



Employment Impacts of Deploying Climate- Smart Agriculture Practices

A Value Chain Input – Output Analysis
Approach

GGGI

July 2025



Source: iStock – Farm workers harvest yellow peppers California

Agenda

Opening
remarks

01

Test your
knowledge

02

Objectives
and scope of
the study

03

Results

04

Questions

05

PRESENTATION TITLE

How much do you know about employment in the agriculture sector?



Answer the poll

What's the share of the global workforce working in the agricultural sector?

- ☐ 18%
- ☐ 26%
- ☐ 47%

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Agriculture continues to be the largest employer in the world. Therefore, increasing climate-smart agriculture, represents an enormous potential to improve rural livelihoods.

— ILO, 2021



GGGI's latest employment study assesses the labor market impacts of deploying CSA



Labor market aspects assessed



Labor demand for reaching NDC CSA targets



Changes in labor productivity due to climate change



Changes in occupations and skills



Decent jobs in agriculture













Quality of jobs



The study measures the impacts of reaching the NDC targets related to CSA deployment

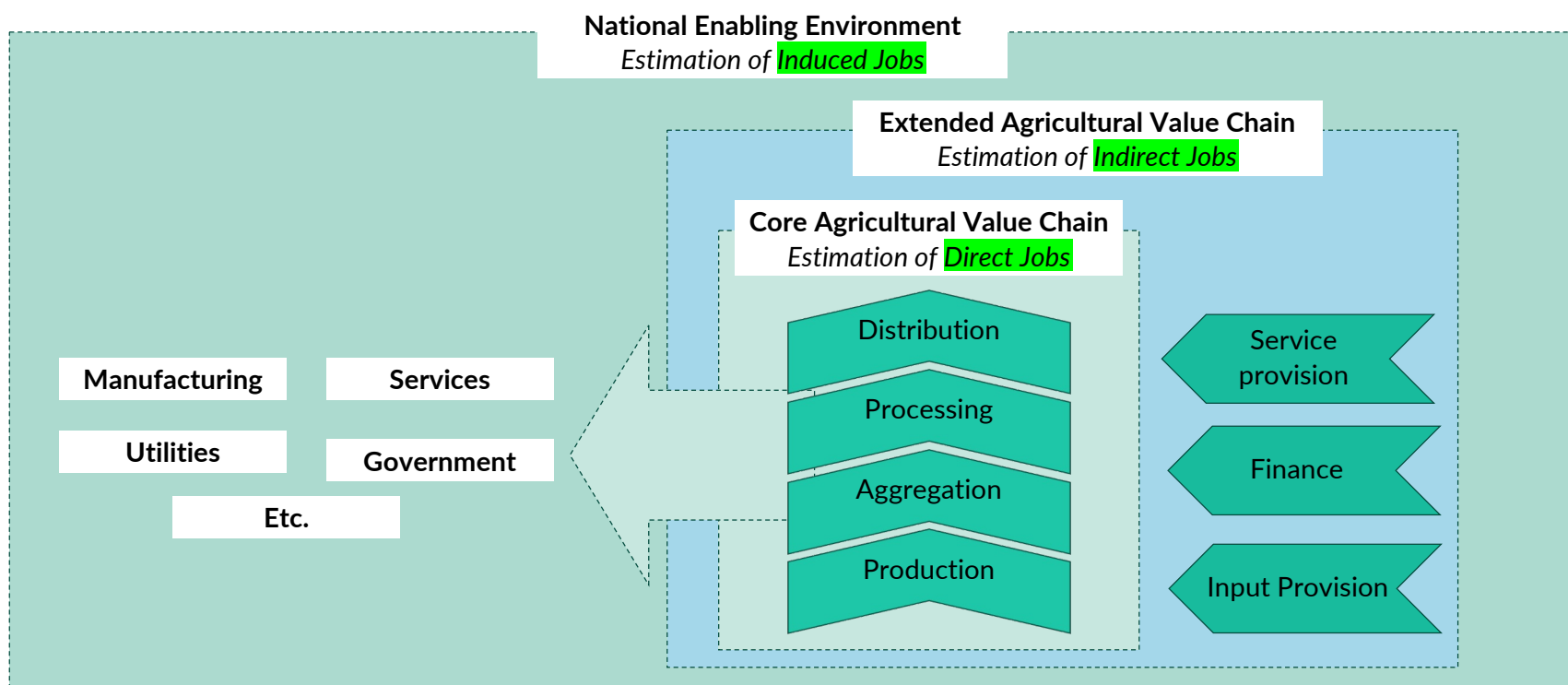
Modelling impacts from 2022 to 2032

	Crop	CSA NDC Targets
Colombia 	 Cocoa	230,000 ha.. (150,000 ha. under agroforestry, 80,000 ha. for rehabilitation)
	 Rice	462,046 ha. (255,000 for irrigated rice cultivation and 207,046 for rainfed rice cultivation)
	 Sugar (Panela)	From 165,980 ha. to 200,000 ha.
	 Commercial Forestry	368,836 ha.

	Crop	CSA NDC Targets
Ethiopia 	 Wheat	225,913 ha. (2,049.31 Smallholder farmers at main rainy season)
	 Teff	225,913 ha. (3,172.12 Smallholder farmers at main rainy season)
	 Corn	225,913 ha. (2,733.32 Smallholder farmers at main rainy season)
	 Barley	225,913 ha. (957.61 Smallholder farmers at main rainy season)

Employment impacts are estimated across the Agricultural Value Chain

Labor demand of direct, indirect and induced jobs



Ensuring quality control

GGGI employment studies are validated by practitioners and government experts

Supervisory Board Members



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Organization of the
United Nations



International
Labour
Organization



MINAMBIENTE

SBM's tasks include:

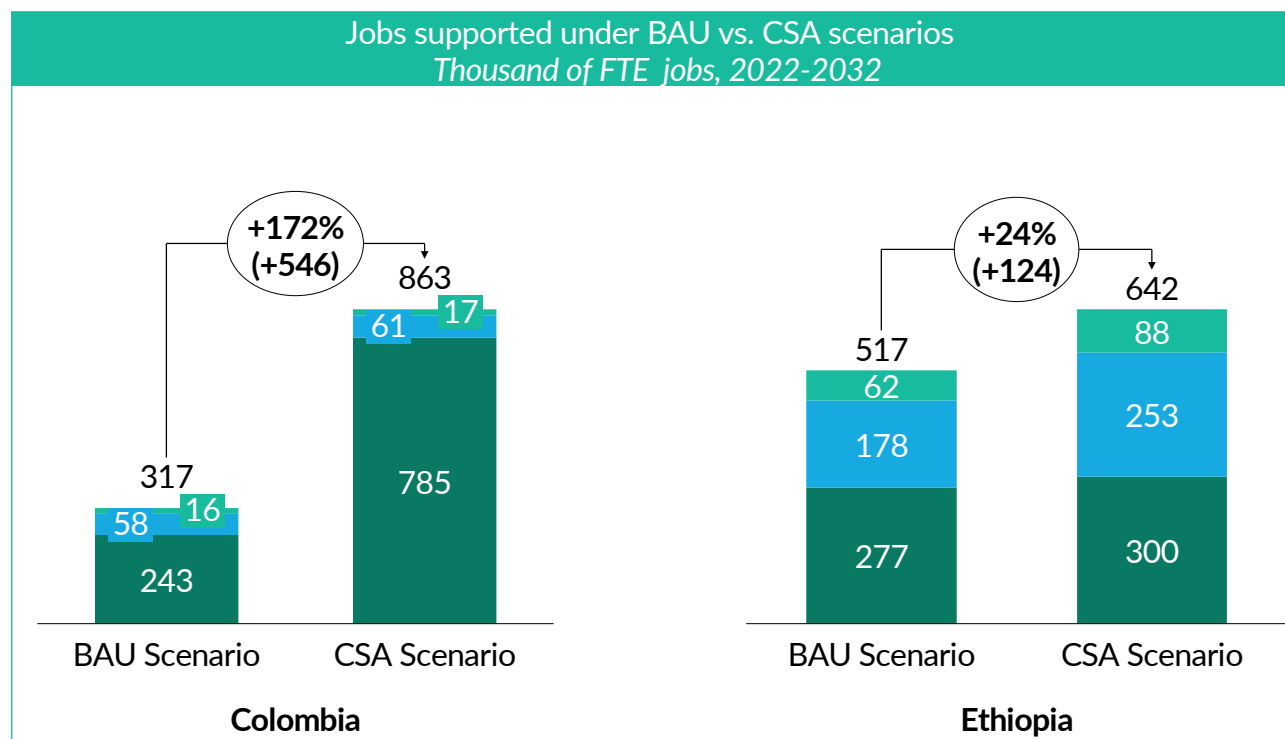
1. Assessing Model Accuracy
2. Ensuring Relevance and Sounding Results
3. Ensuring Impactful Communication



Utilizing CSA practices support more jobs than conventional agricultural practices



Jobs supported under BAU vs. CSA scenarios
Thousand of FTE jobs, 2022-2032

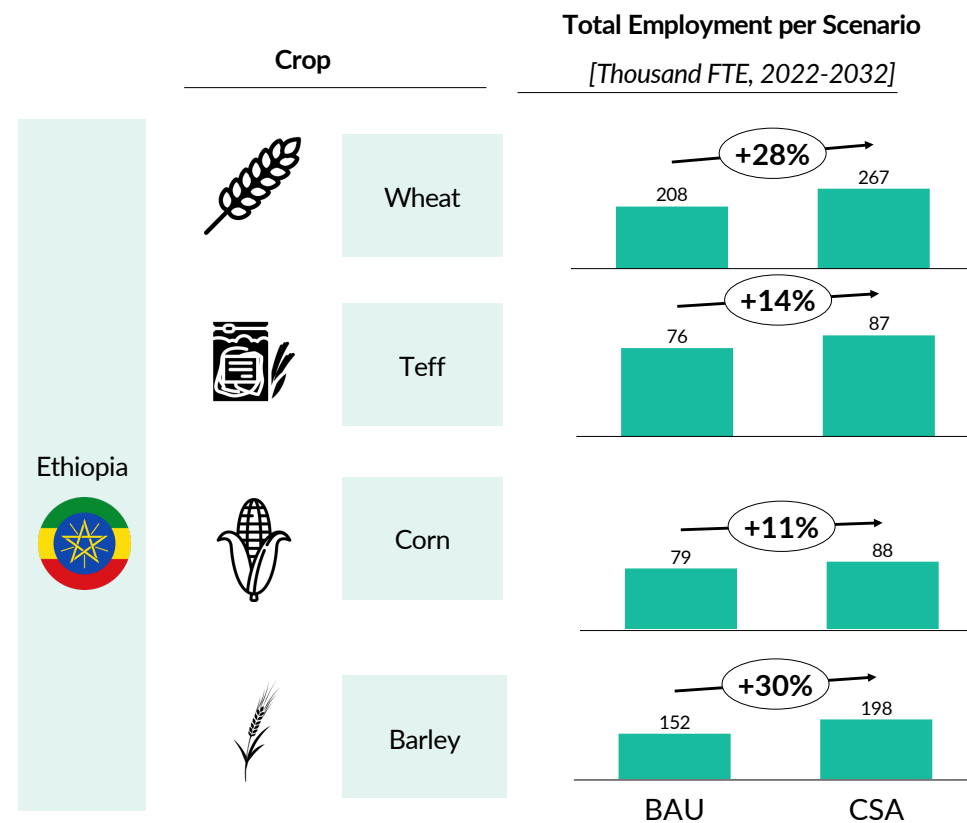
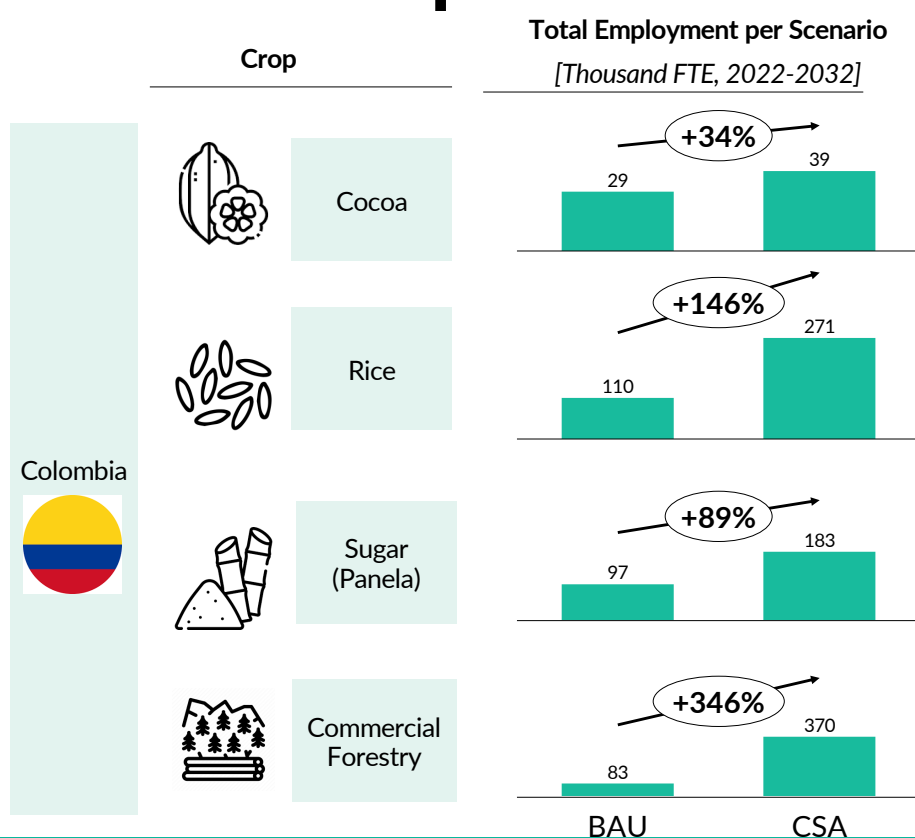


Drivers for labor increase

- Direct employment: There is a need for additional labor for CSA installation and annual maintenance, and some CSA practices are more labor-intensive than conventional ones.
- Indirect jobs: Extensive investment in infrastructure required to enhance productive potential and resilience to climate change
- Induced jobs: Restructuring and consolidating the food system, which impacts labor markets and re-shaping business activities in towns and cities.

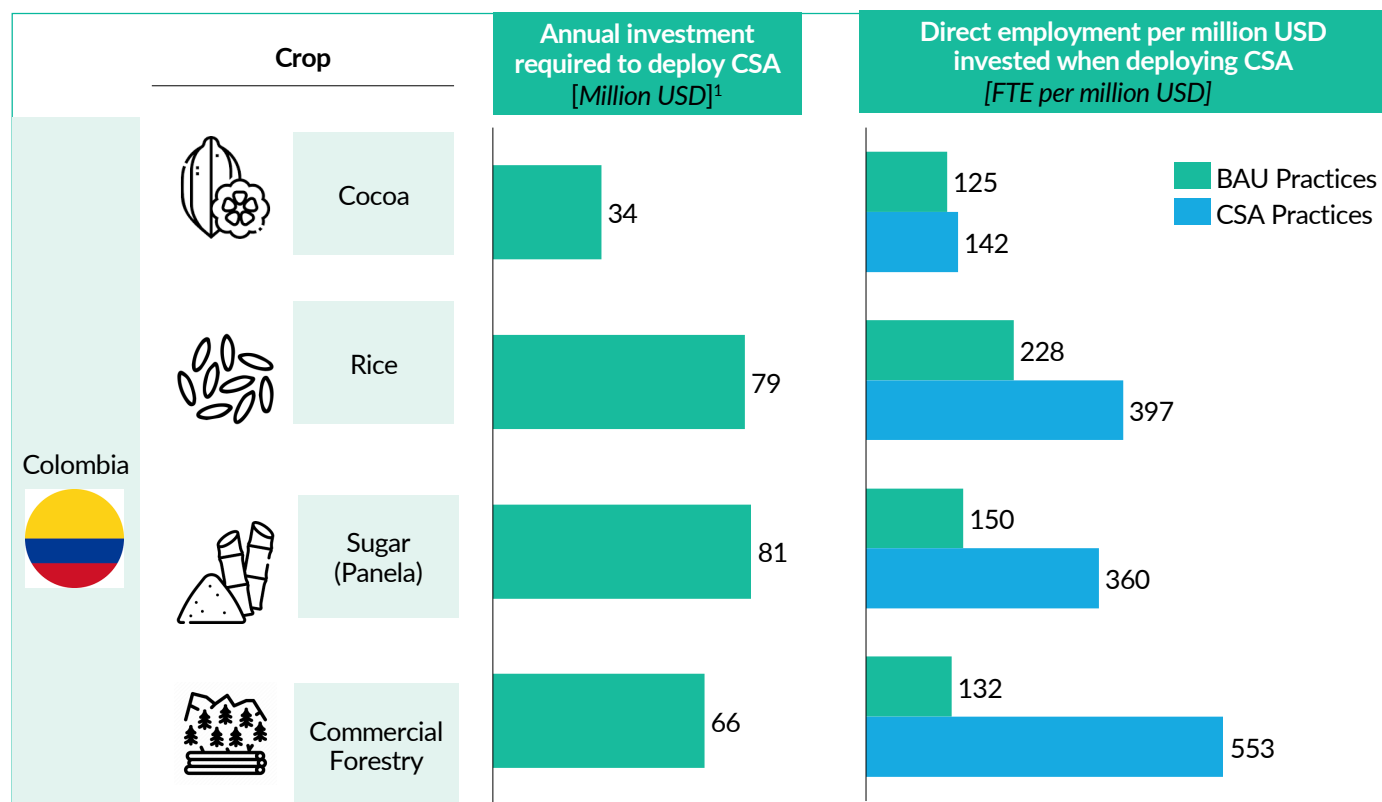
LABOR DEMAND TO REACH NDC TARGETS

Employment requirements per crop in Colombia and Ethiopia



LABOR DEMAND TO REACH NDC TARGETS

Financial requirements of deploying CSA at scale in Colombia

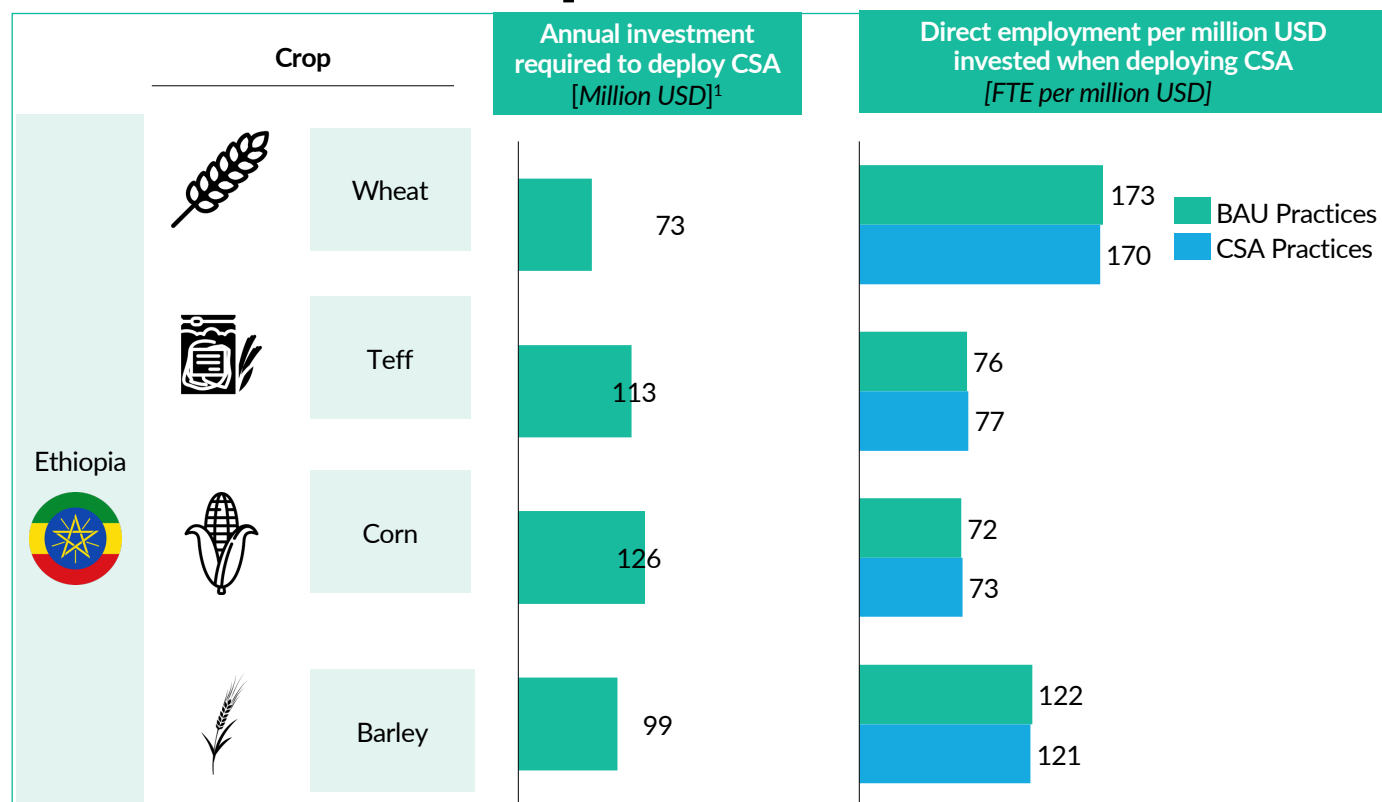


What do we observe?

- The magnitude of jobs supported by the utilization of CSA practices outweighs the additional costs associated with introducing such practices in Colombia.

LABOR DEMAND TO REACH NDC TARGETS

Financial requirements of deploying CSA at scale in Ethiopia

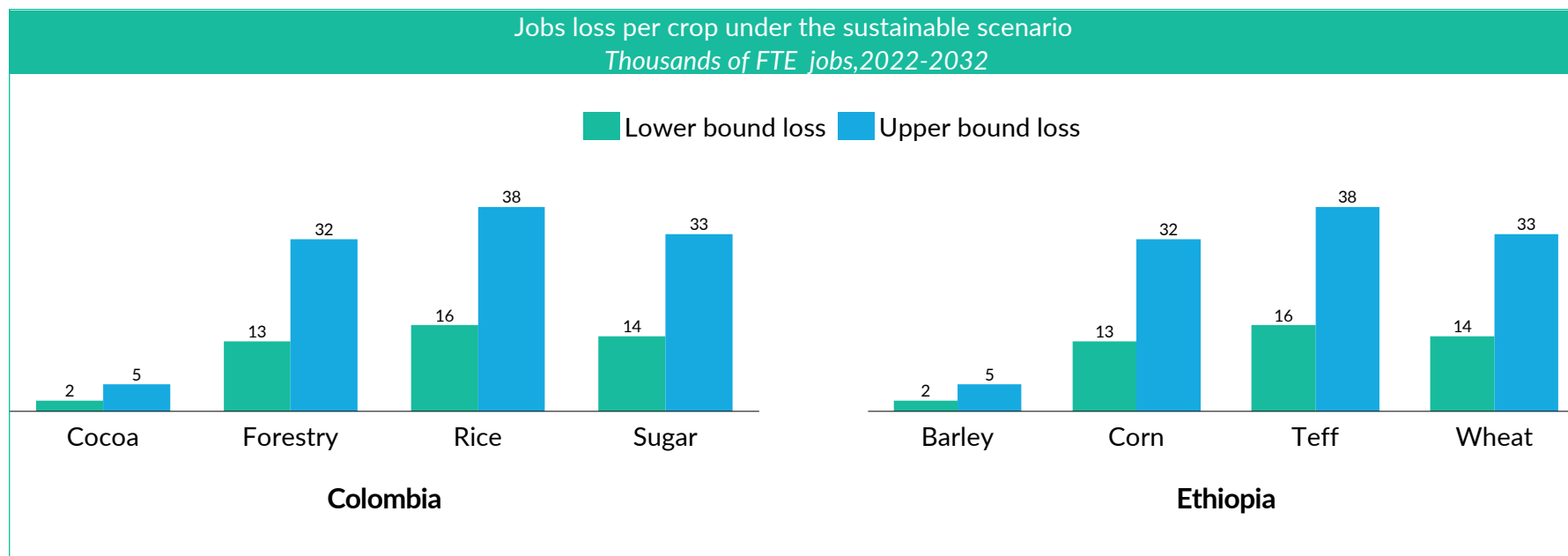


What do we observe?

- Comparatively, both conventional and CSA practices yield similar results for employment per million dollars of investment. This occurs because, despite CSA practices generating a higher overall number of jobs, introducing some of these practices increases non-labor production costs, resulting in a smaller budget for hiring personnel

LABOR DEMAND TO REACH NDC TARGETS

The negative impacts of climate change cause a loss in labor productivity, which translate into a loss of employment



DECENT JOBS

The challenge of improving working conditions - particularly for women and smallholder farmers.



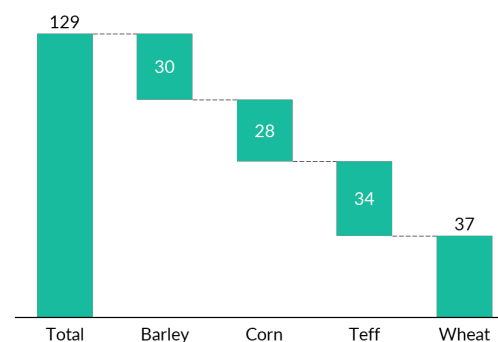
Example of Ethiopia

However, if no supporting policies are implemented, current informality and women's participation rates will prevail.

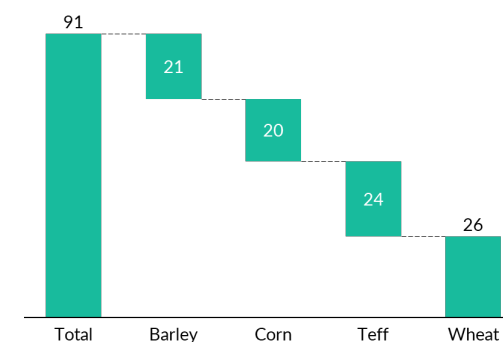
Impact on informality

- Given the prevalence of informality in the sector, it is forecasted that most direct jobs created will remain informal. Out of the total direct job estimate of 300 thousand for the four crops, an estimated total of 129 thousand (43%) formal jobs would be generated.

Direct formal employment per crop under the CSA practice scenario
Totals in thousands of FTE jobs, 2022-2032



Direct non-remunerated employment per crop under the CSA practice scenario
Totals in thousands of FTE jobs, 2022-2032



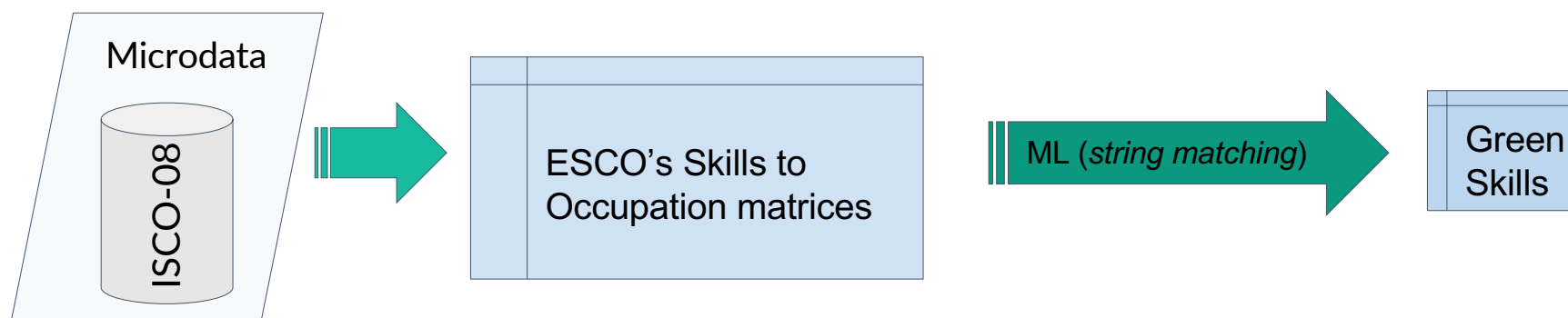
A novel approach to identifying skills

Underpinning **ESCO's skills-to-occupation matrices** and **Machine Learning (ML)** to map skills and *green skills* for a set of occupations identified within specific agricultural activities.

- 15 matrices match occupations to specific skill labels and a dataset of 570 green skills.
- From 10/8 occupation/skill to 3008/296 occupation/skill trees.

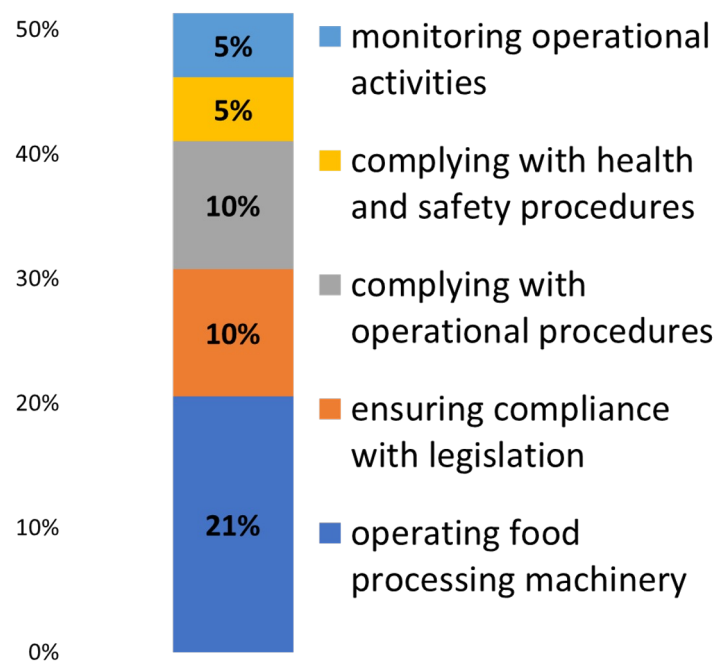
A parsimonious method:

1. Use official microdata (e.g., Colombia's GEIH) to identify a set of occupations within the economic sectors of interest.
2. Match the share of ESCO skills labels defined by CEDEFOP for each of these occupations.

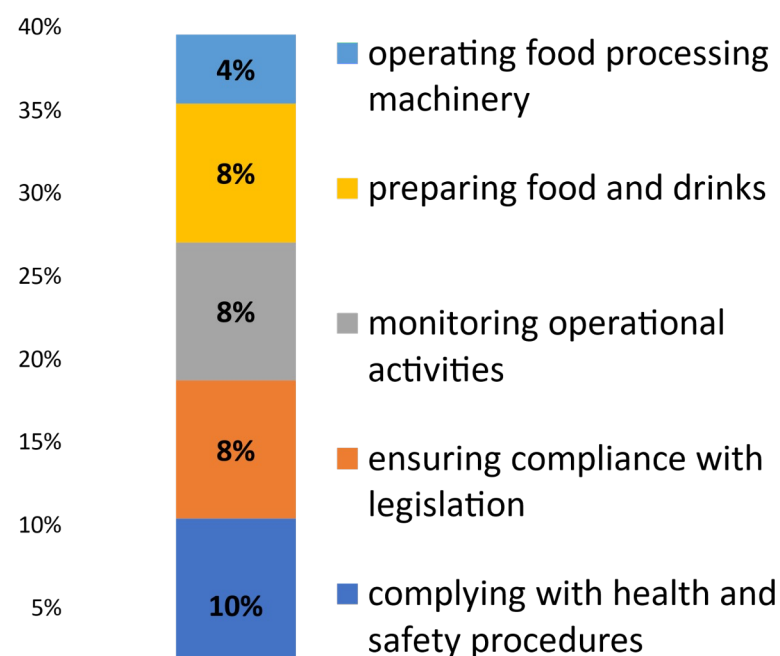


Skill Composition of Specific Occupations

5 most required skills for Cacao Beans Cleaners (51%)



5 most required skills for Cacao Bean Roaster (40%)



Three lessons from the skill composition data

1. Common skills.

Complying with health and safety procedures, Following instructions and procedures, and Working in teams.

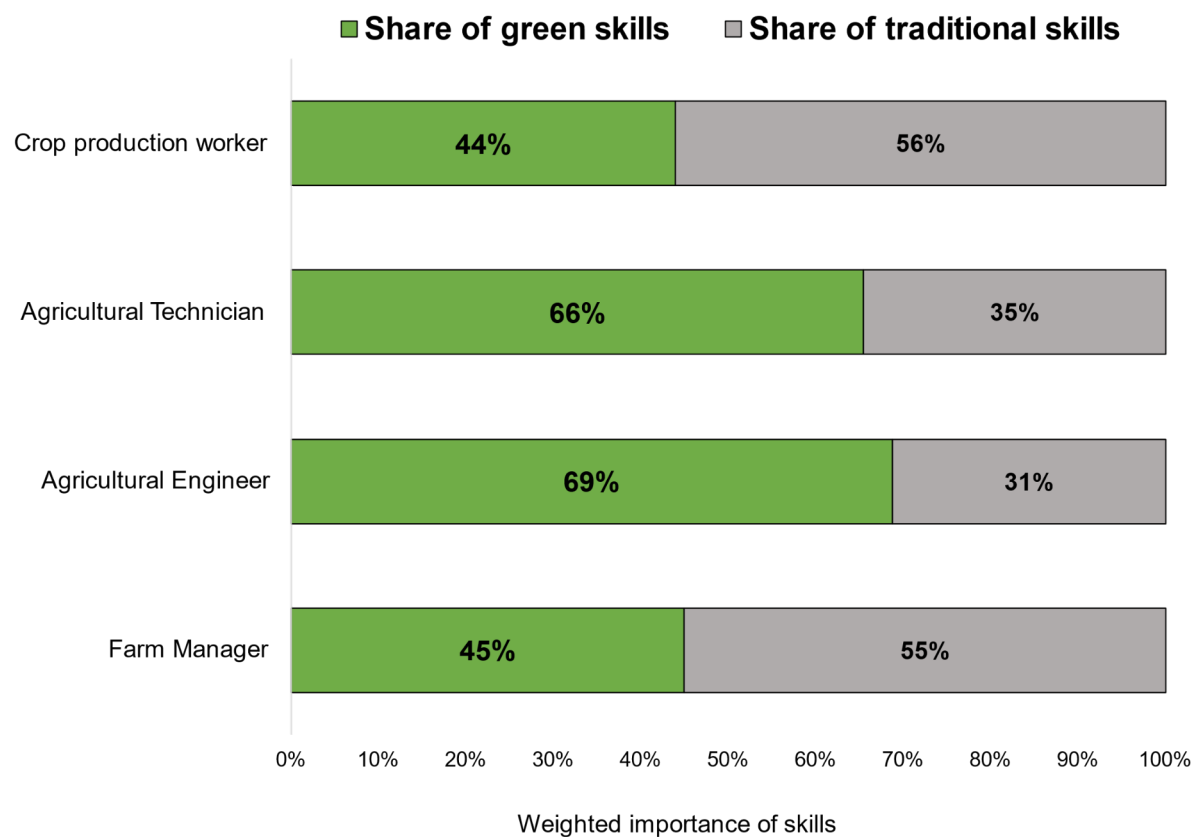
2. Differentiated skills.

- a. Cacao beans cleaner: This occupation emphasizes skills specific to maintaining cleanliness, quality control, and regulatory compliance.
- b. Cacao bean roaster: This occupation focuses on skills closely related to the roasting and processing aspects of cacao beans.

3. Some skills show partial overlap between the two occupations.

Both occupations require some level of measuring physical properties, but it is more prevalent in the cacao bean roaster occupation.

Green/Traditional Skill Composition



Sources: GGGI

Skill Composition and Green Skills classification for Agricultural Technicians

Sources: GGGI



Example			
Agricultural Technician	66%	35%	
General Skill String Labels	Percent	Green	Percent Green
cultivating land and crops	6%	1	6%
complying with health and safety procedures	6%	1	6%
conducting academic or market research	9%	1	9%
advising on business or operational matters	6%	1	6%
analysing business operations	6%	1	6%
analysing scientific and medical data	11%	1	11%
technical or academic writing	6%	0	0%
advising on environmental issues	3%	1	3%
evaluating systems, programmes, equipment and products	6%	1	6%
monitoring environmental conditions	6%	1	6%
gathering information from physical or electronic sources	6%	0	0%
performing calculations	6%	0	0%
cleaning interior and exterior of buildings	3%	0	0%
assessing land or real estate	3%	0	0%
tending and breeding aquatic animals	6%	1	6%
maintaining electrical, electronic and precision equipment	6%	0	0%
monitoring operational activities	3%	0	0%
cleaning tools, equipment, workpieces and vehicles	3%	0	0%
advising on products and services	3%	1	3%
Sum	100%	11	66%

Discussion

- This study offers a comprehensive understanding of the unique dynamics and potential strategies for fostering job growth in the following decade.
 - Colombia: ~**800 thousand new jobs** in Cocoa, Rice, Forestry, and Sugar production.
 - Ethiopia: ~**600 thousand new jobs** in Barley, Corn, Teff, and Wheat production.
- This type of tool is informative, extensible, and scalable. Furthermore, it can be strengthened and improved upon by implementing public policies that:
 - Enhance data availability and quality;
 - Provide updated contextual nuances through detailed targeting of NDCs-related policies for specific crops;
 - Link national and regional development policies to labor market challenges within agriculture (labor formality and gender gaps).



Thank you



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