productivities. The program which operated between 1970 and 1974 during the Imperial Government and extended to 1978 under the Dergue regime aimed at providing incremental farm inputs and finance to purchase fertilizer, rural feeder roads, extension and support services, and credit facilities. The basic unit of the program was based on the principle of targeting 10,000 households covering an area extending 5 km on either side of a 75 km all - weather road. The basic unit area was further divided into five sub areas each of which having a market center and one hectare trial and demonstration plot [World Bank, 1980]. This program which was based on model farmer approach covered the major agro-ecological zones of the country. The participation of more farmers into the program and the intensification of modern inputs tended to push the productivity balance towards land productivity.

Figure 8.1: Patterns of Labor and Land Productivities in the Ethiopian Crop Agriculture



Source: EEA computations using data from National Planning Commission

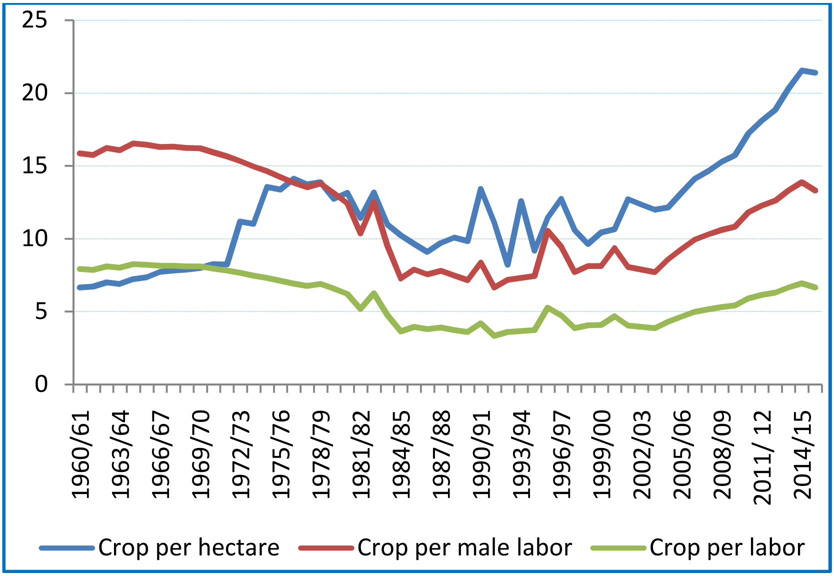
The year 1975 marked the redistribution of land to rural households. At the same time, the new regime that took power in 1974 overtook the first agricultural minimum package with a number of modifications due to the reform and political uncertainties. The first agricultural minimum package program was followed by the adoption of the second agricultural minimum package program in 1980s with the intention of considering innovations such as improved seeds, pesticides, better seed supply, soil preparation and planting procedures, and soil and water conservations along with fertilizer applications. This was aimed at erecting the blanket adoption of fertilizer regardless of variations in climatic conditions, soil type, and accessibility of rural areas in during the first minimum package program. The combination of the land redistribution and the interventions under the minimum package program tended to attract the participation of more labor into the agriculture and at the same time increased land productivity. This has been demonstrated by the movement of the relative labor and land ratio towards the 45 degree line for the period 1975 to 1983. This was however accompanied by a declining average per capita rural income.

Intensification of socialist principles in the agricultural sector such as collectivization, quota deliveries, and villagizations in mid 1980s and the incidence of the infamous famine that followed the server drought in 1985 dragged both labor and land productivities to the worst case scenario. Agricultural activities during the late 1980s were hampered by the climax of the civil war which ended with the collapse of the Dergue regime in 1991. Despite major efforts by the new government in the rural economy under the agriculture development – led industrialization (ADLI) strategy that was introduced in 1995, there was no a clear pattern of improvement in productivity. In general, Ethiopian agriculture had been in stagnation with low labor and land productivity failing to support the rural population for two decades between 1984 and 2005.

A clear pattern of improvement in land productivity began to emerge in 2006. Even though there is a general trend towards more labor productivity which apparently witness the high dependence on chemical fertilizer, labor productivity has also begun to rise in recent years. The decline in the share of labor force of the agriculture sector by 7.5 per cent between 2005 and 2013 is consistent with the tendency of the relative productivity of land labor towards the later. The rise in land and to some extent labor productivity in the agriculture sector is, however, challenged by the recent incidence of drought.

The trends in land and labor productivities in the crop sector in Ethiopia can also be shown in Figure 8.2. Labor productivity measured by crop output per male labor was in general greater than land productivity between 1961 and 1975. Considering both male and female labor force, labor productivity was still higher than land productivity between 1961 and 1972. During the period between mid - 1970s and mid - 2000s, both labor and land productivities were declining. The period between 2006 and 2009 saw a recovery in land productivity. Labor productivity has to yet keep pace with the level that was maintained in the 1960s.

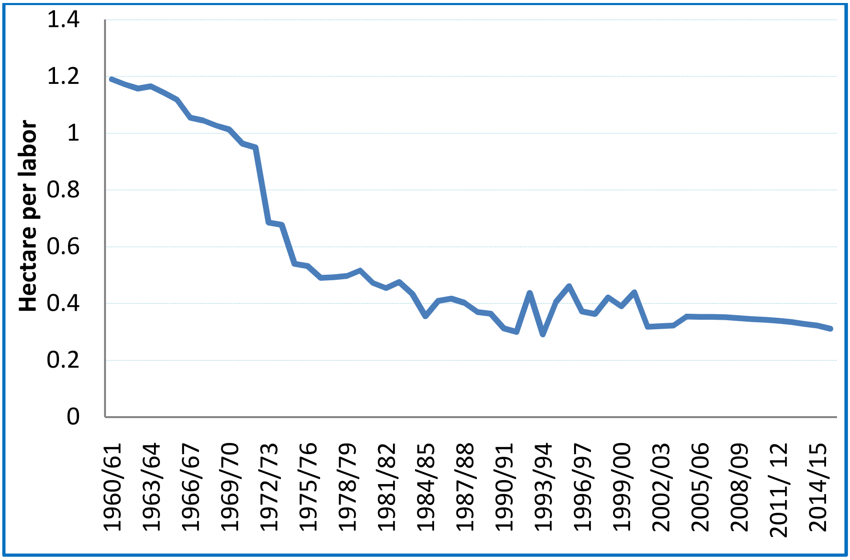
Figure 8.2: Trends in Labor and Land Productivity in the Ethiopian Crop Agriculture



Source: EEA staff computations using data from CSA.

An important feature that is usually shared by most developing countries is a declining land – labor ratio. Ethiopia had a land – labor ratio of 1.2 hectare per unit rural labor in early 1960s. This figure stood at 0.31 hectare per unit rural labor. Lack of overall structural change in the Ethiopian economy with its features of high population pressure in the rural sector led to the missed opportunities of transforming the agricultural sector in the 1960s and 1970s when land was not a major constraint. Ethiopia is currently faced with constraints of both fragmented land and high rural population pressure. One major avenue to restore the opportunity of increasing rural income through rising labor productivity in the agriculture sector is through simultaneous effort of deepening structural change in the overall economy that insures the movement of labor towards the nonagricultural sector.

Figure 8.3: Trend in Land–Labor Ratio in the Ethiopian Agriculture



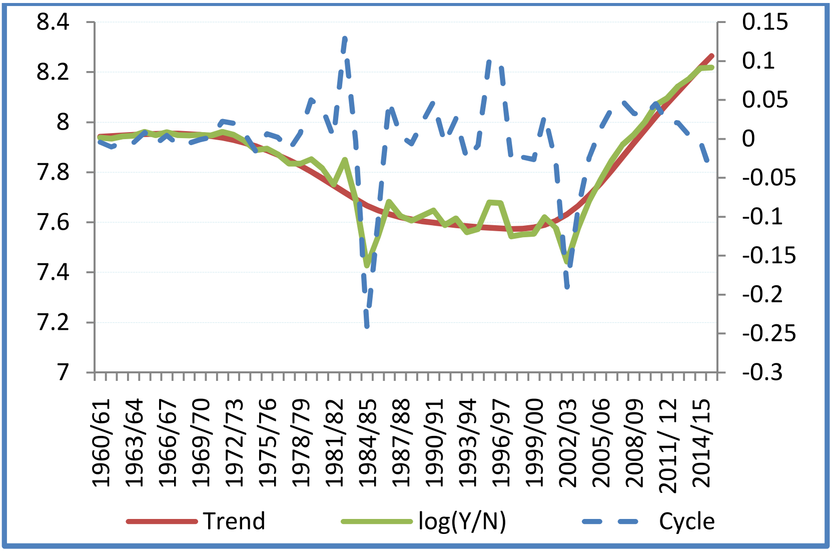
Source: EEA computations using data from CSA.

8.3 Trends in Rural Per Capita Income

The irregular patterns of labor and land productivities in the agricultural sector have been translated into erratic and unpredictable levels of income in the agricultural economy. The stable though not rising level of per capita income in the agricultural sector began to not only to fall but also to experience high volatility since mid – 1970s. Drought and war compounded the problems associated with policy gaps during the period between mid – 1970s and 2005.

Rural per capita income has begun to recover since 2006. The Ethiopian agriculture enjoyed a rising income with relatively sustainable growth in crop production mainly due to demand from the nonagricultural sector and government's intervention in the form of rural extension services.

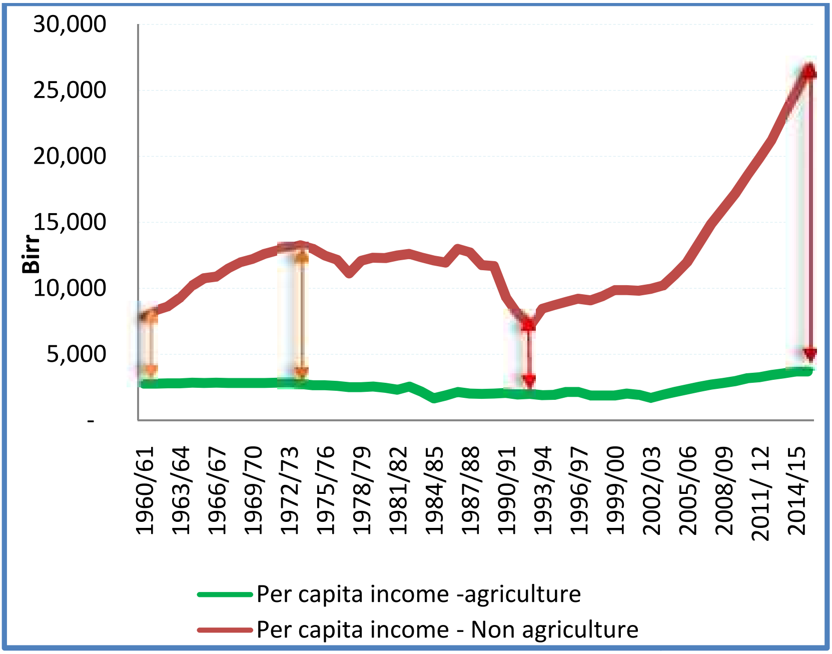
Figure 8.4: Trends and Patterns in per Capita Income in the Agricultural Sector



Source: EEA computations using data from NPC.

Nevertheless, the rise in per capita income in rural areas was not robust enough to narrow the gap between income in the rural economy and the nonagricultural sector. Per capita income in the nonagricultural sector in mid 1990s was four times higher than the level of per capita income in the agricultural sector. The gap has widened to seven fold in favor of the nonagricultural sector over the last three years since 2013/14. In the year 2015/16, per capita and income in the agriculture and nonagricultural sectors were, Birr 26,748, and Birr 3,709, respectively. Essentially, by the level of income in the nonagricultural sector, Ethiopia would have already been a middle income country! That is why a little change in the demographic balance between the rural and the urban sector tend to increase per capita income.

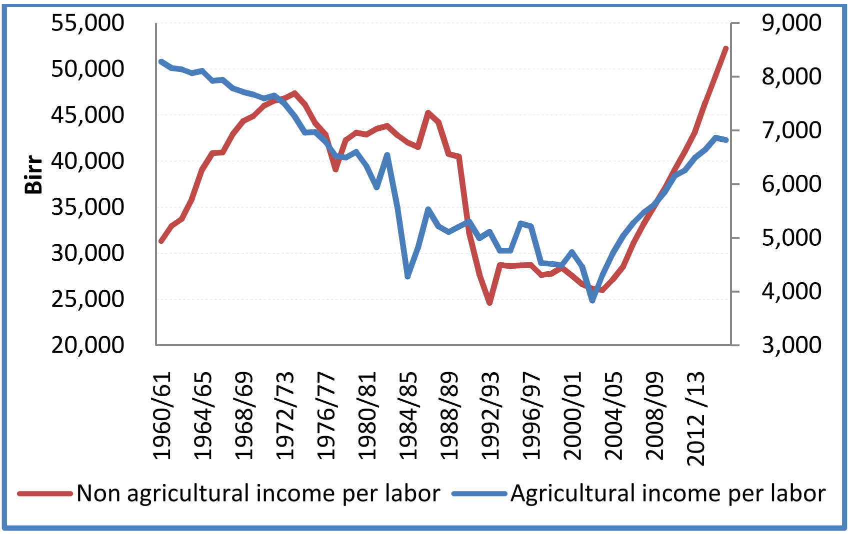
Figure 8.5: The Gap in per Capita Income between Agricultural Sector and Nonagricultural Sector



Source: EEA computations using data from NPC and CSA.

The difference in per capita income between the two sectors is primarily attributable to the difference in labor productivity. In 2004/05, an average worker in the nonagricultural sector used to earn about 27,200 Birr a year and a typical farmer in the rural economy used to earn 4,700 Birr – which is more than one – fifth of the income earned by a worker in non-agricultural sector. In 2015/06, the annual income of an average worker in the nonagricultural sector reached 52,200 Birr. The annual income of a farmer in the agricultural sector in 2015/16 was 6,800 Birr – which is more than one sixth of the income of an average worker in the nonagricultural sector.

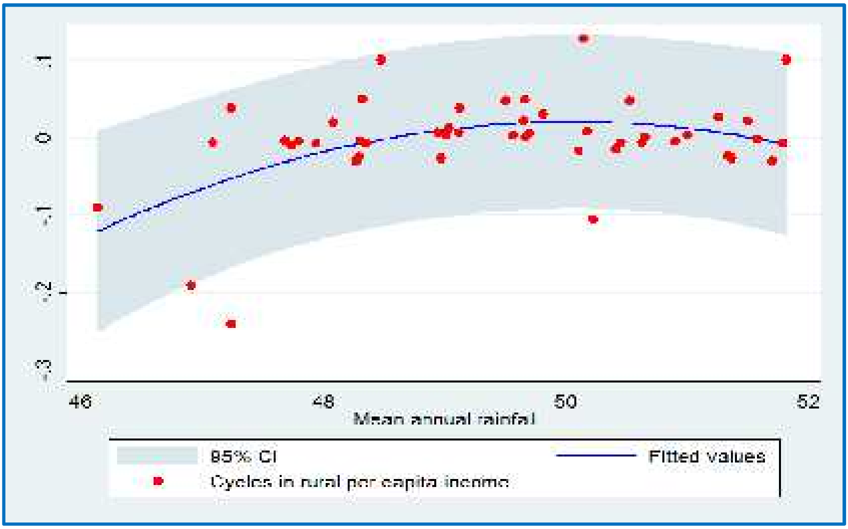
Figure 8.6: Differences in Labor Productivity in the Agricultural and Nonagricultural Sectors



Source: EEA computations using data from NPC and CSA.

In a typical transforming agriculture, the sector tends to compete with other sectors for resource and labor inputs so that rural wage would increase and thus income in the agricultural sector improve. Ethiopia being very far from that stage, the gap in productivity between the nonagricultural and the agriculture sectors and the ensuing difference in income is expected. Nevertheless, the susceptibility of the agriculture sector to shocks such as a onetime drought should be a subject of concern. The country faced three major and a number of minor drought years between 1975 and 2004. Two more major droughts challenged the development efforts in the sector in 2007/08 and 2014/15. The threat of drought is still lingering in the fiscal year 2016/17 in particular in the eastern and southern part of the country.

Figure 8.7: Patterns of Association between Cycles of Rural Income with Rainfall



Source: EEA staff computations using data from CSA and Ethiopian Meteorological Agency.

A cross plots of the cyclical components of the rural per capita income with rainfall shows a typical pattern of quadratic association between the cycles and rainfall (Figure 8.7). Both drought and excessive rainfall contributed to poor performance in the agricultural sector. That is, the impacts of efforts exerted in the agricultural sector to boost production heavily depended on the probability of availability good weather conditions. This situation indicates the level of the county's capabilities in the agriculture sector.

8.4 Capabilities in the Rural Economy

Crop production in the country grew at an average rate of 8.8 per cent between 2005/06 and 2013/14. According to official reports, rural poverty was reduced as the number of population below national poverty line dropped from 39.3 per cent in 2004/05 to 30.4 per cent in 2010/11. Why is that the rural economy failed to resist a onetime drought shock such as the one that occurred in 2014/15 and threatened the livelihood of over 10 million people? One plausible explanation is that Ethiopian agriculture lacks the basic components of transformation. Primarily, capabilities in the agriculture sector are yet to be transformed. Ethiopian agriculture still relies on oxen operated ploughs. Productions are highly stochastic depending on the probability of occurrence of suitable weather conditions particularly good and timely rainfall. Livelihoods are not significantly diversified still being dominated by traditional livestock and subsistent crop agriculture. Savings are made in kind usually in the form of grains. Asset formations are made in the form of livestock which are in turn susceptible to drought shocks and epidemics. There is a strong social duality in the rural communities where preferences are limited to what is produced within the sector implying less incentive to produce marketable surplus.

One important capability that is missing in the Ethiopian agriculture is irrigation infrastructure. Experiences from other countries show that not all countries need to invest heavily in harnessing their water resources to transform their agriculture. This option is, however, available only for countries with no problem of moisture or precipitation. Ethiopia's major constraint for its agricultural development is recurring drought. Ironically, the failure in crop and loss of livelihood due to drought in the country occurred in the face of huge surface and ground water resource the county is endowed with.

To be fair to Ethiopian authorities, this has long been recognized mainly beginning in 1950s. For instance, one of the recommendations of the mid-term evaluation of the first agricultural minimum package project in 1970s was that fertilizer applications had to be accompanied by, among others, harnessing water resources [World Bank, 1980]. Water and natural resource management was one major component of the second minimum package project during the Dergue regime. The Ethiopian government under the Ethiopian People Revolutionary Democratic Front (EPRDF) began to carry out ambitious plan on harnessing water resources and rehabilitation of degraded environment particularly in Tigrai, Amhara, and Southern regions in 1990s. Sustainable Environmental and Agricultural Rehabilitation in Tigray(SEART) and Sustainable Environmental and Agricultural Rehabilitation in Amhara Region (SEARAR) were once famous for their efforts to harness ground and surface water resources in their respective regions. Two decades later, irrigated land in the country is just 0.45 per cent of the total cultivated land. The drought is still creating havoc causing crops to fail and livestock to perish. The low level of irrigation scheme in Ethiopia sharply contrasts with the fact that 52 per cent of the arable land of South Korea is irrigated.

But where has all that effort gone? The answer is probably found in the institutional capacity of the country. Institutions tasked with developing underground water, constructing dams and diversion weirs, and disseminating water harvesting techniques might face technical glitches. Dissatisfaction with initial failures on technical aspects and the temporary flip of the climatic cycle to the favorable phase worked against the efforts. Once convinced with the indispensible importance of these capabilities, the right thing to do would be to stubbornly keep on working on the technical aspects until they master it and most importantly until the problem would no more be a major constraint.

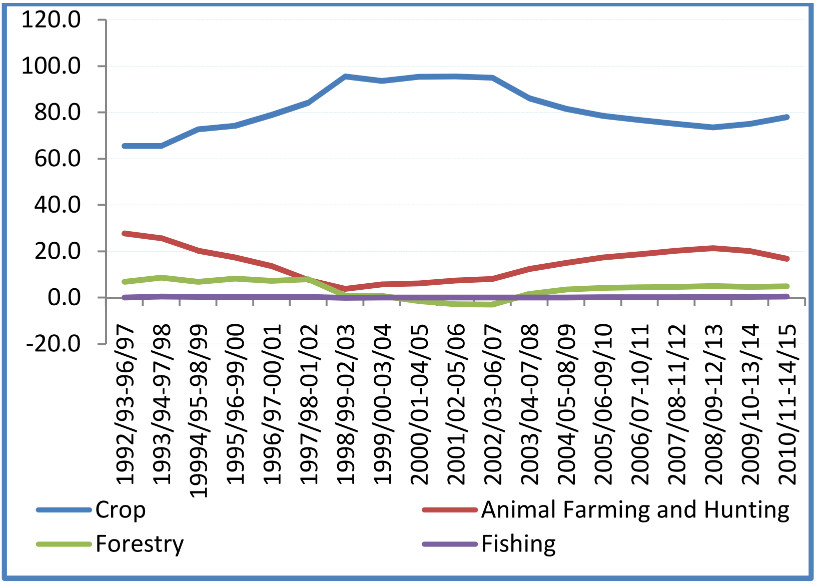
The other major capabilities that had been missing for long are agricultural machineries. Both small scale and nationally representative surveys indicate that more than 95 per cent of the rural farmers operate with traditional ploughs operated by oxen. A recent survey by Feed the Future in major regions such as Oromia, Amhara, South, and Tigrai indicated that 5.5 per cent of the respondents reported to have used machine to plough their plots either during the *belg* or *meher* seasons of the year 2015. Moreover, 9 per cent of the farmers responded that they used machine either to till their land or harvest their crops or thresh. About 77 per cent of those who used machines to prepare their land either rented the machine (64 per cent) or were provide by the government (3 per cent) [IFRPI –ESSP, 2016]. (Details of results of the EEA survey on rural capabilities in selected woredas are presented in the next chapter)

Another major capability that would help reduce vulnerability of farmers in the rural areas during adverse shocks such as drought is access to financial institutions. The conventional financial institutions are concentrated in urban areas. These institutions are less accessible to rural farmers. Rural microfinance institutions usually focus on provision of credits. Saving mobilizations by microfinance institutions are attached with credits.

8.5 Levels of Structural Change within the Agricultural Sector

The agricultural sector is dominated by crop production. Between 2010/11 and 2014/15 (GTP – I), crop accounted for 69.9 per cent of the value added and 78 per cent of the growth in the value added of the agriculture sector. The animal farming and hunting sector in contrast had a share of 21.1 per cent in the value added by the agricultural sector. It had a 16.8 per cent dynamic contribution of the agricultural sector. The static and dynamic contributions of the forest subsector to the value-added in the agricultural sector were, respectively, 8.9 per cent, and 4.9 per cent. Fishery had a negligible contribution (about 0.1 per cent) to the value added in the agriculture sector.

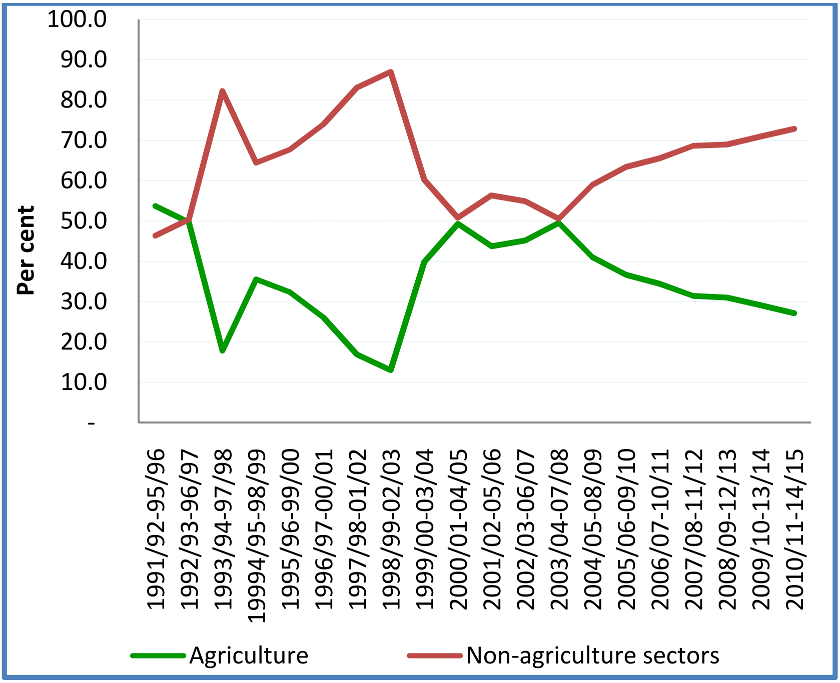
Figure 8.8: Dynamic Contribution of Subsectors to Value – Added in the Agricultural Sector (five years moving average)



Source: EEA computations using data from NPC.

One of the highest contributions to growth in GDP from the agricultural sector occurred during the period 2003/04 to 2007/08. Dynamic contribution of the sector to GDP during this period was 50.5 per cent. The sector's contribution to growth in GDP during the PASDEP (plan for sustained development to end poverty) that runs over the period 2005/06 to 2009/10 was 36.6 per cent. That means3.7 percentage points of the 10.2 per cent growth in GDP during GTP – I was the contribution of the agricultural sector. The sector's dynamic contribution to growth slowed down to 27.2 per cent over the period of GTP – I (2010/11 - 2014/15). The high share of crop in the GDP growth was overtaken by the construction sector during GDP.

Figure 8.9: Contribution of the Agriculture Sector to Growth in GDP (five year moving average)

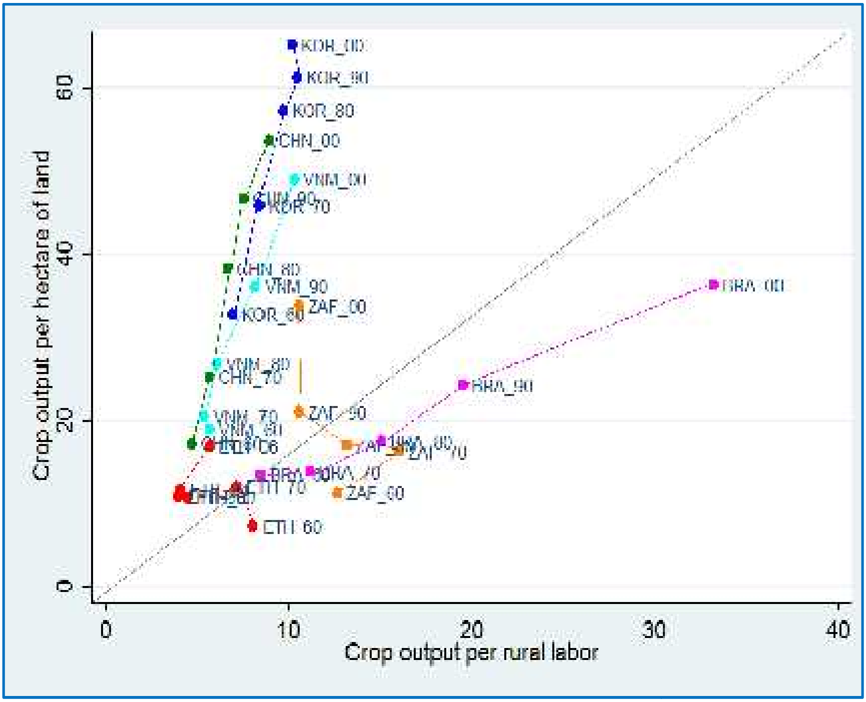


Source: EEA computations using data from NPC.

8.6 Comparative Status of Productivity in the Crop Agriculture

The patterns of changes in the labor and land productivities of the crop agriculture in Ethiopia that has been demonstrated in figure I does not necessarily depict the intensity of agricultural transformation. Periods of high land labor productivities in Ethiopia may still be one of the lowest by the standard of other countries which managed to undergo conventional agricultural transformation. To get a clue on the extent to which Ethiopia's agriculture is nearer to features of agricultural transformation, the performance of the Ethiopian agriculture has to be compared with other countries in terms of agricultural income, agricultural capabilities, land and labor productivity, and changes in the structure of rural economy in production, consumption and trade.

Figure 8.10: Patterns of Labor and Land Productivities in Selected Courtiers



Source: EEA computations using data from the World Bank.

In this report, more emphasis is given to the comparison of productivity levels in the crop agriculture in Ethiopia with patterns of changes in relative productivity of crop agriculture in a number of selected countries. The trend of relative productivity of land and labor in the crop agriculture of countries Brazil (BRA), China (CHN), Ethiopia (ETH), South Africa (ZAF), South Korea (KOR), and Vietnam (VNM) over the last five decades have been considered. Initial attempt to include other countries known for their success of agricultural transformation such as the US, Australia, and Canada were dropped due to their outlying performance in terms of labor productivity. Inclusion of other African countries such as Kenya and Botswana was a mere duplication of the pattern observed in the Ethiopian case.

Ethiopia had better labor productivity in the crop agriculture than China in 1960s (1961 – 1970). Ethiopia had also similar level of labor productivity in the sector with Brazil in 1960s. But the relatively higher land productivity in both China and Brazil implied that Ethiopia had no higher per capita rural income than the two countries. The performance of Ethiopian crop agriculture in terms of labor and land productivity for the period between 1971 and 2005 was in general behind the performances in the sector in the five countries considered in this study. Ethiopia's performance in crop agriculture in terms of productivity during the period between 2006 and 2016 is similar to the performance of the sector in China during the 1960s and in Vietnam in 1960s as well as 1970s. South Korea had already experienced a higher level of land productivity in its crop agriculture – a level which was surpassed by China in mid 1980s and Vietnam in early 1990s. In 2013, crop yield in quintal per hectare was 65 South Korea, 59 in China, 54 in Vietnam, 48 in Brazil, and 37 in South Africa. The 21.5 quintal per hectare level of yield Ethiopia had achieved in 2014/15 was achieved by Brazil in 1992, Vietnam in 1981, and China in 1970. By such productivity measures, the current Ethiopian agriculture is 23 years behind Brazil, 36 years behind Vietnam, and 45 years behind China. If crop yield in Ethiopia continues to grow at the average rate registered over the last five years (2011/12 – 2015/16), it would take twenty and fifteen years to reach at the current crop yield level of China and Brazil, respectively. By the time Ethiopian crop agriculture maintains the level of land labor productivities that have been achieved by Brazil in 2013, only 45 per cent of the current land under crop production and 14 per cent of the current labor force in the agricultural sector would be required to maintain the crop output that have been produced in 2016 in Ethiopia.

The path each country followed is worth investigating. South Africa and Brazil had initially pursued crop production in the direction of more labor productivity consistent with the abundance of land relative to their population. South Africa later shifted the path in the direction of land productivity in particular after early 1990s. This could be explained by the participation of black South Africans in owning land thereby reducing the land – labor ratio following the fall of the apartheid regime. South Africa is still behind agricultural transformation though the country is known for its industrial capabilities.

Brazil has consistently increased its labor productivity but at the same time keeping balance between using its land and labor resources. Comparison with productivity performance of the crop sector of the US, Canada, and Australia shows that land productivities in these countries is by far lower than other countries such as Denmark, UK, and France which chose to keep balance with both labor and land resources.

A common pattern in the crop agriculture of South Korea, China, and Vietnam is that all of these countries have higher land productivity compared to labor productivity. The direction to which these countries are heading in terms of productivity in crop production is consistent with the theoretical position where population growth is matched by higher yields due to higher labor input and technological change. Such gain in yield is sustained by technological capabilities that include machinery, human capital, and harnessing of water resources. For instance, South Korea increased one of its agricultural machineries from 0.1 tractors per 100 square kilometer in 1960 to 1,115 tractors per 100 square kilometer in 2000. In mid 1970s, 52 per cent of agricultural land of the country was irrigated. Moreover, these countries do not have problems of lack of precipitation with little challenge of recurring drought.

Which path should Ethiopia follow? An important clue that might be taken into consideration as to which path Ethiopia should follow in its effort to transform its agriculture is the land – labor ratio. Ethiopia had similar land – labor ratio with South Africa in 1960s. Land – labor ratio in both countries stood at 1.1 hectare per rural labor. Interestingly, both Ethiopia and South Africa had relatively higher labor productivity than land productivity. Currently, Ethiopia has a land – labor ratio of 0.35 hectare per rural labor. Among the countries considered in this study, all but Brazil had experienced a declining land – labor ratio. Brazil consistently increased its land – labor ratio from 0.6 in 1960s to 0.9 in 2000s. Its trajectory of relative productivity tended to move towards a balanced use of land and labor inputs. All other countries had land – labor ratio less than

0.3 (ranging from 0.15 to 0.23) when they began agricultural transformation. Another unique attribute of Brazil's agricultural transformation is that increase in productivity of its crop agriculture began relatively latter and was faster than in other countries considered. Crop yield in the country was 21 quintals per hectare in 1992. Ethiopian reached this level (21.5 quintal per hectare) in 2014/15. Ethiopia is in a better potion to follow the model of Brazil that keeps balance between its vast land and labor resources mainly focusing on labor productivity. An important potential for the country in increasing labor productivity in the agricultural sector is the low rate of urbanization. A steady moping of the rural labor force to the formal sector can be translated into a rising land – labor ratio and increase in labor productivity. Rural education can play a catalyst role in the process.

8.7 Lesson for Ethiopian Agriculture

Ethiopia has a long history of agriculture. With a declining land – labor ratio and deteriorating fertility of land, the agriculture sector struggles to sustain the rural livelihood let alone serve as a basis for the county's ambition of industrialization. Investigations of Ethiopian history of agricultural practices and experiences of other countries which succeeded in transforming their agriculture suggest some important lessons for the transformation of Ethiopian agriculture.

The first lesson is that agricultural transformation is less likely to occur in separation from over all structural transformation that involves a shift of economic activities from primary sectors to sectors of high productivity. While the modern nonagricultural sector benefits from the rural sector primarily in the form of cheap labor, the agricultural sector benefits in reciprocity from the nonagricultural sector. The benefit from the modern nonagricultural sector is many folds: the first is reducing underemployed labor force from the agricultural sector thereby improving labor productivity in the sector. The second benefit is production and distribution of modern inputs to the agricultural sector that are designed to suit the special needs of the Ethiopian agricultural landscape. The third benefit is monetization of the rural economy including access to financial institutions primarily to assist the transition of saving modalities from grain to options of modern portfolios including financial assets.

The second lesson is that episodes of rising income in the rural economy need to be accompanied by modern capabilities. In the Ethiopian case, there need to be insistence in harnessing water resource for perpetual use in the agriculture sector. Use of modern inputs such as fertilizer needs to be accompanied by other packages including and primarily harnessed water resource capability. The ploughs and the hoes should be replaced by machine operated agricultural capabilities. One possible obstacle for machine use in the Ethiopian agriculture is the fragmented land size in the hands of small farmers and train of the country. Two aspects are in order for consideration. First, agricultural machineries need not be owned by small farmers. Rural private entrepreneurs and cooperatives can specialize in renting agricultural machines. The second aspect which is related to the difficult train of the country in relation to its deterrence to mechanization is that every region of the country need not be self - sufficient in all agricultural production. Regions can specialize in major categories of producing staple crop, cash crop, and livestock.

The third lesson may point to the need to diversify the Ethiopian agriculture to potential subsectors. The existing underdevelopment in livestock resource, cash crop, and sideline activities in the rural area are potential for transforming the agricultural sector.
The fourth point is that fertilizer adoption and crop choice need to be purposeful and an outcome of rational decision by the adopter. Farmers can be induced with incentives but not dictated on their crop choice and preference of use of fertilizer. After all, fertilizer adoption depends on soil type, crop type, climate, and availability of other packages.

The fifth lesson is to understand that resources are limited and interventions in the agricultural sector need to be focused, demonstrative, and effective.

Chapter IX

Scenarios on the Possibilities of Transforming Smallholder Agriculture: A Case Study

9.1 Background

It is a valley that extends along 340 km strip of land from Shewa Robit to Alamata. It has a width of 6 to 20 km along East-West direction. The total land size of the valley is 411,025 hectares which is equivalent to 4,110 square kilo meters. Average land holding is 1.2 hectares per household. This is equivalent to a per capita land size of 0.26 hectare.

The major resource of the area is irrigable land. Both surface and ground water resource is available. The livelihood of the population is mainly crop agriculture and livestock farming. Sorghum, maize, and Teff are the major crops grown in the area. Average yields for maize, sorghum, and Teff in 2014/15 were 25.7, 17.4, and 10.5, quintals, respectively. Average crop per capita production stands at 2.3 quintals. Household income is usually augmented with significant production and sale of fruits and vegetables to urban markets such as Dessie, Woldia, Bahir Dar and Mekele.

Table 9.1: Some Features of the Study Area

Dimension:	340 km South-North by 6 to 20 km East-West
Land size :	4,110 km^2 (= 411,025 hectares)
Land per capita:	0.26 hectares
Land per household:	1.2 hectares
Major resource:	Irrigable land (surface and ground water)
Major livelihood:	Crop agriculture , livestock
Average crop yield in quintals per hectare (2014/15)	
Sorghum:	17.4
Maize:	25.7
Teff:	10.5
Weighted Average:	16.2
Average annual crop per capita (quintal):	2.3
Fruit, vegetables:	A good deal of fruit and vegetable supply
Major challenge:	Frequent drought

Source: Ethiopian Statistical Agency, Google map

One of the challenges in the area is recurring drought. Few agricultural households have access to irrigation schemes in the face of abundant underground water resource. Households in general produce surplus during good weather. Savings are usually in the form of grains and livestock. Saving in the form of grains is eventually consumed on festivities and traditional celebrations. Size of livestock is constrained by the limited and even declining pastoral land. Even worse, livestock are vulnerable to drought shocks. Apart from the traditional consumption behavior and preferences which involve very high discount rates, there is lack of access to financial intermediaries. This makes agricultural households vulnerable to shocks such as drought.

Figure 9.1: Map of the Study Area

Interventions need to involve the following packages of capabilities:

i. Harnessing water resources
ii. Rural infrastructure to encourage linkages
iii. Replacing the hoe and the plough with agricultural machinery
iv. Institutions

9.2 Harnessing Water Resources

The valley enjoys two rainy seasons. Following this pattern of rain, there are two cropping seasons called *meher* and *belg*. The belg harvest accounts for 10 to 12 per cent of the total annual harvest in the whole country. A failure in either or both of these seasons of harvest due to late rainfall or complete drought leads to a situation where many households expect food handouts. Harnessing the surface and ground water resources of the valley enables small farmers to increase number of production cycles from one to two and even three times a year. A reliable access to irrigation scheme also reduces risk so that farmers allot a significant portion of their land for the production of high value cash crops.

Increasing the number of cycles of crop harvest would double the current crop production of 6.6 million quintals to 13.2 million quintals under the current land productivity of 16.2 quintals per hectare. If this effort is accompanied by an increase in land productivity from 16.2 per cent to 25 per cent, the boost in crop production from the valley alone would be enough to sustainably ensure the food consumption requirement of Eastern Amhara and Southern Tigray at a per capita crop of 2.2 quintals.

While increasing the number of cycles of production through harnessing the available water resources would have a positive impact on the volume of production, even a more important role of irrigation infrastructure is its capability to shield small farmers from drought.

Table 9.2: Annual per capita crop production under different productivity scenarios

	Annual per capita crop	Assumption on productivity	
		16.2 q/h	25 q/h
The status quo	District (Woreda)	2.7	4.1
	East Amhara and Southern Tigray	0.7	1.1
Doubling crop season	District (Woreda)	5.4	8.3
	East Amhara and Southern Tigray	1.4	2.2
Tripling crop season	District (Woreda)	8.3	12.8
	East Amhara and Southern Tigray	2.1	3.3

Source: EEA survey

The 2015/16 fiscal year was characterized by a drought endangering the livelihood of over ten million people in Ethiopia. The Shewa Robit – Raya valley was also affected by the drought. A study was conducted to evaluate the impact of access to irrigation infrastructure on the resilience of small farmers to drought shocks by interviewing 325 rural households. Data on land management, crop production, and access to irrigation infrastructure was collected for the fiscal years 2014/15 and 2015/16. There was normal harvest during 2014/15 fiscal year while crop failure is reported for the harvest period of the 2015/16 fiscal year due to the El Niño incidence.

Among the total households interviewed, 35.5 per cent of them had access to irrigation infrastructure. The majority of the beneficiaries of irrigation infrastructure depend on stream water using diversion weir developed by the government. Others make use of ground water facilities developed by the government. Still some had the courage to develop their own underground water facilities in areas where ground water can be traced in the range of four to five meters deep. About 10.8 per cent of the agricultural households own water pumps.

During the drought year, crop production for the sample households fell by 17.7 per cent which was mainly due to the incidence of drought. Agricultural households who had access to irrigation schemes managed to mitigate the impact of drought. Crop output for those households with access to irrigation facilities grew by 6.4 per cent. The severity of the drought can be seen by the fact that crop production of the households with no access to irrigation facilities fell by 34.6 per cent. Households in some districts in the study area found a way to escape a complete crop failure by sawing crops with shorter gestation period. The research also shows that a non-trivial number of households in some districts faced a complete crop failure.

The main implication of this result is that harnessing water resources by equipping households with better capability in addition to efforts of increasing agricultural productivity ensures sustainable food security. Interventions in rural development programs need to be based on critical gaps which when addressed can surely improve livelihoods.

Table 9.3: Role of Irrigation Infrastructure in dealing with Drought Incidences

Percentage of households with access to irrigation infrastructure (%):	35.5
Change in crop production for all households in the sample (%):	-17.7
Change in crop production for households with access to irrigation (%):	6.4
Change in crop production for households with no access to irrigation (%):	-34.6

Source: EEA survey data

Figure 9.2: Irrigated Farm in Some Villages – North Wollo

Whenever there is access to irrigation infrastructure, farmers can produce crops and vegetables more than once in a year.

9.3 Replacing the Hoe and the Plough with Modern Agricultural Tools

Important factors of production in agriculture are agricultural tools and machineries. They increase productivity of land compared to farms tilled with hoes and oxen operated plough. More importantly, unlike assets in the form of oxen and other livestock, agricultural machineries are not susceptible to drought shocks. However, machineries such as tractors and threshers were not options for small scale agriculture. First, there are high costs of acquisitions of such machineries for individual farmers. Second, landholdings among smallholder agricultural units are fragmented and are too small to be operated by agricultural machineries such as tractors.

Table 9.4: Ownership of agricultural tools

Asset	Proportion of households owning the asset (per cent)
Hoe	94.5
Plough (complete set)	92.6
Hammer, saw, mallet	31.7
Sickle	96.9
Shovel, spade	72.6
Axe	93.8
Modern plough operated with engine power	1.8
Modern plough operated with non-engine power	4.3
Tractor	0.0
Water pump	10.6
Sprayer	16.9

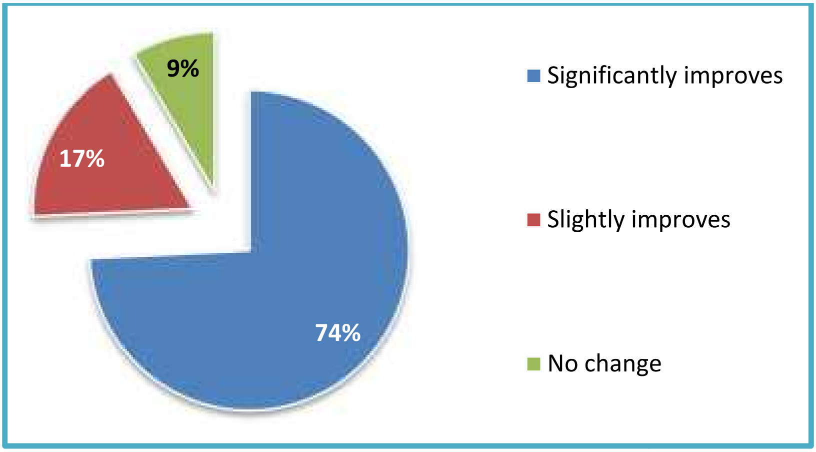
Source: EEA survey

In the Shewa Robit – Raya valley, there is little change in the position of ownership of agricultural tools and machineries. About 93 per cent of respondent farmers still use traditional ploughs while only 1.8 per cent own simple modern plough operated by engine power. An important development is that 10.6 per cent of the respondents own water pumps and about 17 per cent of them own sprayers.

A new development in the Shewa Robit-Raya valley is that some small holder agricultural units rent tractors irrespective of the size of their plots of agricultural land from owners of tractors. The proportion of rural households in the 13 kebeles (the lower administrative units) covered by the study which rented tractors ranged from nil to 20 per cent. In villages were purposive sampling was conducted based on the number of users of agricultural machineries, 45 per cent of the land owned by small holder farmers was tilled using tractors.

The first advantage of farmers who use tractors over those who use oxen pulled plough is enhancement in agricultural productivity. Some 74 per cent of the respondents who rented tractors to till their land in the past 12 months believed use of tractor significantly improved land productivity. Another 17 per cent believed that their decision to use tractor to till their land has slightly improved land productivity. Only 9 per cent believed there was no change in land productivity as a result of tilling their land with tractor.

Figure 9.3: Perception of smallholder farmers on the impact of using tractors on land productivity



Source: EEA survey

An interesting finding of the study is that using a rented tractor is much cheaper than using oxen pulled plough to till a plot of land. The average price of a pair of oxen at the current price is estimated to be 21,242 Birr. With 10 years longevity of an ox, depreciation of a pair of oxen is estimated at 2,124.2 Birr per annum. Average annual cost of animal feed per pair of oxen is about 1,513.5 Birr. Wage paid to cattle herder is estimated at 3,828.8 Birr per year. Estimated cost of veterinary medicine for the oxen is 55 Birr per year. While such costs are incurred as a result of owning oxen, the pair of oxen is normally used for a maximum of three weeks in a year.

Average price of a set of ploughs per year is estimated at 548 Birr. Considering other direct costs such as wages paid for oxen operator during tilling, total cost of tilling a hectare of land using a pair of oxen is estimated at 9,217.5 Birr.

Indirect or opportunity costs include the foregone revenue from selling oxen. Farmers can sell a pair of oxen at an average annual turnover of two with gross revenue of 32,005 Birr. Moreover, there are risks of mortality of oxen due to disease and drought. A 1 per cent probability of losing a pair of oxen is a risk to the owner costing Birr 2,124 per annum in value of livestock, in this case oxen. These components result in a total economic cost of Birr 43,346.50.

Table 9.5: Comparison of Cost of using Tractor and Traditional Plough

Average price/value of pair of oxen (Birr):	21,242.00
Longevity of an ox (years):	10.00
Average annual cost of animal feed per pair of oxen (Birr):	1,513.50
Price of plough (Birr):	548.00
Annual wage for cattle herder (Birr):	3,828.80
Daily wage for tilling a hectare of land (Birr):	82.00
Cost of vet medicine per year (Birr):	55.00
Average number of days required to till a hectare of land using oxen pulled plough:	5.00
Depreciation of a pair of oxen (Birr/annum):	2,124.20
Total cost of tilling a hectare of land using oxen (Birr):	9,217.50
Annual opportunity cost in Birr of keeping oxen (a turnover of two per annum):	32,005.00
Cost of risk of mortality of oxen due to disease and drought (Birr):	2,124.00
Economic cost with no risk of cattle loss (Birr):	**41,222.50**
Economic cost with risk of cattle loss (Birr):	**43,346.50**
Cost of leasing a tractor (Birr/hectare):	2,383.00
Total cost in two rounds of tilling using tractor:	**4,766.00**

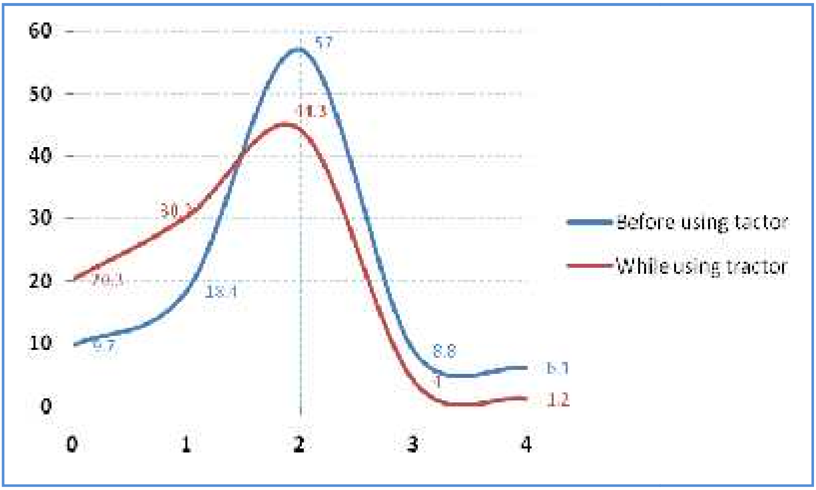
Source: EEA survey

On the other hand, at a rate of 2,383 Birr per hectare, two rounds of tilling a hectare of land by renting a tractor costs 4,766 Birr. It is apparent from this analysis that even without considering differences in productivity gains, the difference in cost effectiveness of production between the two modes is significantly high in favor of renting in tractor.

Ethiopia ranks first in Africa in terms of livestock population and yet, meat processing industries are constrained by lack of livestock at a commercial scale. While the country is believed to have a comparative advantage in leather industry, firms are constrained by shortage of good quality hides and skins. Hides and skins are either in short supply or are damaged due to traditional skinning practices. The reason behind this seemingly paradoxical situation of large number of livestock population and an apparent shortage of live animals for the country's emerging industries is that livestock in the rural area are held in the form of assets and/or for farming activities. While a large number of oxen in farming communities are held as a factor of production, an even larger livestock population roaming in the pastoral communities is held in the form of an asset whose produce such as milk and meat are consumed within the pastoral communities.

Harnessing the livestock resource would generate an opportunity for economic growth in the country and would provide a better livelihood for rural communities. One way of increasing livestock surplus and at the same time improving rural livelihood is making oxen operated plough redundant in the farming practice by replicating the emerging cases of tractor renting from larger farming communities. In the case study of Shewa Robit- Raya valley, rural households were asked if they sold their oxen because they did not need them any more as they started tilling their plots of land using rented tractors. About 18.7 per cent of the respondents who tilled their plots of land using tractors responded that they had sold their oxen for the sole reason that they did not need the animals for their farming activity any more. A further analysis on the data showed that the distribution of oxen ownership shifted over since 2011 for households which used tractors to till their land. Some 9.7 per cent of respondents who rented tractors recently had no oxen five years ago. During the sampling year, 20.3 per cent of the households who used tractors had no oxen. During the same period, the proportion of households who had one ox increased from 18.2 per cent to 30.2 per cent. However, proportion of households who owned a pair of oxen fell from 57 per cent to 44.3 per cent during the same period. Similarly, the proportion of agricultural households who owned 3 and four oxen dropped. In general there might be many reasons behind the decline in the ownership of oxen operated by households in the sample. Nevertheless, the fact that 18.7 per cent of the respondents sold their oxen specifically for the reason that they began tilling their land using tractors is an appealing story to tell. An intervention can help on how to maximize revenues from the sale of oxen. Fattening a limited number of livestock and at the same time increasing the turnover of selling the animals could result in better financial returns and a change in livelihood.

Figure 9.4: Actual Change of Distribution of Oxen Ownership between 2011 And 2016



Source: EEA survey

9.4 Constraints

Perceived constraints

Households were also asked about the major constraints they face in their agricultural activities. Lack of access to irrigation infrastructure, small land size, and high prices of chemical fertilizers were the top constraints. About 62 to 66 per cent of the respondents said that limited access to irrigation schemes, small land size and high prices of fertilizers were the major constraints.

Low productivity of land and lack of engine operated agricultural machines constitute the second level constraints in the households' agricultural practices. For about 47 per cent of the households, low productivity of land is a major problem. For another 30.5 per cent of the households, low productivity of land is somehow a constraint.

An important observation from the survey is that some 41 per cent of the respondents consider lack of agricultural machineries as a major constraint in their farming practices. For another 29 per cent of the respondents, agricultural machineries are somehow constraints. This implies that the introduction of modern agricultural machineries such as tractors has induced small farmers to consider these tools in their technological choice.

Table 9.6: Farming Constraints as Perceived by Agricultural Households

	Major constraint	Slightly a constraint	Not a constraint
Irrigation (access)	65.2	17.2	16.6
Land (small size)	61.8	21.8	16.3
Fertilizer (high price)	61.8	20.6	17.5
Land (low productivity)	47.1	30.5	22.5
Machinery (lack of modern machine)	41.4	28.6	29.8
Labor (high wage rate)	28.9	30.5	40.6
Pests	28.3	34.5	37.2
Land (inability to buy or sell)	22.5	29.5	48.0
Access to market and road	22.2	23.7	54.2
High yielding variety	17.5	30.5	52.0
Labor (few wage workers available)	12.6	25.5	61.8
Shortage of rain	9.2	0.3	0.0
Fertilizer (timelines)	4.6	29.8	65.5
Fertilizer (access)	2.8	25.5	71.7
Natural disaster	2.8	0.0	0.0
Lack of oxen	1.2	0.0	0.0
High price of tractor	0.6	0.0	0.0
High price of pesticide	0.6	0.0	0.0
Crop disease	0.3	0.0	0.0

Source: EEA survey

High labor wage rate is a major constraint for 29 per cent of the respondents while pests are a major problem for 28 per cent of the respondents. Some 22.5 per cent of the respondents think that absence of land market (inability to sell or buy land) is a major constraint. For another 30 per cent of the respondents, land policy is somehow a constraint for their agricultural activities. A non-trivial number of respondents also think that limited access to markets and roads, limited supply of high yielding variety seeds, and shortage of labor (wage workers) are additional farming constraints. Labour in particular is characterized by high rate of migration towards the Middle East. As a result, land belonging to migrants can be operated by hired labor. This tends to push wage up making difficult for farmers to competitively hire workers during pick seasons. Average daily wage in the study area ranges between 80 and 100 Birr for male workers and 60 to 80 Birr for female workers. In some villages, daily wage for male workers is as high as 120 Birr. This has an important implication for transformation within agriculture and in the overall economy as well. While the emergence of the labor market within the agricultural sector with a better wage is an important development for the livelihood of the farming community, higher wages in the agricultural sector may push the price of food and thereby threaten the competitiveness of the much anticipated manufacturing sector.

Institutions

Lack of continuity: If harnessing water resources is indispensible for sustainable food security and agricultural transformation, why didn't the government invest enough in this venture? Indeed, the regional governments of Amhara and Tigray have long recognized the critical importance of developing water resources to deal with drought shocks as early as the 1990s. The Sustainable Environmental and Agricultural Rehabilitation in Amhara (SEARAR) and the Sustainable Environmental and Agricultural Rehabilitation in Tigray (SEART) were tasked with harnessing the available water resources in the valley. Budgets had been allocated to construct dams, diversion weirs, develop underground water, and water harvesting ponds. The campaign-like effort began to deliver in the first years. However, technical failures, and high turnover of experts challenged the operation of the institutions at their full capacity. Above all, drought normally challenges the area once in ten years so that authorities lose focus.

Social duality

While the population in this area covers only a small portion of the zone as well as the Woreda population in general, why in the first place farmers exert more effort to produce surplus which could be enough to feed the entire region anyway? An important concept that characterizes rural transformation is social duality. The rural society has in general its own choice of technology, production decisions, consumption preferences, and institutional setups. The survey shows that about 90 per cent of the consumption demand of households is met by products of the agriculture sector itself. Aspirations are limited to demands that can be met by the agricultural supply. This has implications on decisions of surplus production. If structural transformation is a shift of economic activities from sectors of low productivity to sectors of high productivity, rural households or members of rural household have to transform thereby reducing pressure on the agricultural means such as land. A lack of desire to change the status quo due to the long-held consumption and broadly speaking livelihood preferences has a dual impact. First, there will be a lesser motive to produce surplus beyond what is needed to meet the near subsistent level of consumption. Second, the status quo is meant a larger family size thereby threatening the sustainability of rural livelihood due to diminishing land size.

An important intervention to break the social duality in favor of agricultural transformation is education. However, the relatively high wage in the informal sector vis-à-vis the wage rate in the formal sector means less demand for education. The smallholder informal agriculture itself is paying a relatively higher wage than the formal sector. A daily wage of 120 Birr is equivalent to a 3,600 Birr monthly salary. However, a college graduate earns a monthly salary which is by far less than this not mentioning the duration of unemployment a graduate has to bear before he or she gets employed. Rural infrastructure such as roads, electricity, and financial institutions are other means of altering the current social duality. It is interesting to observe in some villages of the study area is that provision of electricity induced many household to own satellite receivers and TV sets. While this is in itself an induced demand, information through television networks can further induce rural households to change their preferences towards manufactured goods. A rise in demand such as this would be an important objective to be met by producing more marketable surplus.

Financial institutions

A significant portion of rural income is saved in the form of grains and assets are held in the form of livestock. Grains are destined to an eventual consumption in traditional celebrations. Assets that are held in the form of livestock are among the most vulnerable to drought shocks. One way of breaking such social duality is introducing financial institutions in major rural centers. Few aspirants among the individuals in this survey reported that they travel 30 to 60 km to deposit their savings in modern banks. There is not even a concept of livestock insurance among the farming household interviewed.

Specialization

Supposing that proportionally a small number of rural households in the study area can produce surplus which can be enough to ensure food security of the region, rural transformation can happen only when it affects the livelihood of the larger population in the region. One way of transmitting the generated surplus towards improving the livelihood of the larger population is through specialization. Both the East and West massifs of the valley under study do have a potential for livestock farming. The West massif is a highland known for its sheep population. The East massif is endowed with cattle and goats. Specialization maximizes crop productivity in the valley generating surplus and livestock production in the East and West massifs which in general would improve livelihood in both communities through trade.

Moreover, increase in the cycles of production implies higher demand for labor. Workers from adjacent districts can offer their labor in surplus producing areas. New consumption patterns leads to higher demands for manufacturing goods and modern services. Following increased income, migrants from other districts can specialize in rural enterprises and other sideline activities.

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