



Rapid Assessment

GENDER AND
AGRICULTURAL
MECHANIZATION
IN ETHIOPIA



MARCH 2020
UN WOMEN ETHIOPIA



Defining Mechanization

Since the dawn of time, technological innovation has contributed significantly to humankind's success. From the discovery of fire, to the introduction of the wheel, iron and electricity, we – as people, have been constantly seeking means of bettering our existence. Truly, with the introduction of machines and mechanization, humans took their game to a new level. And with the vast improvements that machines brought to our lives, the mechanization of virtually everything 'human' was here to stay – for better or worse.

However, in the developing world, many have yet to reap the benefits of mechanization. Particularly women. Despite that females provide two thirds of Africa's agricultural labour, the majority of women on the continent continue to miss out on the rewards of several millennia of human innovations. If Africa is to move forward in its quest for greater human development, this is a circumstance which urgently requires attention. For girls to have genuine opportunity to fully see through an education, and for women to realize substantive economic empowerment, more time – and so less agricultural labour – are necessary requirements. Thinking otherwise is undoubtedly putting the cart before the diesel thresher.

Subsequently, this document is a technical review of how Ethiopian women farmers might gain more access to agricultural mechanization. However, to begin, it is important to consider how the concept has been defined over the years.

Considering G. D. Aggarwal's thoughts on mechanization, the noted Indian engineer defined the concept as, *'Farm mechanization is a term used in a very broad sense. It not only includes the use of machines, whether mobile or immobile, small or large, run by power and used for tillage operations, harvesting and thrashing, but also includes power lifts for irrigation, trucks for haulage of farm produce, processing machines, dairy appli-*

ances for cream separating, butter making, oil pressing, cotton ginning, rice hulling, and even various electrical home appliances like radios, irons, washing machines, vacuum cleaners and hot plates.'

According to Dr. Bhattacharjee the process is described as, *'Mechanization of agriculture and farming process connotes application of machine power to work on land, usually performed by bullocks, horses and other draught animals or by human labor.'*

In harmony with the above, Dr. C. B. Memoria noted when thinking about mechanization, *'It [mechanization] chiefly consists in either replacing, or assisting or doing away with both the animal and human labor in farming by mechanical power wherever possible.'* *"Mechanization may be either partial or complete. It is partial when only a part of the farm work is done by machine. When animal or human labor is completely dispensed with by power supplying machines, it is termed as complete."*

In summary, the mechanization of agriculture broadly exists in one of two forms. Either mobile mechanization, or stationary machinery. The former attempts to replace animal power of which agriculture has depended since time immemorial, while the latter aims at reducing the drudgery of meticulous labour usually performed by humans. Either would greatly aid in allowing Ethiopia's most vulnerable an authentic participation in their education, or pursuit of greater economic privilege and independence. Sadly, and unlike mechanization, humans have yet to invent efficient systems which fully realizes such a circumstance. Perhaps this document will be the first small step for those many Ethiopian female agriculturalists waiting for these innovations.

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ACRONYMS

AM	Agricultural Mechanization	SDGs	Sustainable Development Goals
EATA	Ethiopian Agricultural Transformation Agency	SDGPP	Sustainable Development Goal Philosophy Platform
EARI	Ethiopian Agricultural Research Institute	SDPRP	Sustainable Development and Poverty Reduction Plan
ECO	Ethiopia Country Office	UNESCO	United Nations Educational, Science and Cultural Organization
FAO	Food and Agricultural Organization	USAID	U.S. Agency for International Development
FGD	Focus Group Discussion	WCYD	Women, Children and Youth Directorate
GOE	Government of Ethiopia	WEE	Women Economic Empowerment
GTP	Growth and Transformation Plan	RBOA	Regional Bureau of Agriculture
HoF	House of Federation	RARI	Regional Agricultural Institute
KII	Key Informant Interview	ATVET	Agricultural Technical and Vocational Education Training
MDGs	Millennium Development Goals	HIMI	High and Intermediate Mechanization Implement
MOA	Ministry of Agriculture	LMI	Low Mechanization Implement
NGO	Non-Governmental Organization		
PASDEP	Plan for Accelerated and Sustainable Development to End Poverty		

EXECUTIVE SUMMARY

Though a large number of the Ethiopian population reside in rural areas and are mainly dependent on agriculture, the development of agriculture through mechanization is very low. Yet mechanization is believed to reduce labor, cost and energy, in order to improve production and productivity within agriculture. Recognizing the importance of such innovations in Ethiopia, as well as a pressing need for improving and promoting agricultural mechanization, UN Women in collaboration with the Women, Children and Youth Directorate (WCYD) of the Ministry of Agriculture (MOA) commissioned a team of consultants to conduct a rapid assessment considering gender in agricultural mechanization in the country, and prepare a report.

This report on gender and mechanization is presented to inform the agricultural mechanization policy currently under development, and so add value to the process by introducing gender responsiveness. As such, consultants assessed current practices in gender and mechanization in the country, as well as key challenges and opportunities for the promotion of agricultural mechanization in rural households. Additionally, this report aims to provide substantive policy recommendation on how agricultural mechanization in Ethiopia may be more gender responsive.

A number of approaches and methodologies were undertaken in this assessment, including stakeholders' discussions and consultations, as well as desk reviews of secondary data on documents and research outputs on the topic. Moreover, the researchers implemented key informant interviews to generate primary data from government representatives, CSOs/NGOs, research centers, the private sector and other partners. Finally, data was analyzed and proposed policy recommendations have been made.

In Ethiopia, various gender policies, strategies and projects exist, and which are relevant to agricultural mechanization. Generally, the Government of Ethiopia (GoE) has supported women's involvement in the overall socio-economic development of the country through the institutionalization of issues surrounding women, youth and children, and through the Ministry of Women, Youth and Children Affairs (MoWYCA) which is found at both regional and district levels. A predominant pillar strategy¹ in the Growth and Transformation Plan (GTP), was

that of better realizing the potential of women in Ethiopia. As such, female representation at the national level in the House of Federation (HoF) was improved with a 50/50 gender representation within the Federal Cabinet. An extremely positive initiative for enhancing women's involvement in Ethiopia's development. And with respect to women in agriculture, the Ministry of Agriculture (MoA) has established a Women, Children and Youth Directorate with a priority of addressing women's issues in agriculture, as well as aiding greater access to agricultural mechanization and linkages with female stakeholders. However, shortcomings do continue to exist.

Women constitute half of the rural farming community in Ethiopia, and contribute significantly to household food production.² Yet, despite playing such a significant role, many challenges hinder women from exploring their full agricultural potential. And this is important as women's role in Ethiopian agriculture is prominent such that females are involved in the majority of farm labour including, seed cleaning, sowing, planting, weeding, applying fertilizer/manure, pesticides, threshing and harvesting. Additionally, rural women are also tasked with significant domestic work, and so often carry a heavier burden than their male counterparts. It is women who wake early and go to bed late, and who are responsible for a daily work routine that involves care and maintenance of the home and family, and requires child care, food preparation, fetching water, fuel collection, home-gardening,

¹ Source: GTP1 document, 2010

² <https://www.jica.go.jp/english/gender/background/pdf>

tending animals and housekeeping.³ Yet, technological innovations can drastically reduce women's chores and save valuable time. However, a significant caveat for a great deal of technology is that most of this equipment is generally suited for what is often considered traditional men's work, but are seldom designed 'women's' labour. For example, tractors are available for tilling, but not much exists for weeding or post-harvest handling – primarily women's work. To alleviate this quandary, this research paper has identified an existing need for gender sensitivity along the agricultural mechanization value chain.

Over the past several decades, the GoE prioritized a strong focus on agricultural development, with particular emphasis given to the development of agricultural mechanization. In this context, and in collaboration with the Ethiopian Agriculture Transformation Agency (EATA), the MoA prepared a national agricultural mechanization strategy for Ethiopia, and which is currently used for strategic policy direction in the country. Different studies and assessments assure that from the three levels of agricultural mechanization, hand tool, animal and mechanically powered technology, farmers in Ethiopia largely depend on the first and second, but have limited access to the third level, mechanical power technologies.

Yet, institutions promoting mechanization in Ethiopia exist, including Haramaya University, which has linked education research with extensive work in various aspects of agricultural engineering. Other institutions such as, *Melkassa Agricultural Research Center, Agricultural Mechanization Research Directorate* within EIAR with regional counterparts, Bahir Dar, Mekele, Assella, Bako, Jimma and Fedis agricultural mechanization research centers under Tigray, Amhara and Oromia Agricultural Research Institutes have also made important contributions. Moreover, private institutions/companies have been pivotal but efforts are required. Among these, *Selam Vocational Training Center, Anglophonic Engineering, Ameo Engineering* have been prominent.

In this light, to further improve agricultural mechanization in Ethiopia a number of forums and meetings have been conducted by both

Government and donor organizations. For example, in collaboration with the MoA's Women and Youth Directorate (WAYD/MoA), UN Women organized forums in which all stakeholders participated. Likewise, the Ethiopian Network for Gender Equality for Agriculture (ENGEA) conducted two workshops to discuss the issue of gender and agricultural mechanization involving stakeholders from Government, NGO's, development partners and research centers.

From these seminars, observations surrounding Ethiopia's agricultural mechanization included stronger emphasis and priority given to Governmental policy and strategies that focus on gender, indigenous knowledge and introduction of promising household and group-level agricultural technologies. Moreover, it has been well argued that enhanced Governmental focus on the commercialization of agricultural, and an authentic commitment to engage youth in agricultural work would provide better opportunity for agricultural innovations in the country.

Conversely, challenges exist for such a project, and include hurdles such as, inadequate capacities surrounding the management, operation and maintenance of mechanization facilities; limited knowledge on prevailing technologies; hindered access to finance; imperfect access to leading research, and, a limited impetus of farmers themselves. Complicating this situation, a dearth of female-friendly technologies exists, and which further constrain the enhancement of agricultural technologies in the country.

Thus, the following recommendations were given to promote gender and agricultural mechanization in Ethiopia:

- A need for promotion of gender responsive agricultural mechanization technologies;
- Enhancement of gender mainstreaming and coordination between WAYD/MoA and the Agricultural Mechanization Directorate;
- Realization of gender-focused finance surrounding agricultural mechanization;
- Provision of subsidies for female farmers to access loans with low interest rate;
- Better connection between female farmers and the agricultural extension system;
- Promote and conduct women focused capacity building activities;

³ CASCAPE, 2019 Gender Analysis in CASCAPE Interventions: Gender-based roles and constraints in agricultural production.

- Enhance private sector involvement with more gender focus on agricultural mechanization development and dissemination;
- Improve and facilitate women's access to agricultural information systems;
- Improve agricultural marketing and value chain systems;
- Enable all actors participating in technology development and dissemination to understand gender dimensions;
- Identify the technology needs of women farmers, promote and support production and dissemination of technologies which reduce women farmers' work burden and saves time;
- Pilot technology dissemination which specifically addresses the needs of women farmers;
- Identify and support women farmers in technology adoption and promote various forms of media to influence wider audience;
- Assess and document best practices for further learning and dissemination;
- Develop strategies that address wider policy issues on gender and technology development and dissemination;
- Empower female youth farmers to access agricultural mechanization.

1. Background

In Ethiopia, more than 80 per cent of the population resides in rural areas, and mainly depends on agricultural production for their livelihoods in which women provide the significant portion of the agricultural labour force (70%)⁴ in these communities. However, their contributions in agriculture are often largely unrecognized and there is restricted access to resources and community participation. Moreover, the agricultural technologies, especially most of the farm mechanizations, don't consider female farmers and are not gender responsive.

Yet, empirical research indicates that agricultural mechanization saves both time and labor for small-scale farmers, and is increasingly available in rural areas. It is still believed that mechanized approaches are required for increased productivity and reducing post-harvest loss, and are viewed as necessary for transforming and promoting sustainable commercialization and modernization of smallholder agriculture. However, women's needs and interests are often not fully considered when the machines are developed, introduced and adopted by communities.

Responding to this context, Government developed a *National Agriculture Mechanization Strategy* in 2014 which attempted to incorporate gender aspects. However, there has not been any analysis undertaken to understand the extent to which the strategy was implemented and gender concerns addressed. During the *Third Agricultural Mechanization Forum*, held in Bahir Dar, December 21, 2018, the need for developing agricultural mechanization policy was discussed. As a way forward, it was agreed to conduct a policy gap analysis would be conducted. Afterwards, evidence-based findings would be presented to UN Women Ethiopia for the production of a knowledge product that informs policy decisions and influences implementation of the *Ethiopian National Agricultural Mechanization Strategy* in a more gender responsive manner.

Subsequently, UN Women's Women Economic Empowerment (WEE) Unit is working to create opportunities for women living in rural areas by enabling access and control over productive resources and inputs such as land, climate smart technologies and technical knowledge. To ensure women are economically empowered and benefit from economic development policies and programmes the WEE Unit further supports networks and coordination of activities on gender equality and women's empowerment (GEWE) issues. This is done in partnership with Government and other development partners. In this regard, with the purpose of critically analyzing gender responsiveness of the agricultural mechanization strategy and practices within the context of Ethiopia, UN Women recruited consultants to undertake a rapid assessment for the development of a policy paper on gender and agricultural mechanization in Ethiopia. Thus, this report has been prepared as guidance for high-level policy considerations surrounding agricultural mechanization in Ethiopia.

⁴ Women's Affairs Directorate of MoANR (2016) Gender Equality Strategy for Ethiopia's Agriculture Sector. Long version published September 2016.

2. Objective of Rapid Assessment

2.1 General Objective

The major objective of this assessment is to develop a report and policy brief on gender and mechanization and provide clear recommendations which inform the agricultural mechanization policy development process while strengthening enforcement of the existing agricultural mechanization strategy in a gender responsive manner.

2.2. Specific Objectives

- To assess current practices in agricultural mechanization in Ethiopia with gender in mind;
- To assess key challenges and opportunities in promoting and using agricultural mechanization in rural households of Ethiopia;
- To make high level policy recommendations on gender responsive agricultural mechanization in Ethiopia.

3. Methodology and Approach

The following methodologies were utilized for this document's data collection and analysis:

3.1 Stakeholders Discussion in the Workshop

Discussions were facilitated during the *National Gender in Agricultural Mechanization Workshop* organized by *Ethiopian Network for Gender Equality for Agriculture (ENGEA)* held June 6-7, 2019. Facilitators used this opportunity to capture issues raised during presentations by different researchers, development practitioners, and discussions made by participants, as well as hearing thoughts and experiences shared by women

Primary data review participants

No.	Affiliation	Stakeholders
1	Government	MOA - Women, Children and Youth Affairs Directorate, Agricultural Mechanization Directorate, Extension Directorate, MOA - Marketing Directorate, Ethiopian Agricultural Transformation Agency (ATA), Rural Land Use and Administration
2	Civil Society/ INGO	BENEFIT, GIZ and CYMMIT, CCAFS
3	Research Centers	Melkassa Research Center, Oromia Research Center, EIAR
4	Private Sector	Selam Children Village, Selam GRO Engineering PLC, Ameo Engineering, Wubshet and Guadegnochu Engineering
5	Development partners	FAO, UN WOMEN, SWWAE, Sasakwa Global 2000
6	Other	ENGEA advisory group

farmers currently employing agricultural mechanization. During the meeting, best practices from women farmers, private organizations, NGOs were shared regarding how female friendly agricultural mechanization technologies save labor, time and labor for women in agricultural production.

3.2 Review of Secondary Data

Researchers also undertook a desk review to analyze existing secondary data by conducting a thorough review of documents and research outputs in gender and agricultural mechanizations in Ethiopia. Also reviewed were the various existing policies, strategies and programme documents with respect to agricultural mechanization, women's economic empowerment, agricultural extension programming and gender issues in AGP, PSNP, SLM and other national ventures. Moreover, researchers explored current legal frameworks related to land issues in the country. Additionally, numerous global research initiatives related to gender and agricultural mechanization were reviewed, with particularly consideration paid to African experiences.

3.3 Key Informant Interviews

Primary data was obtained from key stakeholders such as Government, the private sector, research institutions, and civil society organizations operating in Ethiopia. Key informants interviewed are listed in the table below. To maintain consistency in these interviews, several semi-structured questionnaires/checklists were developed for discussion guidance, and may be found on pages 14 and 15 at the end of this document.

4. Overview of Gender Policies, Strategies and Plans in Ethiopia

In Ethiopia, 80 per cent of the population resides in rural areas, and women provide the majority of the agriculture labour within these communities. However, women's access to resources and community participation are usually mediated through men – either fathers or husbands – and their agricultural contributions often go largely unrecognized.⁵ Additionally, when women have access to their own income, they are more likely than men to spend it on the betterment of families, such as savings or school fees for children. Strong evidence exists of positive links between women's economic empowerment and foundational health outcomes for families, including beneficial effects on nutrition, family planning, maternal mortality, and child mortality.⁶

Yet, the Government of Ethiopia (GoE) has supported women's involvement in the overall socio-economic development of the country. For example, the GoE has institutionalized the issues of women, youth and children in numerous departments and ministries, as well as establishing an independent ministry dedicated to these affairs. Likewise, the *Ministry of Women, Youth and Children Affairs* is also represented in regional governments of Ethiopia, and with regional bureaus further cascading to district level like other ministries.

Another example of the GoE's interest in women's development is the *Eight Pillar Strategies*, developed under the *Plan for Accelerated and Sustainable Development to End Poverty (PASDEP)*, and which have been guiding important strategic directions pursued under the *Sustainable Development and Poverty Reduction Plan (SD-PRP)* – which also suggests new policy priorities for women. With a major focus on growth, for instance, and also with particular emphasis on the greater commercialization of agriculture and enhancing private sector development, industry, urban development and scaling-up efforts to achieve the Millennium Development Goals (MDGs). Among these pillar strategies⁷ unleashing the potentials of Ethiopia's women was one of the strategic directions developed.

On another important note, until recently, women's representation in the House of Federation (HoF) – at the national level, lacked proportional regional shares in both 3rd and 4th election terms.⁸ However, in the 5th election there were greater numbers of women's political empowerment/representation in public, political decision-making positions, which is in line with policy guidance of the '*National Gender Equality Policy*' which aims for effective gender equality and women's empowerment in Ethiopia.

Additionally, one of the pillars of the *National Growth and Transformation Plan II* focuses on gender. In short, the plan states that the promotion of women's empowerment, participation and equity within the country's national development is of high importance. As such, Government has demonstrated high commitment to empowering women by encouraging participation in democratic systems, social-economic initiatives and the development of cultural processes. The plan explicitly outlines women initiatives to facilitate access to credit and ownership of productive assets. Additionally, the plan forwards policy designed promote gender equality in education, employment, and create a conducive environment for female students through the expansion of female teacher numbers. Similarly, emphasis exists for the plan to enhance women's ownership of land and other fixed assets; eradicate violence against women and children, and other harmful practices; eliminate gender-based discrimination practices; and, revise political decision-making processes with gender equality in mind.

Finally, Ethiopia is a signatory to the *Beijing Platform for Action (1995)* and has also endorsed both the *Millennium Development Goals (2000)* and the *Sustainable Development Goals (SDGs) (2015)*, demonstrating genuine commitment to gender equality. For example, the SDGs⁹ set goals for the achievement of gender equality and empowerment for all women and girls, and which was also fully incorporated and harmonized with the GTP II.

⁵ USAID working document. 2014.

⁶ <https://www.gatesfoundation.org/equal-is-greater/our-approach/>

⁷ GTP1 document, 2010.

⁸ Journal of Law, Policy and Globalization; Assessment of Gender Equality in Ethiopia: The Position of Ethiopian Women's Political Representation from the World, Sub-Saharan Africa, and Eastern Africa Ethiopian by Okock, O, Asfaw, M, 2004.

⁹ <https://sustainabledevelopment.un.org/sdgs>

5. Women and Agricultural Mechanization in Ethiopia

Women constitute half of the rural farming community in Ethiopia, and contribute 70 per cent of household food production.¹⁰ Despite playing such a significant role, many challenges exist that hinder women from realizing their full potential in Ethiopia. One central obstacle is access to extension services by female-headed households. While there is limited data on the rate of Extension Service accessibility by Ethiopian women, anecdotal evidence does exist which suggests women significantly lag behind male counterparts. And this is genuine cause for concern.

For instance, according to FAO, providing women farmers equal access to productive resources could increase farm yields by 20 to 30 per cent and raise total agricultural output by between 2.5 – 4 per cent.¹¹ Similarly, addressing gender inequalities at national levels would contribute an estimated 1.9 per cent increase in Ethiopia's GDP.¹² Further, investment in women's farming income would carry a ripple effect of improving household nutrition, children's schooling, and the ability of the household to generate savings. Realizing this, both National Growth and Transformation Plans (I and II) clearly articulate the need for supporting women's institutions and targeting at least 30 per cent female-headed households (FHHs) in all extension services.¹³

Yet, one of the easiest means for enhancing agricultural production is directly rooted in mechanization, particularly when considering rural women farmers. As women's role in agriculture is prevalent in all aspects of commercial agriculture, including seed cleaning, sowing, planting, weeding, applying fertilizer/manure and pest management, threshing and harvesting, it may be clearly argued that authentic need for technological innovations would go a long way to enhancing the above noted goals of increased agricultural production and income growth.

However, rural women also conduct domestic work and are generally busier than males. They are responsible for daily work that involves care and maintenance of the household and includes child care, food preparation, fetching water, fuel collection, home-gardening, tending animals and housekeeping.¹⁴ As such, assistance with efficiencies are required, and agricultural mechanization could dramatically reduce women's workload and facilitate greater achievements. Yet, experiences in many countries, and Ethiopia in particular, show the promotion, adoption and benefits of mechanization are not gender-neutral. And of the few mechanized technologies that are adopted, many address only challenges related to men's tasks but do little for women. Moreover, of the many tasks designated as 'women's work', such as weeding, a majority of these jobs are usually labour-intensive and the most time consuming. Additionally, when the few mechanized devices available to smallholder farmers are accessed, trainings for these devices are most often organized by extension services – a resource generally inaccessible by many women. Thus, the utilization of agricultural technologies by Ethiopian women remains limited.

While many of the above circumstances are related to a variety of reasons, one critical problem is that of relatively little policy focus which addresses women's capacities to access agricultural mechanization technologies.

¹⁰ Ministry of Agriculture, 1992.

¹¹ FAO. 2014. Socio-Economic Context and Role of Agriculture. Food and Agriculture Policy Decision Analysis (FAPDA) Country Fact Sheet on Food and Agriculture Policy Trends: Ethiopia. www.fao.org/economic/fapda/tool, accessed on 23.02.2016.

¹² Elissa Braunste. GEM-IWG Working Paper 07-4, March 2007: 6.

¹³ GTP I, 2011-2015.

¹⁴ CASCAPE, 2019. Gender Analysis in CASCAPE Interventions: Gender-based Roles and Constraints in Agricultural Production.

6. Status of Agricultural Mechanization and Gender in Ethiopia

In the past, the GoE rightly made strong focus on agricultural as a driver of national development, and much emphasis was given to the mechanization of agriculture for the country. For example, in collaboration with the ATA, the MoA prepared an agricultural mechanization strategy which is currently used for strategic guidance of agricultural development within Ethiopia. However, a simple visit to any agricultural community in Ethiopia clearly demonstrates that of the three levels of agricultural mechanization, Ethiopian farmers are largely dependent on the first and second which involve significant farmer labour. These include hand-driven technologies employing only humans themselves, and archaic animal approaches which employ domesticated animals for their source of power. However, the third level, i.e. that which utilizes mechanical power, remains rare in Ethiopia.

In terms of academic attention for the mechanization of agricultural practices in Ethiopia, a number of initiatives have operated over the last several decades. Started in 1959 at Haramaya University, the *Agricultural Engineering Programme* sought to link education research with extension work in various aspects of agricultural engineering. Likewise, in 1976, the *Agricultural Mechanization Research Unit* was hosted at the *Melkassa Agricultural Research Center* and still serves as an apex unit in the country for agricultural mechanization. In 2000, the *Agricultural Mechanization Research Directorate* was established within the *EIAR* and recently the same directorate setup under the MoA. Parallel restructuring also took place at the regional level, and some regions have established their own research programmes on mechanization. As such, the *Bahir Dar Mechanization and Food Science Research Center*, exists under the *Amhara Agricultural Research Institute*, the *Mekele Mechanization and Rural Energy Research Center*, operates out of the *Tigray Agricultural Research Institute* and the *Assella, Bako, Jima and Fedis Agricultural Mechanization Research Centers* were established under the *Oromia Agricultural Research Institute*. Within the MoA, there is also similar restructure under the regional Bureaus of Agriculture.

Recently a number of alternative agricultural mechanization institutions and companies were established and now work in partnership with public research institutes. The contributions of

private institutions/companies are significant still require greater interest. Among these, the *Selam Vocational Training Centers*, *Anglophonic Engineering*, *Ameo Engineering* and others are contributing to the development of agricultural mechanization technologies in Ethiopia.

To further improve Ethiopia's agricultural mechanization, especially in terms of greater focus for women's involvement in the sector, different forums and meetings have been organized and conducted by government and donor organizations. For instance, in collaboration with the Women's and Youth Directorate, under MoA (WAYD/MoA), UN Women Ethiopia organized several Gender and Agricultural Mechanization Forums in which all stakeholders under government, private sector, community representative women organizations, CSOs, donors and other development partners participated. Subsequently, agricultural mechanizations and gender's progress, opportunities, challenges and future were discussed and used as guidance for this report. During these forums, various best practices and initiatives were presented by a number of actors who advised how improvements for agricultural production and productivity might be realized, particularly with respects to gender and agricultural mechanizations in mind. Among these technologies, *Enset Processing Technologies*, were discussed in depth and included Enset Scraper and Fermentation Technologies, Datxa Extraction Technologies, hatchery technologies, and dairy technologies.

7. Opportunities, Challenges and Gaps in Gender in Agricultural Mechanization

7.1 Opportunities in Agricultural Mechanization

Key opportunities regarding agricultural mechanization in Ethiopia were found to be the following: (1) emphasis and priorities should be given to agricultural mechanization, as well as a new strategy considered for the country that includes gender issues; (2) indigenous knowledge and introduction of promising household and 'group level' agricultural mechanization technologies utilization should be considered; (3) need exists for Government's strong political commitment, as well as encouragement of the private sector involvement in agricultural mechanization development; (4) need exists for demand creation initiatives which target skilled and semi-skilled

youth and encourages the adoption of modern labour saving technologies; (5) research centers should continue the development of innovative mechanized prototyping, piloting and disseminating for use at the community level; (6) enhanced involvement of other ministries, such as the *Ministry of Innovation and Technology* and the *Ministry of Women Children and Youth Affairs* in the project of researching existing female friendly agricultural technologies for smallholder farmers; (7) Government should consider tax exemption on major agricultural mechanization technologies imported from abroad; and, (8) cluster-based approaches for agricultural production suggests promise for the expansion of agricultural mechanization.

Finally, real need exists for increased Governmental focus which seeks to shift the country towards the agriculture approaches which utilize mechanization, and should include the expressed articulation of an authentic need for mechanization, as well as improved agricultural extension systems through demand-driven, market-focused and multi-dimensional extension services for the promotion of improved technologies and best practices greater food security.

7.2. Challenges of Gender and Agricultural Mechanization

These challenges can be explained as technical constraints and knowledge gaps: (1) inadequate awareness of agricultural mechanization management as operation and maintenance of agricultural mechanization facilities, (2) inadequate knowledge on improved agricultural mechanization, (3) low access to finance for agricultural mechanization, (4) poor coordination in disseminating research outputs and initiative to farmers, (5) inadequate existing women friendly technologies can be mentioned as a major challenges.

On-farm work is labor-intensive and time-consuming just like the reproductive work. On top of their domestic chores, women spend their time in the farm performing different tasks such as cultivation, sowing, weeding, fertilizer application, harvesting and storage. Keeping of livestock and other associated activities like milking, milk processing and fodder collection are also carried out by women.

Overall, women have a heavy work load; they have much less leisure time and sleep than men. On average, women indicated that they are busy for 17.6 hours per day during the peak season.¹⁵ Thus, agricultural mechanization can have a significant impact for reducing women's work and can significantly reduce their time and labor, while increasing productivity and production.

One of the main challenges is general thinking in agriculture that agricultural output is produced by men and therefore technology needs only to consider the men's role in agriculture. Technologies are tested mostly only on men. Therefore, technologies' effectiveness related to ergonomic considerations is mainly based on ergonomic measurements of men. Women generally have fewer avenues to let their needs be known by researchers and technology developers. Women in agriculture are bound by time constraints and are much less consulted by extension and researchers. Furthermore, women are less mobile than men because of their household responsibilities that require their constant presence and socio-cultural norms.

In addition, female-headed households appear to be the most disadvantaged group. For male-headed households (MHHs), the gender gap is explained by men's decision-making power and control of productive resources, as well as their potential disregard for women's interests and labor time. Apart from this, lower educational levels and technical skills may prevent women from using farm machinery. In addition, social norms may regard mechanized tasks as inappropriate for women. However, these barriers do not restrain women in all cases. Mechanization frequently entails a renegotiation of labor with unpredictable outcomes; women may mechanize their own tasks or transgress into male domains, while elsewhere female jobs may be turned into male enterprises as soon as they become mechanized and profitable.¹⁶

¹⁵ Cascape, 2019. Gender Analysis in CASCAPE Interventions: Gender-based roles and constraints in agricultural production.

¹⁶ World Bank, 2008. van Eerdewijk and Danielsen, 2015.

The constraints in Agricultural mechanization can be categorized in the following:

Technology Design

- Lack of adequate attention given to women-friendly technologies and taken as technologies are neutral and do not consider ergonomic difference of men and women;
- Needs identification and planning does not meaningfully involve women;
- Inadequate recognition of gender roles in agriculture;
- Insufficient agricultural mechanization development skill throughout sectors;
- Insufficient information about types of available female technologies.

Technology Dissemination

- No deliberate effort to target women farmers;
- Low level of literacy of women compromises their capacity to understand, appreciate and use new technologies;
- Farmers are not sufficiently aware of technology opportunities;
- Female farmers do not receive reliable information and advice;
- Poor access to effective forms of credit;
- Poor holistic view of the full market system;
- Lack of geographic presence.

Technology Adoption

- Limited due to female farmer's poor access to information and knowledge on technologies, affordability, accessibility, and applicability;
- Technologies developed do not include women's perspective and are not attractive for adoption – extension and support services are not oriented to needs. Engrained cultural biases affect new technology adoption;
- Female Farmers lack regular access to technology basic services;
- Topography and soil type (including fragmented land);

- Inadequate maintenance and repair services;
- Farmers' lack of confidence in output markets reduce adoption.

8. Stakeholders' Roles and Responsibilities in Addressing in Agricultural Mechanization and Gender Issues

Broad based stakeholders are being involved in agricultural mechanization realization in Ethiopia. These stakeholders are engaging gender issues in their implementation process. The major stakeholders here include government organizations, private companies, Non-Governmental Organizations and smallholder and commercial farmers. Below are some of the key direct stakeholders' status in realizing their roles and responsibility in gender involvement in agricultural mechanization.

8.1 Government

The Ministry of Agriculture is responsible for developing the overall national agricultural and rural development strategies and policies for Ethiopia, along with input and support from the regions and other stakeholders. Within the MoA, the Mechanization Directorate oversees the agricultural mechanization program. The Mechanization Directorate coordinates implementation of this strategy in collaboration with regional counterparts. Additionally, the Mechanization Directorate takes the lead role in organizing joint planning, monitoring and evaluation sessions to align stakeholders in the sectoral strategy. The MoA's continued engagement on the agricultural mechanization value chain – both through the Mechanization Directorate and other directorates (Input, Extension) – is essential for the overall success of the agricultural sector. The Extension Directorate also oversees services used to promote and popularize new technologies and practices through the public extension system. The Extension Directorate works closely with counterparts at the Regional Bureau of Agriculture (RBoAs), and zone and district levels offices.

Likewise, research of agricultural mechanization occurs through the Ethiopian Institute of Agricultural Research (EIAR), who is responsible for the design, implementation and coordination of federal-level agricultural research, and the Regional Agricultural Research Institutes Regional Agricultural Research Institutes ((RARIs), which

are expected to conduct inquiries based on various agro-ecologies to identify region-specific needs and recommendations. EIAR and RARIs collectively form the National Agricultural Research System (NARS). Together, they contribute and play an important role in developing and disseminating research on best practices for Ethiopian smallholder farmers.

Similarly, there are also agricultural universities and Agricultural Technical and Vocational Education Training centers (ATVETs) in country who work in agricultural technology implementation and dissemination on a piloted basis. These academic institutions also work in training and building the capacity of professionals in the fields of agricultural engineering, while working at different levels of agricultural institutions.

In many government institutions, the priority of gender issues in agricultural mechanization is limited. Though assigned gender experts exist little attempt is made to consider gender issues within agriculture in general, and agricultural innovations in particular. The experts and Development Agents (DAs) are evaluated by other activates and the gender task they performed are not taken as part of their job evaluation and so that less attention is given by professionals.

8.2 Private Stakeholders

During field surveying researchers contacted a number of organizations working in agricultural mechanization, including: *Selam Children Village*, *Selam GRO Engineering PLC*, *Ameo Engineering*, *Wubshet* and *Guadegnochu Engineering*.

Essentially, these locally-based organizations utilize skilled blacksmiths who are primarily responsible for the production of a majority of basic agricultural implements – often referred to as *low mechanization implements* (LMIs) – and including items such as the traditional plow (marshal), sickles, and wegel.¹⁷ Often, these suppliers are a form of secondary income generation, however, some are professionalized artisans who also informally employ others.

¹⁷ A pair of metal made loops used to join maresha with other plough attachments.

Conversely, a number of privately owned small and medium enterprises (SMEs) supply a majority of agricultural equipment used in Ethiopia, often through the production of units, and then selling directly to the RBOAs or farmers through informal channels. Examples of these implements would be sickles, ploughs or stationary threshers. The majority of these products would be LMIs, yet, some organizations do produce both Intermediate Mechanization Implements (IMIs), as well as (HIMIs). Frequently, companies who produce HIMIs are larger in size – considering market size, facilities and access to capital – and are private entities that often have pre-existing relationships with foreign suppliers. Due to the significant investment required, such as financing, facilities, and technical resources, HIMIs-type entities need to supply mechanized agricultural equipment at scale. However, producing or importing medium/large agricultural machinery into Ethiopia is capital intensive and often requires significant financing, as well as intensive capacities. As such, only a limited number of entities in Ethiopia can accommodate this type of activity currently.

As such, large foreign industrial agricultural companies provide the majority of equipment, such as those used in highly developed economies. And while much of this technology has been developed by large manufacturers, their products remain applicable to Ethiopia, but enjoy a relatively limited local presence. In fact, most organizations are represented by agents/distributors, and so almost no design/adaptation is implemented for the Ethiopian market and/or smallholder practices. This includes organizations which purchase goods with the aim of reselling, either as wholesale or retailer. This also includes companies who act as a sole importer of agricultural machinery with the aim of re-selling, as well as those who work at a regional level and may handle multiple brands.

There are also private sectors organizations which provide fee-based labour output, irrespective of the type of skill involved. These services include both organizations who implement mechanized services to other farmers/recipients (such as tilling or harvesting), as well as organizations who support the operational functionality of machines, such as engineers and mechanics.

In either of the above describe service-delivery approaches, gender is not adequately considered, nor taken as a priority issue by these business

operations. Thus, real need exists for Government to encourage the private sector to further address gender disparities in the agricultural mechanization service sectors.

8.3 Development Partners

Development partners such as UN agencies, unilateral and multilateral organizations, embassies and others have contributed their part to agricultural mechanization in Ethiopia. NGOs also play a valuable role in the promotion and dissemination of technologies, providing an alternative to the public extension system. In general, these development organizations have better gender inclusion strategies in their development programming and great interest in addressing gender issues in agricultural development.

8.4 Smallholder Farmers

Smallholder farmers, defined as female and male farmers who own less than 2 hectares of land, make up around 90 per cent of the farmers in Ethiopia.¹⁸ They are the ultimate users and beneficiaries of agricultural mechanization, and therefore a participatory approach is critical in all stages and sectors of the agricultural mechanization system. This includes the determining of which types of technologies are produced, as well as identifying more effective distribution models that more efficiently reach smallholder farmers.

However, smallholder farmers are less aware and have a lower capacity to adopt gender sensitive technologies. Subsequently, even if efforts exist to innovate and test machines by development actors, they are unlikely to be adopted by female farmers at first glance. Ultimately, few efforts exist by different actors to introduce innovative technologies due to limited coordination by Government and other actors, as there is no conducive policy framework and so linkages remain weak.

¹⁸ ATA, Agricultural Mechanization Strategy Document, 2010.

9. Conclusion and Recommendation

9.1. Conclusions

Agriculture is the backbone of the Ethiopian economy and provides a large share of GDP (34%)¹⁹ and labour contributions. Nonetheless, the Ethiopian agricultural sector remains underdeveloped. As such, urgent need exists to critically examine current agricultural mechanization technologies in order to improve production and productivity within the sector.

As noted previously, women are commonly involved in agricultural activities, while also primarily responsible for domestic work. Subsequently, a key solution to assisting rural women farmers with their heavy workload is to improve productivity and production through agricultural mechanization. Structurally the *Women's Youth Directorate* was established by the MoA to address women's issues in agriculture, however, little progress has been experienced in gender and agricultural mechanization to date. Although it should be noted that recent efforts have been observed in bringing the issue to the *ENGRA* with strong work being conducted in attempts to identify key bottlenecks in the sector.

Likewise, there have been positive changes in governmental policies and a conducive environment in promoting gender in the country to date. Realizing the potential of Ethiopian women has been an ongoing strategic direction which is suggesting noteworthy change. For example, women's representation in the House of Federation (HoF) at the national level has dramatically improved only recently, with 50 per cent representation in Federal Cabinet – a worthwhile initiative providing strategic focus for Ethiopia's development. However, women's role and status in agricultural – the country's primary economic driver – continues to remain low.

Consequently, many opportunities exist for women's development in agricultural in Ethiopia. Recently, Government placed attention on agricultural mechanization policies and strategies with strong focus on gender issues, indigenous knowledge and the introduction of household

¹⁹ [https://www.statista.com/statistics/455149/share-of-economic-sectors-in-the-gdp-in-ethiopia/Ethiopia: Share of economic sectors in the gross domestic product \(GDP\) from 2007 to 2017](https://www.statista.com/statistics/455149/share-of-economic-sectors-in-the-gdp-in-ethiopia/Ethiopia: Share of economic sectors in the gross domestic product (GDP) from 2007 to 2017)

and group level agricultural mechanization technologies. Government's invaluable commitments regarding tax exemption from agricultural mechanization machinery imports is a positive example for the development of agricultural technologies. Yet, with population increases and continuing demand for mechanization to increase rural farmer's production, more opportunities to continuing mechanization are at hand. Another opportunity is the high demand for skilled and semi-skilled farm labour, particularly that of youth, to adopt modern technologies. Thus, opportunities abound for innovative agricultural approaches in Ethiopia.

Nevertheless, challenges do exist, such as an unfamiliarity with the management of commercial agricultural practices and products, as well as technical know-how surrounding the maintenance such facilities, limited knowledge on innovations available, and the high costs involved with agricultural enhancements. Similarly, inadequate financing opportunities, lack of coordination and dissemination surrounding new research, and inadequate female-friendly technologies continue to constrain agricultural development in Ethiopia.

9.2 Recommendations

Based on the above analysis the following recommendations have been suggested:

Gender Responsive Agricultural Mechanization Technologies

Gender responsive agricultural mechanization technologies should be developed and disseminated by relevant stakeholders, and adapted by smallholder Ethiopian farmers. Though currently few organizations produce adequate technology in the country, current technologies are not female-friendly nor do they incorporate the needs and priorities of women. Additionally, when technology is available, female smallholder farmers are rarely aware of have access to existing technologies. Thus, it is recommended that low-cost, women-friendly agricultural mechanization technologies should be researched, manufactured, piloted and distributed to suitable women farmers. Moreover, the identification of the technological needs of women farmers should further be considered, and with realistic considerations as to how this equipment might be distributed.

Gender Mainstreaming and Coordination

At the federal level, the Women, Children and Youth Directorate, and the Agricultural Mechanization Directorate have limited coordination for mainstreaming gender in mechanization. Furthermore, at regional and lower level structures, limited capacity and coordination also exist. As such, clearer coordination between agricultural research, agricultural extension and the private sector is necessary. Gender issues are not mainstreamed nor implemented in all Government organizations, universities/collages, research institutions, or with private sector actors. Therefore, there is a need to develop mechanization policy which align appropriate institutional philosophies at all levels, and with clear gender mainstream and coordination guidelines.

Gender focused Finance on Agricultural Mechanization

Finance is a critical challenge in agricultural mechanization in the country. To date, there is no inclusive financing strategy, nor a strong financial service system in Ethiopia for smallholder farmers. The *agricultural machinery lease scheme* remains under implementation, but mechanization costs are high for all smallholders farmers. Loans for agricultural machinery from financial institutions remain inaccessible to smallholder farmers.

Therefore, access to small, short-term loans for access to mechanization services for female farmers is a significant challenge. As no financing programme for this group currently exists, women have limited access to loans – also due to a lack of collateral, male resource domination, and other gender issues. Thus, the review and revision of current financial sector regulations to support rural women with greater financial products is strongly recommended.

Subsidy for Women Farmers

Women farmers have many obstacles when competing with male farmers. As increasing women's access to agricultural mechanization would narrow productivity gaps between male and women farmers, the introduction of a GoE-led, private financial institution implemented subsidy financial scheme is strongly suggested.

Women-focused Agricultural Extension System

Currently, Ethiopia's agricultural extension system targets only head of households, while ignoring married women.

For example, according to a World Bank study (WB)²⁰, female farm managers are 11 per cent less likely to attend extension programmes than male counterparts. This difference widens the gender gap for agricultural productivity.

Top-down agricultural extension models have often prioritized male over female farmers by targeting 'model' or 'progressive' farmers who are perceived to be more likely to adopt and use technological innovations. Subsequently, the agriculture extension system needs to focus advisory service trainings and other services to female farmers, including both married women, as well as female headed households.

Women-focused Capacity Building

Skills development programming which considers gender's place in agricultural development should be reconsidered. This includes both the selection and placement of students in agricultural mechanization departments, as well as training workshops with appropriate representation of women. Gender should be considered in the training of extension agents as well.

Enhance Private Sector Involvement

While the private sector's role in agricultural mechanization is growing, the industry as a whole receives little encouragement from Government for production of gender-sensitive technologies. Current technologies marketed by the private sector are gender-neutral, and do not consider female farmers' needs. As such, the private sector needs stronger guidance with clear direction in the areas of testing, certification, distribution and service provisions. Moreover, the private sector should work closely with both the Mechanization Directorate and the Women Children and Youth Affairs Directorate, in order to better identify women farmer's technological needs. Such an initiative would greatly aid in ensuring women's needs are considered in product development and dissemination processes.

Women's Enhanced Access to Agricultural Information Systems

Access to agricultural information by women farmers is limited. Likewise, information surrounding agricultural inputs, such as improved seeds and fertilizers, technological innovations,

enhanced farm management, post-harvest handling, and marketing are scarce for his demographic. This may be attributed to the capacities of existing information systems, as well as illiteracy rates and limited extension services. Nonetheless, improved information systems – such as the *Extension Advisory System* – could be adopted to better support female farmers.

Agricultural Marketing and Value Chain

As above, women have low access to agricultural price information; have weak bargaining power in business contexts; and, utilize only limited innovative agricultural technologies. Thus, adapting appropriate gender sensitive policies surrounding both value chains and agricultural equipment would be beneficial for women farmers. Such policies might consider areas of enhanced technologies, product processing, storage, transportation and/or packaging.

Enabling All Actors in Agricultural Mechanization

Creating an enabling environment for all actors (private sectors, researchers, development practitioners, and others) participating in technology development is critical for enhancing the sector as a whole. Interventions such as, incentivization for actors who facilitate gender sensitive technologies, would be a worthy policy to begin with.

Greater Support to Media and Encouragement of Women Farmers

Identifying and supporting pioneering female farmers in technology adoption through the use of mass media would serve to influence widespread attitudes surrounding female farmers in the country. Likewise, the broadcasting of best practices utilized by women farmers would also serve to provide excellent role models.

Empower Female Youth in Agricultural Mechanization

Special focus should be given to female youth in order to introduce agricultural innovations. Subsequently, it would be valuable to design a 'youth package' which targets young female farmers by organizing specialized groups, delivering capacity building initiatives, and which offers support such as seed money/loans, etc., thus providing opportunity for access to enhanced agricultural equipment.

²⁰ Documents.worldbank.org › curated › pdf › wps6370 Gender and Agriculture World Bank Group.

Annexes

Annex I. Work plan and Timeline

No.	Affiliation	Stakeholders
1	Preparation submit and comment incorporation of inception report	May 30 – June 3
2	Preparation of the Workshop	June 3 – 5
3	Attend and facilitate group discussion at the W/S	June 6 – 7
4	Outline and draft checklist for stakeholder KII	June 10 - 14
5	Conduct Stakeholder KII	June 17 - 21
6	Prepare draft Rapid assessment Report	June 24 - 26
7	Prepare draft report and share to UNWOMEN	June 27 - 28
8	Comment incorporation, finalize report, and assessment report	June 29 - 30
9	Present and validate the draft/final report	June 30
10	Submit the final rapid assessment report and report	June 30

Annex 2. Group work leading question for the workshop

1. What are the existing practices in agricultural mechanization?
2. What are the existing challenges in agricultural mechanization for female farmers? And what 3 key are gender issues in relation to this?
3. What are the opportunities and best practices?
4. What is the recommendation / suggestion for policy makers regarding enhanced gender responsive, e.g. mechanization?

Annex 3. Check list for Key Informant Interview (KII)

Rapid Assessment of Gender in Agricultural Mechanization Report

Checklist for KII (Draft)

Government Organizations

What are the roles and responsibilities of your governmental department/ministry/agency?

Do you have a gender expert in your organization? What is the role of the gender expert, and what practical activities have been performed by the expert?

What agricultural mechanization practices currently exist in your organization?

How do you evaluate the current performance of agricultural mechanization in terms of women farmers benefiting from the service?

What do you think are the existing challenges in agricultural mechanization for female farmers? And what are the key gender issues in relation to agricultural mechanization in our country?

What opportunities and best practices are available in your organization for scaling up, and with regards to gender in agricultural mechanization?

What are the specific recommendations/suggestions for policy makers regarding gender responsiveness, e.g. mechanization?

Research/Academic Institutions

What are the role and responsibility of your organization?

Do you have a gender expert in your organization? What is the role of gender expert, and what practical activities are actually performed?

What agricultural mechanization practices currently exist in your organization?

What action research you have done in terms of gender responsive agricultural mechanization technologies? Did it benefit women farmers and bring gender equality in particular, or improve agricultural productivity in general?

How do you evaluate the current performance of agricultural mechanization in the country in terms of women farmers benefiting from the service?

What do you think are the existing challenges in agricultural mechanization for female farmers? And what key gender issues exist in relation to agricultural mechanization in Ethiopia?

What opportunities and best practices are available in your organization for scaling up, and with regards to gender in agricultural mechanization?

What are the specific recommendations/suggestions for policy makers regarding gender responsiveness, e.g. mechanization?

Private Organizations

What is the role of your organization?

Do you have gender expert in your organization? What is the role of gender expert and what practical activities are actually performed?

What agricultural mechanization practices currently exist in your organization?

What is your linkage with government offices and research organizations in terms of agricultural mechanization?

How do you evaluate the current performance of agricultural mechanization in terms of women farmers benefiting from the service?

What do you think are the existing challenges in agricultural mechanization for female farmers? And what key gender issues exist in relation to agricultural mechanization in Ethiopia?

What opportunities and best practices are available in your organization for scaling up, and with regards to gender in agricultural mechanization?

What are specific recommendations/suggestions for policy makers regarding being more gender responsive, e.g. mechanization?

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