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# **Executive Summary**

In April 2022, President Samia Suluhu Hassan unveiled her new agricultural transformation strategy – dubbed ‘Agenda 10/30’ – which, as the name alludes, aims to accelerate the pace of output growth in the sector to 10 percent by 2030. At the centre of this strategy is a planned expansion in the amount of labour and land allocated to the sector. An extra 3 million workers are expected to be added to the sector by 2025 – to be made up mostly of women and youth – and land under cultivation is expected to reach 20 million hectares by 2030. Other key elements of the strategy include a massive expansion of irrigation, institution of a block farm system to aggregate smallholder farmers, and deployment of seed multiplication innovations.

The focus on women in the agricultural transformation strategy presents an opportunity to ignite progress towards women’s economic empowerment and catalyse broader gender equality. More women than men (67 percent of the country’s total female labour force versus 64 percent of the male labour force) work in the agriculture sector, most of whom are currently at a distinct disadvantage when it comes to accessing productive inputs such as land, labour (family or hired), fertilizer, improved seeds, labour-saving technology, and finance. Moreover, women in the sector face entrenched and discriminatory economic, political and social norms and attitudes that act as overt and covert impediments to their economic empowerment. The fact that girls are legally allowed to marry at age 15, whereas boys can only marry after they reach age 18, is one example of how these norms operate to deny women and girls equal opportunity to reach their educational and employment potential. Women that marry at a younger age have children earlier and more frequently. In Tanzania, the adolescent (those aged 15-19) fertility rate is 115 per 1000, which is significantly higher than the sub-Saharan African average of 100 per 1000.

In agriculture especially, women with more children inevitably find it harder to juggle their childcare duties with their often-arduous farming duties. They also miss out on training and other agricultural extension services, ensuing that they are left further behind the productivity curve in the absence of policy measures that tackle the myriad constraints that uniquely undermine women’s prospects of reaching their full potential in the sector. Uncovering all these impediments and their operation should therefore be a key facet of government’s strategy to increase the participation of women in agriculture.

This is not only a desirable goal in its own right, but it also makes good economic sense. Empowering female farmers is one of the quickest and surest ways of increasing agricultural productivity and food production significantly. Research shows that if women farmers, globally are given access to the same inputs as their male counterparts today, they could increase their agricultural yields by 20 – 30 percent, raise total agricultural output by 2.5 to 4 percent and decrease world hunger by 17 percent – the equivalent of 100 – 150 million people.[[1]](#footnote-1) The spill over effects of these benefits could be even more significant. According to research by the World Bank, women spend up to 90 percent of their income on their families (compared with up to 35 percent for men).[[2]](#footnote-2) This means that more money is allocated towards investing in their families’ nutrition, health and education, benefiting both men and women, boys and girls, and helping to break otherwise intractable cycles of intergenerational poverty. In fact, the multiplier effect of investing in women’s empowerment in general is so pervasive that it returns seven dollars for every one dollar spent across multiple SDGs.

In Tanzania, the gender gap in agricultural productivity has been estimated at 23 percent[[3]](#footnote-3) for similar-sized farm plots in the same geographical location. Closing this gap could increase annual agricultural production by 2.7 percent, lift around 80,000 people out of poverty each year and add 0.86 percent to the country’s gross domestic product (around USD 583.4 million a year), hastening Tanzania’s transition to middle-income country status.

However, this report presents a growing body of evidence that shows that simply providing equal access to productive inputs for both male and female farmers may not guarantee equal levels of agricultural productivity outcomes among them. In Tanzania, while the lack of access to male labour (an input) explains 97 percent of the country’s gender gap in agricultural productivity, the root cause of this deficit is sometimes linked to prejudicial societal or cultural attitudes which deter men from seeking employment on women-owned farms or repudiating their authority if they do, leading to lower returns from these workers. Likewise, providing women with equal access to inputs like fertilizer and pesticides (which explains the remaining 3 percent of the productivity gap) need to take into consideration the quality of these inputs and the ability of women to use them effectively, which may need tailored training for women.

This report aims to help shed more light on the nature and operation of the constraints that continue to undermine women’s productivity in the agriculture sector. We do so by simulating the impact of policy reforms, both from the literature and from government proposals, on key indicators of women’s economic empowerment such as income, household consumption, employment and productivity, using computable general equilibrium models (CGE).

First, we simulate the baseline or ‘business-as-usual’ scenario where the only policy reform undertaken is the planned increase in the supply of female labour in the agriculture sector. We find that this decreases overall agricultural output and depresses wage rates for all workers in the sector. Second, we simulate the impact of policies to provide women with equal access to agricultural land (alongside increasing the number of women farmers) and find that this reform has positive impacts on agricultural output, demand for female labour, and households’ purchasing power. Third, we simulate the impact of increasing access to fertilizer for women farmers and find that this reform is especially positive for increasing demand for the food crops grown by women, thus increasing their labour income. Finally, we simulate the impact of increasing the level of irrigation in the agricultural sector and find that this has the most positive impact on increasing female employment (and therefore wages) not only in crop production but also in related manufacturing sectors – which is positive for increasing women’s participation higher up the agricultural value chain. A key reason for this finding could be that more access to irrigation helps to reduce the labour burden on women farmers and circumvent the need to rely on the scarce and relatively unproductive male labour available to them.

These results yield the following preliminary policy recommendations:

* Step up efforts to accelerate female land ownership and reduce land tenure insecurity which directly increases the incentive for women to invest more in improving land quality of the land they farm and has also been shown to indirectly reduce women’s fertility levels and hence childcare burden.
* Devise targeted measures to increase women’s access to high quality inputs such as fertilizer and pesticides and provide gender-sensitive training in their application.
* Accelerate investment in irrigation to increase agricultural productivity and sequence the roll-out of such schemes to give priority to crop sectors with high female employment and high expected returns to crop production.

# **Introduction**

Women are at the heart of Tanzania’s new agricultural transformation strategy – Agenda 10/30 – which seeks to increase the sector’s growth rate to 10 percent per year by 2030 (from 3.2 percent in 2021). To achieve this target, the government plans to increase the number of workers employed in the sector by 3 million in mainland Tanzania and 300,000 in Zanzibar, to be made up mostly of women and youth.

If successful, Agenda 10/30 could potentially accelerate progress towards achieving gender equality and women’s empowerment in Tanzania. According to the World Bank, agricultural sector growth is 2 to 4 times more effective at reducing poverty than growth emanating from any other sector of the economy.[[4]](#footnote-4) In Tanzania, 67 percent of female workers are employed in agriculture, meaning that the vast majority of employed women – and their families – stand to benefit from the planned expansion in agricultural output. Further, agriculture has the greatest potential to provide diverse opportunities for women according to the FAO,[[5]](#footnote-5) which could give women easier access to higher value-added economic activities than other sectors. This is especially the case if policies that prioritise women are implemented alongside output expansion measures.

Women farmers globally are at a disadvantage in the agriculture sector when compared with their male counterparts. They have less access to productive inputs such as fertilizers, labour saving equipment and technology, hired or family labour (especially male labour), finance, extension services, improved seed varieties, and land. Moreover, a study conducted by the World Bank[[6]](#footnote-6) also suggests that whatever inputs they do receive could be sub-standard (land, labour, fertilizers) or inconsiderate of the specific needs of women (extension services). Disparities in educational attainment and entrenched cultural and discriminatory norms against women also impede their ability to use productive inputs as effectively as men. It therefore follows that simply providing women with equal access to agricultural inputs does not automatically guarantee equal improvements in their productivity.

However, closing all the gender gaps in agriculture – both in terms of quantity and quality – would allow women to increase their yields by 20 – 30 percent,[[7]](#footnote-7) and decrease global hunger by 17 percent.[[8]](#footnote-8) Also, agriculture’s role in providing the easiest route to women’s economic empowerment in developing countries is also catalytic for ensuring broader women’s empowerment in other spheres of society.[[9]](#footnote-9) Economic empowerment gives women more say and control over how resources are allocated and more stake in the societal and political processes that determine this allocation, turning them from passive recipients of repressive norms and beliefs about their pre-determined position in society to active co-creators of the kind of future they want for themselves and their families.

By prioritising women, the government’s new agriculture strategy is taking steps in the right direction towards closing these diverse disparities including granting female farmers access to irrigated land and providing them with greater access to soft loans and subsidised inputs (fertilizers and seeds). However, it remains uncertain whether these measures will do enough to close the sizable gender gap between male and female farmers’ agricultural productivity, which is estimated at 23 percent,[[10]](#footnote-10) and hence advance gender equality in the agriculture sector. Intuitively, increasing the number of female workers in the sector could increase agricultural output overall, but without a commensurate increase in productivity, i.e. output per worker, the welfare benefits for the anticipated new female entrants into the sector could be eroded overtime. Thus, this paper aims to assess the gender equality and women’s empowerment implications of Agenda 10/30 by simulating the impact of proposed policy changes on key welfare metrics such as income, poverty levels, agricultural output and productivity. The paper will also simulate the policy impact of some policy recommendations derived from the literature on empowering women in agriculture in Tanzania and other developing countries to support government efforts to devise an appropriate mix and sequence of sector-specific and gender-forward enabling environment policies for advancing gender equality and women’s empowerment in the agriculture sector.

The paper is organised as follows: section I reviews the government’s new agricultural transformation agenda, its aims, objectives and drivers both nationally and globally. Section II reviews the economic status of women in Tanzania in general and in the agriculture sector in particular, while section III analyses existing literature and evidence on policies to empower women in the agricultural sector. Section IV introduces the computable general equilibrium model (CGE) framework used for the policy simulations and its rationale, including past applications, the model specifications used for the policy simulations and their results; and section V concludes with policy recommendations from the results of the simulations.

# **SECTION I: Evolution of Tanzania’s new agricultural sector strategy**

In April 2022, President Samia Suluhu Hassan unveiled her new agricultural transformation strategy – dubbed ‘Agenda 10/30’ – which, as the name alludes, aims to accelerate the pace of output growth in the sector to 10 percent by 2030. At the centre of this strategy is a planned expansion in the amount of labour and land allocated to the sector. An extra 3 million workers are expected to be added to the sector by 2025, a third of which are expected to be young people, and land under cultivation is expected to reach 20 million hectares by 2030. Other key elements of the strategy include a massive expansion in irrigation to cover 50 percent of all land under cultivation by 2030, from just 6 percent currently,[[11]](#footnote-11) institution of a ‘block farm’ system to aggregate smallholder farmers, where every farmer – with priority given to women and youth – will receive at least 10 acres of land to benefit from economies of scale, and deployment of seed multiplication innovations.[[12]](#footnote-12)

In addition to accelerating growth in the agriculture sector the new strategy aims to increase the value agricultural exports from USD 1.2 billion per annum to more than USD 5 billion by 2030, led by an increase in horticultural exports from USD 750 million to USD 2 billion. The government also plans to leverage its position as one of Africa’s few surplus food producers to supply 20 percent of the region’s food imports demand, especially for cereals like rice and maize.

Agenda 10/30 results from the culmination of years of underinvestment in the agriculture sector, which has seen the sector’s growth rate fall to just 3.2 percent in 2021, heightening the risk of food insecurity. The war in Ukraine, which led to shortages of wheat and edible oils in the country, also raised the urgency to take immediate measures to address the inefficiencies in the sector. Yet the measures outlined by the President last year largely mirror those in existing policy plans. For instance, the Agriculture Sector Development Programme II (ASDP II) 2015/16-2024/25, seeks to increase productivity, commercialization and incomes of smallholder farmers for improved livelihood, food and nutrition security. Measures currently underway include policy reforms to liberalise markets for agricultural inputs and outputs plus provision of support to transform smallholder subsistence farmers into commercial farmers through increased productivity of target commodities within sustainable production systems. Improvements in rural infrastructure (including expansion and modernisation of irrigation) are also part of ASDP III.[[13]](#footnote-13)

FYDP III defines the broad direction planned for the agriculture sector over FYs 2021/22 – 2025/26, emphasising increasing competitiveness, strengthening forward and backward linkages to other sectors and increasing investments in research and development targeting strategic crops to increase both output and productivity. In Zanzibar, the Government hopes to improve productivity through the use of climate smart, environmentally sustainable techniques and modern technology which can simultaneously free up labour to secondary or tertiary sectors, increase export revenue and improve food and nutritional security while protecting habitats for eco-tourism. The key difference with the new strategy is that the government is now providing the financial muscle to make these plans a reality.

The government increased the agricultural budget nearly threefold to TZS 954 billion shillings in the FY 2022/23 budget (from TZS 294 billion in the previous FY) and plans to keep the budget elevated going forward. Investment in irrigation alone accounts for almost 40 percent of this budget (TZS 360 billion, up from just TZS 50 billion in FY 2021/22). The plan is to scale up small-scale irrigation schemes across the country by tapping the country’s vast water resources including Lakes Victoria, Tanganyika and Nyasa, as well as large rivers like Malagarasi, Ruvuma, Rufiji, Mara and Ruvu.

Another cornerstone of Agenda 10/30 is the Building a Better Tomorrow: Youth Agribusiness Initiative (BBT:YAI) 2022-2030, which was launched by the Ministry of Agriculture to combat the negative perception of agriculture sector employment among young people and thus encourage them to engage more in the sector.

BBT-YAI’s strategic objectives are to; i) inspire youth through implementing a behaviour/ attitude changing communication strategy; ii) empower youth through training, mentoring and coaching; iii) engage youth in profitable and sustainable management of agribusinesses; iv) enable youth-led enterprises by improving the business environment; and v) coordinate effectively youth agribusiness support initiatives for synergy and efficiency. Over the eight-year programme, the agriculture ministry hopes to establish 12,000 profitable enterprises in 12,000 villages across the country.[[14]](#footnote-14) Already, the first cohort of 812 young beneficiaries of the programme have started receiving practical training on modern agricultural methods, after which they will be allocated 10 acres of land for free to use for their agricultural ventures supported by agricultural extension workers.[[15]](#footnote-15)

# **SECTION II: Economic status of women in Tanzania in general and the agriculture sector in particular**

Gender equality is enshrined in the Constitution of the United Republic of Tanzania and operationalised through several national plans including the National Women and Gender Policy (2000) and the National Strategy for Gender and Development (NSGD, 2002). Also, both the third Five-Year Development Plan (FYDP III) and Zanzibar Development Plan (ZADEP) have adopted gender equality and women’s empowerment goals. This has translated into significant progress in increasing women’s access to education and employment, which in turn has boosted economic growth and poverty reduction.

For instance, the country has achieved near-gender parity in primary education, thanks in large part to its fee-free education programme, which was introduced in 2014. The primary school enrolment rate for girls and boys stood at 96.7 percent and 94.8 percent respectively in mainland Tanzania and 86.4 percent for girls and 86.3 percent for boys in Zanzibar in 2020.[[16]](#footnote-16) However, the low enrolment rates at secondary school level for both genders, and in particular for girls at upper secondary level, remains a drag on women’s economic prospects. Overall, only 29.8 percent of girls are enrolled in secondary school (2020 data), with only 5.9 percent in upper secondary school (2019 data), compared with 30.0 percent and 7.8 percent for boys respectively. Upper secondary school enrolment metrics may improve substantially in the future if the government moves ahead with its plan to expand fee-free education to upper secondary school level as tabled in the financial year (FY) 2022/23 budget,[[17]](#footnote-17) although the success of that policy at lower secondary school level has not been impressive either, underscoring the low value placed on educational attainment above primary school level.

Tanzania’s high prevalence of child marriage and teenage pregnancy continue to impede girls’ educational attainment and employment prospects. Girls are allowed by law to marry at age 15 and even as young as 14 with a court’s permission. Boys, by contrast, are only legally allowed to marry from age 18. This has resulted in a wide gap between the proportion of married adolescent girls and boys aged 15-19, which stood at 23 percent and just 2 percent respectively in 2020.[[18]](#footnote-18) This is linked to the country’s persistently high fertility rates as girls who marry young also tend to start having children earlier and more frequently. The adolescent fertility rate in Tanzania stood at 115 per 1000 compared with the sub-Saharan African average of 100 per 1000 in 2019.[[19]](#footnote-19) This impinges on women’s ability to participate in education or employment, especially as pregnant and married girls are legally barred from education.[[20]](#footnote-20)

In the labour market, women’s labour participation rose from 67 percent in 2000/01 to a remarkable 80 percent in 2019 (figure 1) – well above the average for sub-Saharan Africa (63 percent). Also, the gender gap amongst wage-earners narrowed considerably from 0.35 to 0.64 over the same timeframe. Nevertheless, only 22 percent of female workers are in paid employment, compared with 48 percent of male workers,[[21]](#footnote-21) and 88.7 percent are in vulnerable employment.[[22]](#footnote-22) The declining trend in the wage-earning gender gap is somewhat mirrored in the agriculture sector where the share of unpaid female workers fell from 78 percent in 2004/05 to 64 percent in 2015/16[[23]](#footnote-23) – although this remains a prohibitively significant constraint to poverty reduction.

Source: World Bank

Figure 1. Labour Force Participation Rates by Gender, Tanzania and Comparators, 2019

On average, women wage employees are paid 67 cents for every dollar paid to male wage employees, despite legislation (the 2004 Employment and Labour Relations Act), which prohibits gender-based discrimination in employment and mandates equal renumeration for equal work. Women are also more engaged than their male counterparts in the home, performing 54 percent of household duties. Women tend to be the primary caretakers, with responsibility for childcare, cooking food, cleaning the house, caring for the elderly and the sick and fetching water and firewood, curtailing the time they have available for participation in employment and training.

Most (65 percent) of Tanzania’s labour force remains concentrated in the agricultural sector, with 67 percent of women and 64 percent of men engaged in the sector respectively. The majority of farmers in the country (15 million) are smallholders with women comprising roughly half of them. The average area cultivated by women is 0.6 ha compared to 1 ha for men,[[24]](#footnote-24) and women rely on rain-fed (92 percent) or bucket-fed irrigation. Whereas only 63 percent and 23 percent of men rely on rain-fed and bucket-fed irrigation respectively. [[25]](#footnote-25) This implies that all of the country’s limited irrigated land is allocated to men. The gender disparity in cultivated plot sizes is tied to customary rules that only grant women user rights.

Women are less likely than men to own land (33 percent versus 47 percent), but the land gender gap in Tanzania mirrors those observed in the rest of sub-Saharan Africa on average (38 percent and 51 percent, respectively). However, 30 percent of Tanzanian men are the sole owners of land according to the National Bureau of Statistics (2019), while only 9 percent of women solely own land.

In terms of gender roles in the agriculture sector, women are far more likely to be involved in cultivation of lower value food crops, while men dominate the more lucrative cash crops sector. In both food and cash crops, women are more prominent in less ‘techincal’ tasks such as weeding, harvesting and food storage, while men are typically in charge of clearing and preparing the land and farm construction.

Source: Ellis, 2007

Figure 2. Division of Labour in Agriculture by women and men, in % of hours spent on activity

# **SECTION III: Literature review of evidence on policies to empower women in the agricultural sector**

It is widely recognised that a key obstacle to increasing agricultural output and food security across Africa is the wide and pervasive gender gap in agricultural productivity. Although women make up almost half of the agricultural labour force in Africa, a lack of equal access to productive inputs (land, labour, fertilizers, finance, extension services, labour-saving technology and improved seeds) and entrenched, discriminatory and often institutionalized norms continue to act as barriers which curtail women’s productive potential. In the meantime, intersecting crises such as the looming climate emergency, mounting insecurity and the war in Ukraine, together with high population growth and rising demand for food, are threatening food security across Africa, increasing the urgency to tackle the region’s agricultural productivity deficit.

Empowering female farmers is one of the quickest and surest ways of increasing agricultural productivity and food production significantly. Research shows that if women farmers, globally are given access to the same inputs as their male counterparts today, they could increase their agricultural yields by 20 – 30 percent, raise total agricultural output by 2.5 to 4 percent and decrease world hunger by 17 percent – the equivalent of 100 – 150 million people.[[26]](#footnote-26) The spill over effects of these benefits could be even more significant. According to research by the World Bank, women spend up to 90 percent of their income on their families (compared to up to 35 percent for men).[[27]](#footnote-27) This means that more money is allocated towards investing in their families’ nutrition, health and education, benefiting both men and women, boys and girls, and helping to break otherwise intractable cycles of intergenerational poverty. In fact, the multiplier effect of investing in women’s empowerment in general is so pervasive that it returns seven dollars for every one dollar spent across multiple SDGs. The stronger bargaining power women wield within their families because of higher agricultural earnings could also help lessen the incidence of and support for violence against women and girls (VAWG) as they become more valuable to family members (especially children). At least in the long run.[[28]](#footnote-28)

In Tanzania, the gender gap in agricultural productivity has been estimated at 23 percent[[29]](#footnote-29) for similar-sized farm plots in the same geographical location. This rises to 26 percent in the central zones of the country and 51 percent in the eastern zones, which are more arid and therefore food insecure,[[30]](#footnote-30) underscoring the importance of geographical considerations when formulating agricultural sector policies. Closing this gap could increase annual agricultural production by 2.7 percent, lift around 80,000 people out of poverty each year and add 0.86 percent to the country’s gross domestic product (around USD 583.4 million), hastening Tanzania’s transition to middle-income country status (figure 3).

Source: World Bank

Figure 3. The Impact of Closing the Gender Gap in Agricultural Productivity on Marginal Crop Production, Total Agricultural Output, and GDP, Tanzania and Comparators

However, simply providing women and men with identical inputs may not be sufficient to fully close the gender productivity gap. Governments will need to devise a wholistic set of policy interventions that also aim to address, dismantle, and/or circumvent entrenched and systemically discriminatory norms and attitudes that continue to undermine women’s agricultural potential. Emerging research that considers not only the quantity and level of agricultural inputs and resources available to female farmers but also the returns (in terms of productivity gains) that these resources yield for them is shedding new light on the factors that continue to contribute to the persistent gender gap in agricultural productivity, despite the growing policy attention that is being paid to gender equality in African agriculture, along with novel policy recommendations to address these (table 1).[[31]](#footnote-31) Six often overlapping factors stand out as most relevant in the African context:

1. Lack of access to labour, especially male labour, is the biggest barrier facing women farmers in Africa, and the most revelatory about the extent of discrimination facing female employers in general and in agriculture especially. Research findings show that not only do women farmers find is more difficult to mobilize male farm labour (either family or otherwise), in the overwhelming majority of countries studied, the male labour that they are able to access generate lower returns than they do for their male employers. There could be several explanations for this phenomenon depending on the country context including cultural norms that make it difficult for men to accept female authority and/or that prevent women from asserting their leadership. More so if they are young. Other reasons include that women may not be able to pay as much as their male counterparts, may not devote enough time to supervising all labour (including male) because of childcare and other household duties, and that women farmers typically come from smaller households with fewer adult men due to factors such as widowhood, divorce or migration. In Tanzania, this constraint explains 97 percent of the country’s gender gap in agricultural productivity (the remaining 3 percent being explained by lower returns from non-labour inputs such as fertilizers and pesticides). Eliminating it alone could add USD 102 million to Tanzania’s annual GDP.
2. Unequal use of and returns to non-labour farm inputs such as fertilizers also affects all countries to varying degrees. In some cases, the gender gap in agricultural productivity is mainly because of shortfalls in use of these inputs while in other cases (including in Tanzania), lower returns to use of equal quantities of these inputs are also important considerations. This could result from lower quality inputs or incorrect timing and application.
3. Lack of access to and control of land due to discriminatory customary and statutory land tenure systems that favour men’s over women’s rights leads to lower investments on female-managed farms or the allocation of higher quality (including irrigated) land to men while women receive lower quality, smaller and less arable plots. This is compounded by the difficulties women face in managing larger plots because of the unique labour shortages they face and their inability to deploy non-labour inputs effectively.
4. Barriers against accessing agricultural information, markets and extension services that stem from gender-insensitive training programmes, cultural restrictions to interacting with male extension workers, mobility issues due to childcare and other household chores, lower ownership of household assets such as mobile phones and reliance on second-hand agricultural information and knowledge, which may not be accurate.
5. Educational disparities amongst men and women particularly at secondary school level – although this may diminish significantly as the generation of girls that have benefited from stepped-up efforts to achieve gender parity in schooling begin to enter the labour force at scale.
6. Limited access to high-value commercial agriculture. Evidence from several countries show that women enjoy greater returns (and therefore incomes) than men when they switch to higher-value agriculture even with the above barriers, suggesting that this may be one of the quickest routes to closing the gender-gap for female farmers.

Table 1. Ten Policy Priorities for Narrowing the Gender Gap in African Agriculture

|  |  |  |
| --- | --- | --- |
| **Key driver** | **Policy Priority** | **Policy Option**  *Green: Promising policy option (based on available evidence)*  *Yellow: Emerging policy option (based on available evidence)* |
| LAND | 1. Strengthen women’s land rights. | Formalize land rights through registration to increase women’s tenure security. |
| Expand co-titling and individual titling for women. |
| Reform family and inheritance law to protect women’s rights. |
| LABOUR | 1. Improve women’s access to hired labour. | Offer women farmers financing to hire farm labour |
| Task agents with helping women farmers to find labour |
| 1. Enhance women’s use of tools and equipment that reduce the amount of labour they require on the farm | Provide women farmers with financing or discounts for hiring or purchasing machinery |
| 1. Provide community-based child-care centers | Provide community-based child-care centers |
| NON-LABOUR INPUTS | 1. Encourage women farmers to use more, and higher-quality fertilizer. | Provide women farmers with financing or price discounts aligned with their cash flow to encourage the purchase of fertilizer. |
| Certify small bags of fertilizers for used by women. |
| 1. Increase women’s use of improved seeds. | Provide flexible financing for seeds |
| Help women better identify and obtain good-quality seed. |
| INFORMATION | 1. Tailor extension services to women’s needs and leverage social networks to spread agricultural knowledge. | Train extension agents to target female farmers and be more responsive to their agricultural information needs. |
| Bring agricultural training and advice to women’s doorsteps through farmer field schools and mobile phone applications. |
| Identify female volunteer farm advisors to spread information within women’s social networks. |
| ACCESS TO MARKETS | 1. Promote women’s cultivation of high value/cash crops. | Promote women’s cultivation of high value/cash crops. |
| 1. Facilitate women’s access to and effective participation in markets. | Provide market services through information and communication technology (ICT) |
| Channel existing groups to access market opportunities |
| HUMAN CAPITAL | 1. Raise education levels of adult female farmers. | Raise education levels of adult female farmers. |

Source: World Bank

# **SECTION IV: Data and Model**

For this study, we used two types of computable general equilibrium models - static and dynamic. The static form allowed us to simulate the impact of policy reforms such as abolishing VAT on fertilizers and equal access to arable land for women by comparing equilibrium properties before and after the reform in the short-run.

In the dynamic form of the CGE model, we tracked the growth of output as well as economic fluctuations due to policy reforms (specifically, an increase in women's employment in the agricultural sector and investment in expanding irrigation) over a longer timeframe. The database used for this study is the Social Accounting Matrix (SAM) which provides a snapshot of the real economy.

## 4.1 Data: Social Accounting Matrix

This study used Tanzania’s 2015 Social Accounting Matrix (SAM), which was developed by the International Food Policy Research Institute (IFPRI)[[32]](#footnote-32). The 2015 SAM for Tanzania, which originally consists of 70 distinct sectors and 68 commodities, has been consolidated into 56 sectors and 58 commodities. Out of these, 30 sectors are agricultural, 19 are industrial, and 7 are service sectors. The detailed SAM framework for the Tanzanian economy is presented in Appendix 1. Using the Social accounting matrix balance (SAMBAL) method by Lemelin et al (2013)[[33]](#footnote-33), the 2015 SAM for Tanzania was updated to 2019.

For the purpose of this study, the 2015 SAM integrates gender aspect using data fromthe 2014 Integrated Labour Force Survey[[34]](#footnote-34). Three types of labour are considered: skilled, semi-skilled and unskilled. Each labour type is disaggregated by gender. Since we are particularly interested in the agricultural sector, it is the agricultural sectors that undergo a detailed disaggregation of production factors.

The capital factor is disaggregated into the land owned-women and land-owned men, farm and non-farm capital. Land intensity is shown separately from capital intensity to show the dominance of land in Tanzania’s agriculture sector, which could otherwise not be clear if land was considered as part of capital. The land allocation between women-owned and men-owned is based on the 2019/2020 Household Budget Survey and 2019/2020 national data. Mapping and land distribution among women and men are presented in Appendix 2. Labour intensive sectors are health, education, public administration, and business services and capital-intensive sectors are meat processing, fats, oils, and beverages. Among the agricultural sectors, maize, sorghum, and millet are mostly land intensive by both men and women. The economy is relatively capital intensive (Appendix 3).

The SAM considers specific accounts for direct taxes, indirect taxes on commodity sales (including value-added taxes), and import taxes to address fiscal policies. It considers four different institutions: households, firms, the government and the rest of the world. The savings (investment) account is divided into public investment, private investment, and changes in inventories.

Regarding the disaggregation of household income derived from production factors, the income share of each factor type per household category were calculated (table 2).

Table 2. Distribution of income for production factors (in %)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Men labour income | Women labour income | Farm capital | Non-farm capital | Income from women-owned | Income men-owned land |
| Household | 55.4 | 21.9 | 10.8 | 0 | 7.3 | 4.5 |

Source: Author’s estimation based on disaggregated by gender 2019 SAM

## 4.2 Model specification

This study uses both the static and recursive dynamic CGE models of the Partnership for Economic Policy (PEP 1-1 and PEP 1-t, 2.1 version) developed by Decaluwé et al. (2013)[[35]](#footnote-35).

In the model, there are two factors of production, capital and labour. Capital is further divided into land, physical capital and non-physical capital. According to our SAM, labour is also further disaggregated by gender and skills. Therefore, a total of six categories of labour are included in the model.

The domestic production function is assumed to be of constant returns to scale and presented in a four-level production process. At the first level, output is a Leontief function of value added and intermediate consumption. At the second level, it is assumed that composite labour and composite capital are substitutes following a constant elasticity of substitution (CES) function. At the third level, a CES function is used to represent the substitution between composite men and composite women labour. At the fourth level, the composite men labour demand is an aggregate function of men of different skills represented by a CES function having low elasticity. Similarly, the composite women labour is a CES function of women of different skills.

Agents in the model include one household, firms, government, and the rest of the world (ROW). The household receives capital, labour income, and transfers from institutions. Firms’ income is derived from capital owned and transfers from other institutions, while they spend on dividends and direct taxes and make savings. The government collects taxes (direct, indirect taxes, and import duties). The ROW obtains its income from capital, labour, imports, and transfers from firms and government. ROW spending consists of commodities purchases (from exports) and transfers to the households (remittances). Current account balance represents the difference between ROW spending and income.

Static PEP-1-1 CGE model was used for the simulation scenarios (i.e., effects of land reforms aimed at increasing land ownership among women farmers and the productivity and welfare impacts of ensuring equal access to productive inputs (i.e. fertilizers) for all farmers – especially for women. The other two scenarios were run by the recursive dynamic PEP 1-t CGE model. The CGE model is recursive dynamic, which means that key parameters in the model are updated each period based on previous period results. The model is run over 11 years (2019–2030) with each equilibrium period representing a single year. During this time the model captures exogenous demographic and technological change. Changes in the population, labour supply, and total factor productivity (TFP) are based on observed trends and available literature.

We modified the labour market equations following the methodology of Kinyondo and Mabugu (2009)[[36]](#footnote-36) and Maisonnave and Decaluwe (2010)[[37]](#footnote-37).

Labour was broken down into subsets that captured skills and gender groups. To do so, the two broad categories of labour were considered as follows (equation 1):

(1)

where = male labour and =female labour.

The composite male and female labour was further disaggregated according to skills (see equations 2 and 3).

(2)

(3)

Therefore, the SAM has a total of six labour categories. Given this labour disaggregation, the composite labour demand equation was modified to take into account the gender dimension (see equation 4).

(4)

where:

is the composite demand of labour at time t;

is the demand for male labour at time t;

is the demand for female labour at time t;

is the scale parameter (CES - composite labour);

is the share parameter (CES - composite labour);

is the elasticity parameter (CES - composite labour).

At the next level, the composite male and female labour was also modelled using CES functions with substitution possibilities among different skills groups (see equations 5 and 6).

(5)

(6)

The second modification involved relaxing the full employment assumption found in the PEP CGE model.. Although unemployment does not seem to fit a general equilibrium framework, we introduce the rate of involuntary unemployment to make the model a more realistic picture of the Tanzanian economy. We extend the model by including endogenous unemployment. Initially, we add the endogenous variable UN (number of unemployed people) to the labour-supply equation. In doing so, the equilibrium condition for the labour market (equation 7) is adjusted.

(7)

where

is the labour supply by a specific type of worker;

is the labour demand for a particular type of worker denoted by l within a specific sector j;

is the number of people in the economy who are unemployed by the type of worker.

Then, we replace the number of unemployed people in the economy with the unemployment rate. This is presented in equation 8.

(8)

Third, the dynamic PEP-1-t model was extended to include foreign direct investment (FDI) to expand irrigation. Specifically, FDI can be used to improve infrastructure and technology. In the model FDI is an addition to private investment. The volume of the new capital from FDI ) and the cost of capital in sector j is explained by equation 9.

(9)

Where:

is the additional stock of capital k, in industry j

is foreign direct investment in sector j

is an investment price index

FDI then reduces the rest of the world savings (Equation 10).

(10)

Where:

is the rest of the world savings,

is the current account balance.

Since the total investment equals total savings, this relationship is represented in equation 11.

(11)

Where:

is total investment,

is household savings,

savings of the firm,

is government savings.

To determine equilibrium on the private investment market we use equation 12.

(12)

Where:

is total private investment;

is investment in capital k for the private industry.

Finally, we modified value added equation to include total factor productivity for industry j.

(13)

Where:

is value added of industry j;

is total Factor Productivity of industry j;

composite demand for labour of industry j;

composite demand for capital of industry j.

In terms of closure rules, we assume that Tanzania is a small country, therefore world prices are exogenous. The real exchange rate is assumed to be flexible i.e., determined by market forces and the current account balance is exogenous. The distribution of factor income between domestic and foreign institutions was maintained at base-year levels. For the PEP-1t CGE model (dynamic), capital was assumed to be fully employed and mobile across sectors implying that it can be employed in different activities. Potential labour supply grows with the growth of the population rate. Stock variation for each commodity increases at the growth rate of the total demand for the corresponding commodity. The current public expenditure in nominal terms grew up at the GDP growth rate.

Unemployment is split by gender-disaggregated groups and exists in each segment of the labour market. Labour demand and employment varied after the introduction of the reform. We assumed further that there is an inverse relationship between wage rates and the unemployment. In other words, an increase in the unemployment rate leads to a decrease in the wage rates.

For PEP 1-1 CGE model (static), land was sector-specific and labour supply was exogenous. Elasticity values relating to gender disaggregation were obtained from Fontana (2001).

# **SECTION V: Application and Results**

## 5.1 Simulated policy scenarios

We model four observed scenarios. Simulating the observed scenario has the following advantages:

1. Scenarios are based on official data, so we are not exposing our assumptions to guestimates.

2. We can compare the results which we observe (e.g., the change in GDP, and demand for female labour in the agricultural sector with the observed data), this scenario offers a kind of validation.

Table 3. Summarizes the gender policies in the agricultural sectors simulated under the four scenarios

|  |  |  |
| --- | --- | --- |
| Scenarios | Description | Design |
| Simulation scenario 1 | Increase in female employment in the agricultural sector under ‘business-as-usual’ conditions. | * Increase in women's labour supply by 12.6% annually for the period from 2023 to 2025. * Increase in domestic transportation costs by 2% to reflect the real economy. |
| Simulation scenario 2 | The effects of land reforms aimed at increasing land ownership among women farmers | * 14% increase in the amount of land allocated to women in order to close the gender gap. |
| Simulation scenario 3 | The productivity and welfare impacts of ensuring equal access to productive inputs (i.e. fertilizers) for all farmers and especially for women | * Abolish VAT on locally produced fertilizers. |
| Simulation scenario 4 | The impact of investments on agricultural land irrigation and productivity | * 6% increase in public investment and 14% increase in FDI. |

## 5.2 Description scenarios

**Simulation scenario 1.** Increase in female employment in the agricultural sector under ‘business-as-usual’ conditions.

We consider this scenario as our baseline, Business-As-Usual (BAU) Scenario, i.e. a simple increase in the number of female workers in the agriculture sector without any other policy measures. This scenario is in line with the government's policy of creating more than 3 million jobs for women and youth in the agricultural sector by 2025 to reduce unemployment and achieve more than 10 percent growth for the agricultural sector by 2030[[38]](#footnote-38). The simulation of the policy on unskilled women workers is implemented in three-year intervals starting in 2023. To reflect the real economy due to current global economic crises[[39]](#footnote-39), trade and transport margins also increase for the period from 2022-2023.

**Simulation scenario 2.** The effects of land reforms aimed at increasing land ownership among women farmers.

To select the magnitude of the shock for this simulation scenario, we considered the arable land potential of Tanzania. Tanzania's arable land in 2020 amounted to 13.5 million hectares, a 1.36 percent increase from 2019,[[40]](#footnote-40) of which only 15 percent is exploited.[[41]](#footnote-41) The gender gap in agricultural productivity, which did account for gender-based differences in the quality and quantity of land is equal to about 23 percent. The cost of this gap are:

* 3.9 percent in forgone crop production;
* 0.86 percent in lost GDP.[[42]](#footnote-42)

Women’s ownership of agricultural land is lower than that of men. According to the World Bank (2020), 33% of women own agricultural land compared to 47% of men. This disparity translates into a gender gap of 14 percentage points[[43]](#footnote-43). Given this fact, we simulated a 14% increase in the amount of land allocated to women in order to close the gender gap.

**Simulation Scenario 3.** The productivity and welfare impacts of ensuring equal access to productive inputs (i.e. fertilizers) for all farmers and especially for women.

In this simulation scenario, we abolish the VAT rate on locally produced fertilizers in order to improve the productivity of crop sectors.

**Simulation scenario 3.** The impact of investments on agricultural land irrigation and productivity. This scenario is in line with the government's policy of modernizing agricultural farmland by expanding irrigation for crop production to improve productivity.

The increase in investment is initially captured in the model as an increase in the demand for goods and services, such as machinery and equipment and construction. We assessed the level of investment that is proposed in the 2022/23 FY budget to expand irrigated agricultural landto 8,500,000 hectares which corresponds to 50 percent of the total area cultivated in the country by 2030.[[44]](#footnote-44) We allocate to agriculture sectors public investment infrastructure equivalent to 6 percent of annual government investment and 14 percent of private investment from foreign donors, during seven years and analyze effects up to 2030.[[45]](#footnote-45) Investment in irrigation coupled with a 12.6 percent annual increase in women's labour supply in the agricultural sector from 2023 to 2025 as was mentioned in the 2022/23 FY budget.

## 5.3 Analysis of simulation results

**Scenario 1:** Welfare implications of proposed increase in women’s employment in the agricultural sector under BAU conditions.

This section presents the results of increased women's employment in the agricultural sector without improved agriculture productivity from inputs (such as increasing women’s access to land, education, financial services, and technology) from 2023 to 2025. We discuss the macroeconomic impact and then turn to the sectoral and household-level productivity impacts in particular focusing on welfare implications.

*Macroeconomic effects*

The overall observation of the simulation results is that there is a negative effect from the planned increases in the number of women employed in the agricultural sector on macroeconomic indicators, such as real GDP, total agricultural production, real household consumption, and inflation (table 4).

Table 4. Macroeconomic impacts of increasing the number of women employed in agriculture (% annual average change from the base year)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Macroeconomic aggregates | Simulation results | | | |
| 2019  (base year), ml. TZS | 2023 | 2025 | 2030 |
| Real GDP | 103029.1 | -0.45 | -0.62 | -0.93 |
| Total agricultural production | 33338.15 | -0.46 | -0.58 | -0.08 |
| Aggregate exports of agricultural commodities | 4387.4 | -0.91 | -0.95 | -1.14 |
| Aggregated imports of agricultural commodities | 1505.3 | +0.38 | +0.06 | -0.37 |
| Aggregate real consumption of households | 78733.6 | -0.14 | -0.31 | -0.57 |
| Consumer Price Index (CPI) |  | +3.03 | 3.04 | 3.07 |

Source: Authors’ calculation

The real GDP at market prices reflects the actual trend of the Tanzanian economy's performance after the reform measure is implemented. Particularly, increased unskilled women in the agricultural sector reduces GDP by 0.45 percent in 2023and 0.93 percent in 2030.

The main reason for the decline in the real GDP is associated with the annual increase in the consumer price index by 3.1 percent (Figure 4) and in decline exports of agricultural commodities by 0.9 percent annually for the estimated period. It can be assumed that the performance of real GDP is accompanied by inflation which decreases real household consumption by 0.14 percent in 2023, 0.31 percent in 2025 and 0.57 percent in 2030, respectively.

Figure 4. Evaluation of variation of the consumer price index

Source: Authors’ calculation

% change in CPI

According to our results, the total agricultural production is 0.46 percent, 0.58 percent, and 0.08 percent lower relative to the base year in 2023, 2025, and 2030 respectively. These results suggest that attracting additional unskilled workers to labour-intensive industries, such as the agricultural sector, leads to lower productivity and, as a result, a reduction in overall output. A detailed analysis is provided in section 4.2.2.

*Effects on sectoral level and factor markets*

Indeed, this policy leads to a decrease in value-added in the agricultural sector, mostly in the crops sectors, which contributes to a reduction in production in manufacturing sectors that use crops as intermediate inputs (e.g., meat processing, fish and seafood processing, fats and vegetable oil processing, grain milling, sugar refining, other foods, animal feed, luxury foodstuff, paper, fiber, and leather products, and chemicals – figures 5 and 6).

% change in value added

Figure 5. Evaluation of variation of value added in agricultural sectors (% change from the base year)

% change in value added

Figure 6. Evaluation of variation of value added in crop-dependent manufacturing sectors (% change from the base year)

The main reason for the fall in value-added of agricultural sectors and intermediate consumption of crop-dependent manufacturing sectors lies in the significant increase in prices for value-added and intermediate goods.

Figure 7. Evaluation of variation of value-added prices in the agricultural sector (% change from the base year)

The increase in women's participation in the agricultural sector slightly depressed wages in the main sectors of food crop production (such as maize, rice, oil seeds, other cereals, fruit and vegetables, roots, cotton, other crops, etc.), where the share of employed women is approximately equal to that of men (Figure 7). It should be noted that this policy scenario doesn't improve composite wages in agricultural sectors. As we can see from figure 8, the wage rate fluctuates during the observation period and affects the demand for both women and men linearly.

Figure 8. Evaluation of variation of wage rates in agricultural sectors (% change from the base year)

Given the labour-intensive nature of agricultural production in Tanzania, demand for labour increases due to a wage rate reduction in the following sectors: cereals, groundnuts, roots, fruit and nuts, and others (Figure 9).

Figure 9. Evaluation of variation of women demand for labour in agricultural sector (% change from the base year)

As was observed, increasing women’s employment in the agricultural sector decreases the wage rate, thus substituting labour for capital, mostly non-physical capital. The average returns on capital increases, making capital relatively more expensive than labour. In a few crop sectors (such as groundnuts, roots, and fruits), which increased productivity, we found increased demand for land, specifically those that are controlled by women (figure 10).

Figure 10. Evaluation of variation of demand for land owned by women (% change from the base year)

*Effects on prices and trade*

Increasing employment of unskilled women in agricultural sector decrease wages (due to low productivity of unskilled labour), and thus raises the rental rate of capital and the value added price. As a result, the price of agricultural commodities sold in the local market increase, making the imports relatively cheaper and attractive. Consequently, higher domestic prices discourage export for most commodities, including agricultural products.

*Effects on household income and consumption*

It is worth noting that the wage reduction leads to a decrease in total households' income (figure 11) and raises the risk of income inequality, especially for women that are involved in the sector in accordance with the government’s new agricultural strategy. Wage is the main income of households. According to the 2019 SAM, the labour income of men and women accounts for 50.8 percent of their total income.

b) Capital income (farm capital and land)

a) Labour income

c) Total income

Figure 11. Evaluation of the variance in composition of household income

However, given the fact that the consumer price index rises by 3.01 percent from increases in domestic prices of agricultural commodities (e.g., maize, rice, etc.) which constitute the main food basket of households, real consumption budgets of households also declines (figure 12).

Figure 12. Evaluation of the variance in consumption budgets of households

**Simulation Scenario 2: Increase in the supply of land allocated to women.**

Macroeconomic effects

The effect of ensuring equal access to land for women increases agricultural production by 0.66 percent. This increase leads to in real GDP (by 0.2 percent), an increase in total investment (0.6 percent) and exports of agricultural produce (1.29 percent – table 5).

Table 5. Impacts of increases in female-owned land on macroeconomic variables (% annual average change from the base year)

|  |  |
| --- | --- |
| Macroeconomic aggregates | Short-run |
| Total production of agricultural commodities (average) | +0.66 |
| Exports of agricultural commodities | +1.29 |
| Imports of agricultural commodities | -0.94 |
| Real household consumption | +0.15 |
| Real GDP | +0.2 |
| Consumer Price Index | -0.33 |
| Total investment | +0.15 |

From Table 5, we can see that households benefit from the policy reform. Given the increase in their real consumption (by 0.15 percent), households increase their demand for food commodities, specifically maize, fruits, and cash crops (see figure 13).

Figure 13. Evaluation of the variance in consumption of goods and services by households

Increasing women’s access to land and other agricultural inputs could increase their productivity and benefit social welfare. Our observation of increased household food consumption is in line with the findings of FAO (2011), [[46]](#footnote-46) which show that reducing the gender gap in agricultural inputs alone could save more than 100 million people from hunger.

*Effects on sectoral production and factor markets*

Figure 14 presents the impact of the simulated policies on the production of agricultural commodities. According to our results, closing the gender gap in land access would generate significant benefits for the agriculture sector, in particular the cultivation of maize, which increases by 2.4 percent and other crops (5.5 percent).

% change in estimated variable

Figure 14. Evaluation of the variance in agricultural output, demand for composite labour and capital (percentage change from base)

The positive results indicate that the simulated policy option is an effective measure to improve agricultural production and thus close the gender gap in agriculture. This result is in agreement with the findings of Joshi et al. (2023)[[47]](#footnote-47), Rosetti et al., (2010)[[48]](#footnote-48), and FAO (2011), who found that if women had the same access to productive resources as men, they could increase yields on their farms by 20–30 percent. This could have a positive impact on agricultural output growth in less developed countries by about 0.3-4 percent per year.

It was found, that the increase in women's land supply leads to an increase in total consumption of fertilizers by 0.65 percent. Since the cost of fertilizers is driven by import prices, an increase in land availability increases the demand for fertilizer for crops (figure 15).

% change in intermediate consumption price index

% change in intermediate demand

Figure 15. Evaluation of the variance in intermediate demand and intermediate consumption price index of agricultural sectors (percentage change from base)

According to simulation results, increasing female arable land ownership leads to an increase in demand for female labour in the crop cultivation process (figure 16). An increase in women's land ownership causes the market-clearing rental rate of land to fall by 34.9 percent, which increases women's demand for land significantly (figure 17).

% change in estimated variable

Figure 16. Evaluation of the variance in demand for arable land and rental rates in crop production sector (percentage change from the base).

% change in estimated variable

Figure 17. Evaluation of the variance in agricultural output, composite demand for labour and capital across agricultural sectors (percentage change from base).

% change in estimated variable

Figure 18. Demand for female labour by different qualification categories (percentage change from base)

The more extensive arable land owned by women for crop production, required the greater labour factor in the production process (figure 18).

*Effects on household income*

According to the 2019 SAM, households derive their income mainly from labour wages which makes up 50.8 percent of total income (women receive 14.5 percent of labour income and men 36.4 percent of labour income), land and capital income consists of 14.8 percent of total income (women's share of income from land is only 1.5 percent compared to 6.2 for men), and transfers from the government, firms, and the rest of the world (34.5 percent of total income). In this simulation scenario, we have a decline in wages, which is the main source of household income. However, the consumer price index declines by more (0.33 percent) than the decline in nominal incoe (0.19 percent), thereby increasing household purchasing power by 0.15 percent and potentially easing poverty.

**Simulation 3: The productivity and welfare impacts of ensuring equal access to productive inputs (i.e. fertilizers) for all farmers and especially for women**

*Macroeconomic effects*

Abolishing the VAT rate on locally produced fertilizers has positive macroeconomic implications, mainly in terms of total agricultural production, real GDP, inflation, household income, and consumption (table 6). However, this simulation negatively affects total government income by 5.5 percent and government income from indirect taxes by 14.8 percent.

Table 6. Impacts on macroeconomic variables (% change from the base)

|  |  |
| --- | --- |
| Macroeconomic variables | Simulation results |
| Total production of agricultural production | +2.6 |
| Real GDP | +1.7 |
| Consumer Price Index | -3.08 |
| Nominal household income | +6.1 |
| Real household consumption | +9.5 |
| Total government income | -5.5 |
| Total government receipts of Indirect taxes on commodities | -14.8 |

Source: Simulation results

*Effects on sectoral production and factors market*

In fact, the zero VAT rate on fertilizers leads to an increase in the total agricultural production (e.g., 4.67 percent for crops, 3.1 percent for fruit, 5.6 percent for vegetables –figure 19). Specifically, these are the agricultural sectors that have the highest allocation of land for crop production, and the most land-intensive.

% change in estimated variable

Figure 19. Total output across agricultural sectors and domestic demand for agricultural commodities (percentage change from base)

The zero VAT rate leads to a decrease in the cost of fertilizers and an increase in the domestic demand for agri-food commodities in most agricultural sectors by 4.2 percent on average. Mostly, the demand for agricultural commodities increases in sectors where women's employment is higher than in other sectors (figure 20).

Women employment rate, %

% change in domestic demand

Figure 20. Domestic demand for agri-food commodities and women’s employment rate (percentage change from base)

In fact, the simulation results reflect the positive impact on value-added from the production factor of female labour and total capital in the crops sector (figure 21). We can assume that, with an equal allocation of land between women and men and the availability of fertilizers, the value-added from women-cultivated land could increase by 20-30 percent. At the country level, women's agricultural production could increase in proportion to the amount of land controlled by women.

Figure 21. Contribution of factors of production to value added, with a focus on female labour

Figure 22. Composite demand for female labour in crop production sectors

Source: Author’s calculation

*Effects on household income*

Table 7. Effects on household income (% change from the base year)

|  |  |
| --- | --- |
|  | Simulation results |
| Labour income | 6.58 |
| Capital income | 10.1 |
| Transfer income | 3.78 |
| Savings | 6.15 |
| Total government revenue from household income taxes | 6.14 |

Source: Author’s calculation

Table 7 presents the impact of the simulated policy on the income of households. Simulation results show that the increased hiring of women workers by agricultural sectors (e.g., sorghum, millet, rice, wheat, barley, cassava, vegetables, fruits, and others) leads to an increase in labour, capital, and transfer incomes. Additionally, total government revenue from direct taxes paid by employed households rises. This can compensate for government losses from the abolished VAT on fertilizers.

Thus, simulation results of the proposed policy scenario clearly show that this type of action can have positive effects on women's employment and income and can perhaps change substantially the structure of agricultural production in Tanzania.

**Simulation 4: The impact of investments in irrigation on agricultural productivity**

*Macroeconomic effects*

The summary of the effects of this simulation scenario on macroeconomic aggregates is shown in table 8. Investment in land irrigation coupled with adding women's labour in the agricultural sector increases the production of agricultural commodities by 2.46 percent in 2025, which leads to the improvement of exports of aggregated agricultural goods by 5.05 percent.

Table 8. Effects on macroeconomic variables (% annual average change from the base year)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Macroeconomic aggregates | Simulation results | | | |
| 2019  (base year), ml. TZS | 2023 | 2025 | 2030 |
| Real GDP at market prices | 103029.1 | +0.79 | +0.82 | +0.05 |
| Real GDP at basic prices | 89195.0 | +0.64 | +0.68 | +0.078 |
| Total agricultural production | 33338.15 | +2.46 | +2.47 | +0.02 |
| Aggregate exports of agricultural commodities | 4387.4 | +5.29 | +5.05 | +0.21 |
| Aggregate real consumption of households | 78733.6 | +0.47 | +0.51 | +0.07 |
| Consumer Price Index |  | -1.2 | -1.2 | -0.01 |
| Annual unemployment rate | 10.3% | -2.03 | -1.6 | -0.55 |
| Annual women unemployment rate |  | -4.9 | -2.6 | -0.67 |

Source: Authors’ calculation

The agricultural sector constitutes about 26,9 percent of total production and 35.2% of the total exports in Tanzania. As a result, improving production and exports in this sector can play a key role in Tanzania’s economic performance. Our findings are consistent with World Bank (2003)[[49]](#footnote-49) results, which show that expansion of irrigation is associated with increased agricultural productivity. As a result, investment in irrigation of arable land leads to a 0.64 percent, 0.68 percent and 0.078 percent increase in real GDP in 2023, 2025, and 2030 respectively. One of the consequences of improving agricultural production is an increase in real household consumption. The findings show that the real consumption of households increases by 0.4 percent, 0.5 percent, and 0.07 percent in 2023, 2025, and 2030 respectively. The annual total unemployment rate decreased by 2.03 percent in 2023, 1.6 percent in 2025, and 0.55 percent in 2030. The total unemployment rate for women fell more than the total unemployment rate for men.

*Effects on sectoral production and demand for female labour*

Figure 23 shows, that investing in infrastructure, in our case in land irrigation leads to an increase in the value-added of agri-food sectors for the period from 2023-2029, which favours the increase in production in the agricultural sector as well as in the manufacturing sectors that depend on it (e.g., fats and vegetable oil processing, grain milling, sugar refining, other foods, animal feed and luxury foodstuff) and the construction sector.

% change in value added prices

% change in value added

Figure 23. Evaluation of variation of value added in agricultural sectors and their prices

In this simulation we assume, that a change in the labour factor endowment from increasing women's participation in the agricultural sector coupled with investment in infrastructure (e.g., irrigation) is a significant positive shock because it could change the productive capacity of the economy. This simulation scenario leads to a distributional effect when an increase in investment in infrastructure coupled with an increase in the supply of female labour in the agricultural sector, leads to lower wages in agri-food sectors with a high ratio of unskilled females but increases income from capital (Figure 24).

% change in demand for labour

% change in wage rate

Figure 24. Evaluation of variation of demand for female labour and wage rates in agricultural sector

It should be noted, that developing countries, in our case Tanzania, that need to accelerate their agricultural productivity should rely on the participation of combined financial capital through public and private investments.

# **Conclusion and policy recommendations**

The agricultural sector is the mainstay of the Tanzanian economy, accounting for 26.9 percent of the country’s GDP and around 65 percent of its workforce[[50]](#footnote-50). The sector is dominated by women who make up 32.6 percent of the total number of employed in the economy[[51]](#footnote-51). However, women contribute only 18.1 percent of agricultural production, which is significantly less than the 49.8 percent men contribute.[[52]](#footnote-52) This is because women are often excluded from receiving the same level of productive inputs (such as capital, seeds, fertilizer, land, labour, etc.), and access to markets, and technology/services as their male counterparts. This gender discrepancy reduces their productivity and contribution to the agriculture sector and the achievement of broader gender equality and socio-economic development goals. Using CGE models to show the gender-differentiated impacts of policy reforms on the agricultural sector and the economy as a whole, this paper assessed the likely gender equality and women’s empowerment impacts of the government’s new agricultural transformation strategy, which is centered on increasing the number of women employed in the agricultural sector.

In analyzing various policy options for achieving gender equality and women’s empowerment in the agricultural sector, specifically in crop production, this study found that the baseline – or ‘business-as-usual’ scenario – of adding more female workers to the agricultural sector without ensuring their equal access to productive inputs leads to a decrease in agricultural productivity and the earning capacity of women in agriculture. Moreover, the results of the policy simulations indicate that implementing this policy measure alone would depress agricultural output growth in both the short- and long-runs, and wage rates for all workers in the sector, particularly the more labour-intensive ones such as such as cereals, groundnuts, roots, fruit, and nuts.

On the other hand, when policy reforms that ensure equal access to productive inputs for female farmers alongside increases in female labour, were simulated, the results indicated more beneficial impacts on women’s agricultural productivity, access to markets and household incomes.[[53]](#footnote-53) The first simulation considered the impact of providing equal access to land for women, which resulted in an increase in demand for female labour in crop production, a 0.15 percent increase in household income and a 0.66 percent increase in agricultural production in the short-run.

The second simulation assessed the impact of abolishing VAT on fertilizer and found that this would result in a 4.2 percent increase in the domestic demand for agri-food commodities in most agricultural sectors but especially in those where women are concentrated.

Moreover, reducing the cost of fertilizers increases access to markets for both producers and consumers and leads to an increase in labour income, specifically for women.

For the final simulation, we modelled the impact of an increase investment in infrastructure, specifically irrigation, and found that this would increase the demand for women workers in crop and related manufacturing sectors. From a macroeconomic perspective, this policy has a positive impact on the reduction of the total unemployment rate for women (-2.7 percent on average for the estimated period), which fell more than the total unemployment rate for men.

Further research is required to determine the optimal combination of simulated policy options to the greatest returns in terms of increasing women's economic empowerment in the agricultural sector and, secondarily, to create maximum economic benefits.

Based on the estimation of the likely implications for gender equality and women’s economic empowerment of the above simulated policy reforms, we can recommend the following preliminary policies to enhance the government’s agriculture transformation strategy for the benefit of women.

* Ensure equal access to arable agricultural land for women. Gender-sensitive policy support and well-designed reforms aimed at eliminating discrimination in land distribution can help close the gender gap. As indicated by the model results, if women had the same access to land as men, they could increase yields on their farms by 8.65 percent. This could raise total agricultural output by 0.69 percent in the short term, which could in turn reduce income inequality and increase household consumption.
* Facilitate women's access to agricultural inputs (fertilizer, agricultural capital, improved seeds, etc.) to increase their agricultural productivity. These steps should be implemented together with measures to provide gender-sensitive training in the use of these inputs.
* Accelerate investment in irrigation to increase productivity by and prioritize crop sectors with high female employment and high returns to crop production. The simulation results revealed that the crop sector has a significant positive impact on women's employment creation, output, and value-added. The limited amount of government resources available for investing in irrigation (despite the proposed seven-fold increase in the irrigation development budget) will need to be augmented with domestic private investment, FDI and other flows, which will require the development of timely, bankable project proposals that demonstrate returns to investment in irrigation in both financial and developmental terms.

# **References**

Decaluwé, B., Lemelin, A., Robichaud, V., Maisonnave, H. (2013). Pep-1-1: the PEP standard single-country, static CGE model. Partnership for Economic Policy

Dorothée Boccanfuso, Marcelin Joanis, Patrick Richard & Luc Savard (2014) A comparative analysis of funding schemes for public infrastructure spending in Quebec, Applied Economics, 46:22, 2653-2664, DOI: 10.1080/00036846.2014.909576

Food and Agriculture Organization of the United Nations (FAO) (2016). [The State of Food and Agriculture 2016 (SOFA): Climate change, agriculture and food security (fao.org)](https://www.fao.org/3/i6030e/i6030e.pdf)

Food and Agriculture Organization of the United Nations (FAO) (2011). Women in Agriculture: closing the gender gap for development. Rome. https://www.fao.org/publications/sofa/2010-11/en/

Henseler M, Maisonnave H, Maskaeva A. Economic impacts of COVID-19 on the tourism sector in Tanzania. Annals of Tourism Research Empirical Insights. 2022 May;3(1):100042. doi: 10.1016/j.annale.2022.100042. Epub 2022 Feb 28. PMCID: PMC8882425.

Joshi, C.L., Maisonnave, H., Baroki, R.L. and Mariam, A.B. (2023), "Pro-gender policies and the empowerment of women in the DRC", Journal of Agribusiness in Developing and Emerging Economies, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/JADEE-01-2022-0016

Kinyondo, G., and M. Mabugu (2009). ’The General Equilibrium Effects of a Productivity Increase on the Economy and Gender in South Africa’. *South African Journal of Economic and Management Sciences,* 12(3): 307–26.

Lemelin, A, Fofana, I and Cockburn, J (2013) Balancing a Social Accounting Matrix: Theory and Application, available of the PEP website (<https://www.pep-net.org/sambal-gpcema)>

Maisonnave, H., and B. Decaluwe (2010). *Is South Africa’s Affirmative Action Policy Efficient*? Working paper 2010/23. Dakar: Consortium pour la recherche Economique et Sociale. <https://media.africaportal.org/documents/south_africa_1.pdf>

National Bureau of Statistics NBS (2014). Integrated Labour Force Survey, National Bureau of Statistics. Dar-es-Salaam

National Bureau of Statistics NBS (2019). Integrated Labour Force Survey, National Bureau of Statistics 2020/2021: Analytical report. Dar-es-Salaam

National Bureau of Statistics NBS (2020). National Accounts of Tanzania Mainland 2015 - 2021. Dar-es-Salaam

OXFAM (2014). [Empower Women - Effective Approaches to Women’s Economic Empowerment in Agriculture](https://www.empowerwomen.org/en/resources/documents/2016/10/effective-approaches-to-womens-economic-empowerment-in-agriculture?lang=en). OXFAM Background report

Randriamamonjy J. and Thurlow J. (2017). 2015 Social Accounting Matrix for Tanzania a Nexus Project SAM. Washington, DC: IFPRI

Rosetti N. and Kakande M. (2010). Modelling the contributions of reduced gender inequality to GDP growth prospects and poverty reduction. CPRC (Chronic Poverty Research Center) International Conference 2010

United Nationa Development Programme (UNDP) (20218). What are the Factors Driving the Gender Gap in Agricultural Productivity in Tanzania? https://info.undp.org/docs/pdc/Documents/TZA/Final%20Report%20%20Gender%20Gap%20April%202018.pdf

United Nations Conference on Trade and Development (2022). Enhancing productive capacities in the United Republic of Tanzania: coherent and operational strategy.

United Republic of Tanzania (URT) (2021). [Budget Books 2022/2023 | MoF - Ministry of Finance and Planning](https://www.mof.go.tz/publications/budget-books-2022-2023)

United Republic of Tanzania (URT) (2021). Ministry of Agriculture; Building a Better Tomorrow: Youth Agribusiness Initiative 2022-2030.

World Bank (2003). Prospects for irrigated agriculture: whether irrigated area and irrigation water must increase to meet food needs in the future: Washington, DC 20433. http://web.worldbank.org/archive/website00660/WEB/PDF/260290PR.PDF

World Bank (2013). [Agriculture: Sector Results Profile (worldbank.org)](https://www.worldbank.org/en/results/2013/04/15/agriculture-results-profile)

World Bank (2014). LevelLing the field: Improving Opportunities for Women Farmers in Africa

World Bank (2020). Tanzania Mainland Poverty Assessment, World Bank, Washington, DC, [https://doi.org/10.1596/33543](http://dx.doi.org/10.1596/33543).

World Bank (2022). Tanzania Agriculture Public Expenditure Review. https://elibrary.worldbank.org/doi/abs/10.1596/37991

# **Appendices**

Appendix 1

**SAM Framework**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Activities** | **Commodities** | **Factors of production** | **Households** | **Government**  *Taxes* | **Investments** | **Rest of the World**  *Exports* | **Total Income** |
| **Activities** |  | Marketed  output |  | Domestic consumption |  |  |  | **Activity income** |
| **Commodities** | Intermediate inputs |  |  | Marketed consumption | Government consumption | Investments | Exports | **Total demand** |
| **Factors** | Value-added |  |  |  |  |  | Foreign factor earnings | **Factor earnings** |
| **Households** |  |  |  | Inter households’ transfers | Transfers to Households |  | Foreign remittances received | **Household income** |
| **Government**  *Taxes* | Producer taxes | Sales taxes, import tariffs | Factor taxes | Personal Taxes |  |  | Government transfers from ROW | **Government income** |
| **Savings** |  |  |  | Household savings | Government savings |  | Foreign savings | **Savings** |
| **ROW**  Imports |  |  |  | Foreign remittances paid | Government transfers to ROW |  |  | **Foreign exchange outflow** |
| **Total Expenditure** | **Gross output** | **Total supply** | **Factor expenditure** | **Household expenditure** | **Government expenditure** | **Investments** | **Foreign exchange inflow** |  |

Source: 2015 Tanzania SAM (Randriamamonjy and Thurlow, 2017

Appendix 2

**Mapping and land distribution among women and men**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Agricultural commodities from SAM | Agricultural sectors | Farm male income, TZS | Farm female income, TZS | Total income, TZS |  | Male share of land,% | Female share of land,% |  |
| beans, peas, and lentils | Growing of cereals (except rice), leguminous crops and oil seeds | 8,931,557,156.25 | 5,846,943,970.70 | 14,778,501,126.95 |  | 0.604 | 0.396 | 1.0 |
|  | Growing of rice | 6,722,219,429.69 | 1,253,270,162.11 | 7,975,489,591.80 |  | 0.843 | 0.157 | 1.0 |
| vegetables, flowers | Growing of other non-perennial crops | 240,978,920,704.35 | 15,333,626,226.56 | 256,312,546,930.91 |  | 0.940 | 0.060 | 1.0 |
| barley, rice, Palmira, coconuts, grapes, sorghum, maize, sugarcane, corn, palm, coffee, tea, sugar beet, lemongrass, agave, cocoa, grain, hopes, lemon, apples | Growing of beverage crops | 19,656,695,625.00 | 16,800,020,059.57 | 36,456,715,684.57 |  | 0.539 | 0.461 | 1.0 |
| opium poppy, coca, and cannabis | Growing of spices, aromatic, drug and pharmaceutical crops | 4,546,987,968.75 |  | 4,546,987,968.75 |  | 1.000 | 0.000 | 1.0 |
| oilseeds, legumes, wheat, sorghum, rice, sunflowers | Growing of other perennial crops | 84,934,355,456.30 | 7,297,137,365.23 | 92,231,492,821.53 |  | 0.921 | 0.079 | 1.0 |
|  | Plant propagation | 1088192041 | 828288925.8 | 1,916,480,966.80 |  | 0.6 | 0.4 | 1.0 |
| Total | | 366,858,928,381.35 | 47,359,286,709.96 | 414,218,215,091.31 |  | 0.886 | 0.114 | 1.0 |

Source: Cleaned data on dependent income by activity (ISIC 4), gender, and income from self-employment still by sector and gender are obtained from EC-JRC.

Appendix 3

**Labour and capital income share in Tanzania SAM**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Activity** | **Labour intensity,%** | *Female labour income intensity,%* | *Male labour intensity,%* | **Capital intensity,%** | **Activity** | **Labour intensity,%** | *Female labour income intensity,%* | *Male labour intensity,%* | **Capital intensity,%** |
| Maize | 17.2 | *7.7* | *9.5* | 82.8 | Fats and vegetable processing | 7.5 | *2.5* | *5.0* | 92.5 |
| Sorghum and millet | 13.3 | *6.0* | *7.3* | 86.7 | Fish processing | 29.9 | *10.1* | *19.8* | 70.1 |
| Rice | 16.8 | *7.5* | *9.2* | 83.2 | Dairy | 20.8 | *7.0* | *13.8* | 79.2 |
| Wheat and burley | 21.6 | *9.7* | *11.9* | 78.4 | Grain milling | 19.4 | *6.5* | *12.9* | 80.6 |
| Other cereals | 27.3 | *12.2* | *15.1* | 72.7 | Sugar refining | 9.4 | *3.2* | *6.3* | 90.6 |
| Pulses | 37.1 | *16.6* | *20.4* | 62.9 | Other foods | 17.8 | *6.0* | *11.8* | 82.2 |
| Groundnuts | 36.3 | *16.3* | *20.0* | 63.7 | Animal feed | 41.0 | *13.8* | *27.2* | 59.0 |
| Oil seeds | 34.5 | *15.5* | *19.0* | 65.5 | Luxury foodstuff | 17.7 | *6.0* | *11.8* | 82.3 |
| Cassava | 48.9 | *21.9* | *27.0* | 51.1 | Paper and leather products | 33.8 | *11.4* | *22.4* | 66.2 |
| Other roots | 63.6 | *28.5* | *35.0* | 36.4 | Chemicals | 16.1 | *5.4* | *10.7* | 83.9 |
| Vegetables | 32.3 | *14.5* | *17.8* | 67.7 | Non metal minerals | 19.4 | *6.5* | *12.9* | 80.6 |
| Sugar cane | 41.9 | *18.8* | *23.1* | 58.1 | Metal | 29.0 | *9.7* | *19.2* | 71.0 |
| Cotton and fibre | 49.9 | *22.4* | *27.5* | 50.1 | Manufacturing | 20.4 | *6.9* | *13.6* | 79.6 |
| Fruits and nuts | 36.0 | *16.1* | *19.8* | 64.0 | Machinery | 40.3 | *13.5* | *26.7* | 59.7 |
| Cash crops | 45.9 | *20.6* | *25.3* | 54.1 | Electricity, gas, and steam | 56.5 | *2.4* | *54.1* | 43.5 |
| Tea leaves | 51.2 | *23.0* | *28.2* | 48.8 | Water supply | 45.3 | *12.8* | *32.5* | 54.7 |
| Cut flowers | 28.0 | *12.6* | *15.4* | 72.0 | Construction | 74.1 | *1.8* | *72.3* | 25.9 |
| Other crops | 29.8 | *13.4* | *16.4* | 70.2 | Trade | 63.1 | *26.7* | *36.4* | 36.9 |
| Cattle | 34.0 | *15.2* | *18.7* | 66.0 | Transport | 41.6 | *1.0* | *40.5* | 58.4 |
| Raw milk | 39.6 | *17.8* | *21.9* | 60.4 | Hotel and Restaurants | 53.9 | *41.5* | *12.4* | 46.1 |
| Small ruminants | 42.5 | *19.0* | *23.4* | 57.5 | Communication | 23.9 | *5.1* | *18.8* | 76.1 |
| Poultry | 32.2 | *14.5* | *17.8* | 67.8 | Finance and insurance | 39.6 | *18.6* | *21.0* | 60.4 |
| Other livestock | 41.2 | *18.5* | *22.7* | 58.8 | Real estate | 7.6 | *1.9* | *5.7* | 92.4 |
| Forestry | 80.6 | *36.2* | *44.4* | 19.4 | Business services | 94.4 | *15.2* | *79.3* | 5.6 |
| Fishing | 54.4 | *24.4* | *30.0* | 45.6 | Public administration | 96.6 | *15.3* | *81.3* | 3.4 |
| Tuna fishing | 57.6 | *25.8* | *31.7* | 42.4 | Education | 97.2 | *41.0* | *56.2* | 2.8 |
| Mining | 22.5 | *3.9* | *18.7* | 77.5 | Health | 97.2 | *47.9* | *49.3* | 2.8 |
| Meat processing | 8.7 | *2.9* | *5.8* | 91.3 | Other services | 69.8 | *42.3* | *27.5* | 30.2 |

Source: author’s calculations based on the updated 2019 Tanzanian SAM (Randriamamonjy and Thurlow , 2017)

Appendix 4

**Sectoral composition of factor earnings (%)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Activity** | **Male** | | | **Female** | | | **Capital** |
| **Unskilled** | **Semi-skilled** | **Skilled** | **Unskilled** | **Semi-skilled** | **Skilled** |
| Maize | 1.0 | 0.6 | 0.4 | 1.9 | 1.2 | 0.9 | 5.7 |
| Sorghum and millet | 0.1 | 0.1 | 0.0 | 0.2 | 0.1 | 0.1 | 0.8 |
| Rice | 0.4 | 0.2 | 0.2 | 0.8 | 0.5 | 0.4 | 2.4 |
| Wheat and burley | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 |
| Other cereals | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pulses | 1.5 | 0.8 | 0.6 | 2.7 | 1.8 | 1.3 | 2.9 |
| Groundnuts | 0.5 | 0.3 | 0.2 | 0.9 | 0.6 | 0.4 | 1.0 |
| Oil seeds | 0.5 | 0.3 | 0.2 | 0.9 | 0.6 | 0.4 | 1.1 |
| Cassava | 1.1 | 0.6 | 0.5 | 2.1 | 1.3 | 1.0 | 1.4 |
| Roots | 1.6 | 0.9 | 0.6 | 3.0 | 1.9 | 1.4 | 1.1 |
| Vegetables | 0.9 | 0.5 | 0.4 | 1.7 | 1.1 | 0.8 | 2.2 |
| Sugar cane | 0.2 | 0.1 | 0.1 | 0.4 | 0.2 | 0.2 | 0.3 |
| Cotton and fibre | 0.1 | 0.0 | 0.0 | 0.2 | 0.1 | 0.1 | 0.1 |
| Fruits and nuts | 2.5 | 1.4 | 1.0 | 4.7 | 3.0 | 2.2 | 5.2 |
| Cash crops | 0.2 | 0.1 | 0.1 | 0.4 | 0.3 | 0.2 | 0.3 |
| Tea leaves | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| Cut flowers | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 |
| Other crops | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 |
| Cattle | 1.7 | 0.9 | 0.7 | 3.1 | 2.0 | 1.5 | 3.7 |
| Raw milk | 1.9 | 1.1 | 0.7 | 3.4 | 2.2 | 1.6 | 3.2 |
| Small ruminants | 0.3 | 0.2 | 0.1 | 0.6 | 0.4 | 0.3 | 0.5 |
| Poultry | 0.2 | 0.1 | 0.1 | 0.5 | 0.3 | 0.2 | 0.6 |
| Other livestock | 0.2 | 0.1 | 0.1 | 0.3 | 0.2 | 0.1 | 0.2 |
| Forestry | 4.9 | 2.8 | 1.9 | 9.0 | 5.8 | 4.3 | 1.3 |
| Fishing | 2.4 | 1.4 | 1.0 | 4.5 | 2.9 | 2.1 | 2.3 |
| Tuna fishing | 0.2 | 0.1 | 0.1 | 0.3 | 0.2 | 0.2 | 0.2 |
| Mining | 3.1 | 1.9 | 1.5 | 1.3 | 1.4 | 1.4 | 8.4 |
| Meat processing | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| Fish and seafood processing | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 |
| Fats and vegetable processing | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.9 |
| Dairy | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| Grain milling | 0.6 | 0.7 | 0.7 | 0.8 | 0.9 | 1.0 | 3.3 |
| Sugar refining | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 2.5 |
| Other foods | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.9 |
| Animal feed | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Luxury foodstuff | 0.7 | 0.8 | 0.8 | 0.9 | 1.1 | 1.1 | 4.2 |
| Paper. fiber and leather products | 0.3 | 0.4 | 0.4 | 0.4 | 0.5 | 0.6 | 0.9 |
| Chemicals | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 1.0 |
| Non metal minerals | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.8 |
| Metal | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 |
| Manufacturing | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.7 |
| Machinery | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Electrisity. gas. and steam | 0.4 | 0.5 | 0.6 | 0.0 | 0.1 | 0.1 | 0.3 |
| Water supply and sewage | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 |
| Construction | 23.5 | 28.1 | 29.9 | 1.4 | 1.9 | 2.0 | 7.5 |
| Wholesale and retail trade | 11.7 | 13.5 | 14.2 | 21.4 | 26.7 | 29.1 | 10.4 |
| Transport and storage | 4.7 | 5.7 | 6.1 | 0.3 | 0.4 | 0.4 | 6.0 |
| Accommodation and food services | 0.4 | 0.4 | 0.5 | 3.1 | 3.9 | 4.3 | 1.2 |
| Information and communication | 0.9 | 1.2 | 1.4 | 0.6 | 0.9 | 1.1 | 3.5 |
| Finance and insurance | 1.2 | 1.6 | 1.7 | 2.7 | 3.9 | 4.4 | 3.3 |
| Real estate activities | 0.4 | 0.3 | 0.3 | 0.2 | 0.4 | 0.4 | 4.5 |
| Business services | 11.0 | 11.5 | 11.7 | 4.9 | 6.4 | 7.0 | 0.6 |
| Public administration | 11.2 | 12.8 | 13.5 | 5.0 | 7.0 | 7.9 | 0.4 |
| Education | 3.7 | 3.5 | 3.4 | 6.3 | 7.1 | 7.5 | 0.1 |
| Health and social work | 1.8 | 1.9 | 2.0 | 4.4 | 5.0 | 5.2 | 0.1 |
| Other services | 0.9 | 0.9 | 0.9 | 3.0 | 4.1 | 4.6 | 0.8 |
| **Total** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** |

Source: author’s calculations based on the updated 2019 Tanzanian SAM (Randriamamonjy and Thurlow , 2017)

1. [World Bank Document](https://openknowledge.worldbank.org/server/api/core/bitstreams/2dc34f8e-4485-5fe8-bb58-cb98b7f17e54/content) [↑](#footnote-ref-1)
2. [clinton.pdf (un.org)](https://www.un.org/en/ecosoc/phlntrpy/notes/clinton.pdf) [↑](#footnote-ref-2)
3. [World Bank Document](https://openknowledge.worldbank.org/server/api/core/bitstreams/2dc34f8e-4485-5fe8-bb58-cb98b7f17e54/content) [↑](#footnote-ref-3)
4. [Agriculture: Sector Results Profile (worldbank.org)](https://www.worldbank.org/en/results/2013/04/15/agriculture-results-profile) [↑](#footnote-ref-4)
5. [The State of Food and Agriculture 2016 (SOFA): Climate change, agriculture and food security (fao.org)](https://www.fao.org/3/i6030e/i6030e.pdf) [↑](#footnote-ref-5)
6. [World Bank Document](https://openknowledge.worldbank.org/server/api/core/bitstreams/2dc34f8e-4485-5fe8-bb58-cb98b7f17e54/content) [↑](#footnote-ref-6)
7. Ibid [↑](#footnote-ref-7)
8. [The State of Food and Agriculture 2016 (SOFA): Climate change, agriculture and food security (fao.org)](https://www.fao.org/3/i6030e/i6030e.pdf) [↑](#footnote-ref-8)
9. [Empower Women - Effective Approaches to Women’s Economic Empowerment in Agriculture](https://www.empowerwomen.org/en/resources/documents/2016/10/effective-approaches-to-womens-economic-empowerment-in-agriculture?lang=en) [↑](#footnote-ref-9)
10. [World Bank Document](https://openknowledge.worldbank.org/server/api/core/bitstreams/2dc34f8e-4485-5fe8-bb58-cb98b7f17e54/content) [↑](#footnote-ref-10)
11. [Samia launches major 'Kilimo' campaign today | The Citizen](https://www.thecitizen.co.tz/tanzania/news/national/samia-launches-major-kilimo-campaign-today-3770694) [↑](#footnote-ref-11)
12. Special publication for the Africa Food Systems Forum 2023 summit launch in Tanzania, March 17, 2023. [↑](#footnote-ref-12)
13. UNCT CCA 2021. [↑](#footnote-ref-13)
14. Ministry of Agriculture; Building a Better Tomorrow: Youth Agribusiness Initiative 2022-2030. [↑](#footnote-ref-14)
15. Special publication for the Africa Food Systems Forum 2023 summit launch in Tanzania, March 17, 2023. [↑](#footnote-ref-15)
16. UNCT CCA 2021. [↑](#footnote-ref-16)
17. [Budget Books 2022/2023 | MoF - Ministry of Finance and Planning](https://www.mof.go.tz/publications/budget-books-2022-2023) [↑](#footnote-ref-17)
18. UNCT CCA 2021. [↑](#footnote-ref-18)
19. World Bank TEU, p.47. [↑](#footnote-ref-19)
20. UNCT CCA 2021. [↑](#footnote-ref-20)
21. World Bank TEU. [↑](#footnote-ref-21)
22. UNCT CCA 2021. [↑](#footnote-ref-22)
23. [World Bank Document](https://documents1.worldbank.org/curated/en/099850002282226344/pdf/P174894034150b0080a42e081bd547a37b8.pdf) [↑](#footnote-ref-23)
24. https://openknowledge.worldbank.org/bitstream/handle/10986/22770/The0cost0of0th0Tanzania00and0Uganda.pdf?sequence=1 [↑](#footnote-ref-24)
25. https://assets.publishing.service.gov.uk/media/5b18ff6f40f0b634d557af84/Mapping\_Womens\_Economic\_Exclusion\_in\_Tanzania.pdf [↑](#footnote-ref-25)
26. [World Bank Document](https://openknowledge.worldbank.org/server/api/core/bitstreams/2dc34f8e-4485-5fe8-bb58-cb98b7f17e54/content) [↑](#footnote-ref-26)
27. [clinton.pdf (un.org)](https://www.un.org/en/ecosoc/phlntrpy/notes/clinton.pdf) [↑](#footnote-ref-27)
28. [Examining the relationship between women’s empowerment and gender-based violence: The case of the Nigeria For Women Project (worldbank.org)](https://blogs.worldbank.org/africacan/examining-relationship-between-women-empowerment-and-gender-based-violence-nigeria) [↑](#footnote-ref-28)
29. [World Bank Document](https://openknowledge.worldbank.org/server/api/core/bitstreams/2dc34f8e-4485-5fe8-bb58-cb98b7f17e54/content) [↑](#footnote-ref-29)
30. [World Bank Document](https://openknowledge.worldbank.org/server/api/core/bitstreams/2dc34f8e-4485-5fe8-bb58-cb98b7f17e54/content) [↑](#footnote-ref-30)
31. [World Bank Document](https://openknowledge.worldbank.org/server/api/core/bitstreams/2dc34f8e-4485-5fe8-bb58-cb98b7f17e54/content); pp. 10 - 12 [↑](#footnote-ref-31)
32. Randriamamonjy J. and Thurlow J. (2017). 2015 Social Accounting Matrix for Tanzania a Nexus Project SAM. Washington, DC: IFPRI [↑](#footnote-ref-32)
33. Lemelin, A, Fofana, I and Cockburn, J (2013) Balancing a Social Accounting Matrix: Theory and Application, available of the PEP website (<https://www.pep-net.org/sambal-gpcema)> [↑](#footnote-ref-33)
34. National Bureau of Statistics NBS (2014). Integrated Labour Force Survey, National Bureau of Statistics. Dar-es-Salaam [↑](#footnote-ref-34)
35. Decaluwé, B., Lemelin, A., Robichaud, V., Maisonnave, H. (2013). Pep-1-1: the PEP standard single-country, static CGE model. Partnership for Economic Policy [↑](#footnote-ref-35)
36. Kinyondo, G., and M. Mabugu (2009). ’The General Equilibrium Effects of a Productivity Increase on the Economy and Gender in South Africa’. *South African Journal of Economic and Management Sciences,* 12(3): 307–26. [↑](#footnote-ref-36)
37. Maisonnave, H., and B. Decaluwe (2010). *Is South Africa’s Affirmative Action Policy Efficient*? Working paper 2010/23. Dakar: Consortium pour la recherche Economique et Sociale. <https://media.africaportal.org/documents/south_africa_1.pdf> [↑](#footnote-ref-37)
38. https://www.mof.go.tz/uploads/documents/en-1655216926-BUDGET%20SPEECH%202022-23%20ENGLISH%20VERSION.pdf [↑](#footnote-ref-38)
39. United Nations Conference on Trade and Development (2022). Enhancing productive capacities in the United Republic of Tanzania: coherent and operational strategy.

    Henseler M, Maisonnave H, Maskaeva A. Economic impacts of COVID-19 on the tourism sector in Tanzania. Annals of Tourism Research Empirical Insights. 2022 May;3(1):100042. doi: 10.1016/j.annale.2022.100042. Epub 2022 Feb 28. PMCID: PMC8882425.

    https://www.theigc.org/publications/transportation-costs-food-markets-and-structural-transformation-tanzania-policy-brief [↑](#footnote-ref-39)
40. https://www.macrotrends.net/countries/TZA/tanzania/arable-land#:~:text=Tanzania%20arable%20land%20for%202020,a%201.42%25%20increase%20from%202016 [↑](#footnote-ref-40)
41. https://data.worldbank.org/indicator/AG.LND.ARBL.ZS?locations=TZ [↑](#footnote-ref-41)
42. What are the Factors Driving the Gender Gap in Agricultural Productivity in Tanzania? https://info.undp.org/docs/pdc/Documents/TZA/Final%20Report%20%20Gender%20Gap%20April%202018.pdf [↑](#footnote-ref-42)
43. World Bank (2020). Tanzania Mainland Poverty Assessment, World Bank, Washington, DC, [https://doi.org/10.1596/33543](http://dx.doi.org/10.1596/33543). [↑](#footnote-ref-43)
44. https://www.mof.go.tz/uploads/documents/en-1655216926-BUDGET%20SPEECH%202022-23%20ENGLISH%20VERSION.pdf [↑](#footnote-ref-44)
45. World Bank (2022). Tanzania Agriculture Public Expenditure Review. https://elibrary.worldbank.org/doi/abs/10.1596/37991 [↑](#footnote-ref-45)
46. Food and Agriculture Organization of the United Nations (FAO) (2011). Women in Agriculture: closing the gender gap for development. Rome. https://www.fao.org/publications/sofa/2010-11/en/ [↑](#footnote-ref-46)
47. Joshi, C.L., Maisonnave, H., Baroki, R.L. and Mariam, A.B. (2023), "Pro-gender policies and the empowerment of women in the DRC", Journal of Agribusiness in Developing and Emerging Economies, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/JADEE-01-2022-0016 [↑](#footnote-ref-47)
48. Rosetti N. and Kakande M. (2010). Modelling the contributions of reduced gender inequality to GDP growth prospects and poverty reduction. CPRC (Chronic Poverty Research Center) International Conference 2010 [↑](#footnote-ref-48)
49. World Bank (2003). Prospects for irrigated agriculture: whether irrigated area and irrigation water must increase to meet food needs in the future: Washington, DC 20433. http://web.worldbank.org/archive/website00660/WEB/PDF/260290PR.PDF [↑](#footnote-ref-49)
50. National Accounts of Tanzania Mainland 2015 - 2021 [↑](#footnote-ref-50)
51. Integrated Labour Force Survey 2020/2021: Analytical Report [↑](#footnote-ref-51)
52. The estimate was made based on the updated 2019 SAM and included labour and land inputs [↑](#footnote-ref-52)
53. The single-policy simulation was used to show policymakers the effects of the shock in isolation and to emphasize the trade-offs between different policy interventions in the agricultural sector [↑](#footnote-ref-53)