Unraveling the complexity of work organization in rice farming systems in Ghana

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INTRODUCTION

- **Increasing numbers of young people** entering on labour markets each year in sub-Saharan Africa
- While jobs in industry only grow slowly, **the agri-food sector remains the main job provider**
- But the capacity of the agri-food sector to provide jobs **with decent and attractive work is at stake**
- **Rice: a strategic crop** for food security in many SSA countries and in Ghana but with little concern for sustainable farming systems and their capacity to create decent jobs
- Work on smallholder farmers in SSA countries rely heavily on **manual labor** but changes are occurred due to **agricultural intensification** driven by the use of agrochemicals, the development of mechanization, and access to water for irrigation (Lairez et al. 2026), and often coupled with land expansion

INTRODUCTION

What the literature shows

- Intensification (irrigation, mechanization, agrochemicals) reshapes labor demand
- Effects on work duration are diverse — increases or decreases depending on the initial conditions and specific tasks involved
- Studies focus on single tasks: land preparation, weeding, harvesting

The gap

- Little is known about work organization (who is doing what) and working duration at the **farm** level in Africa
- But knowledge about **work organization** is important for analyzing whether the impact of intensification practices varies depending on the type of workers involved (men or women, family or hired workers)

OBJECTIVE Analyze how intensification (mechanization, irrigation, herbicides) reshapes work organization on Ghanaian rice farms — at the farm-system level.

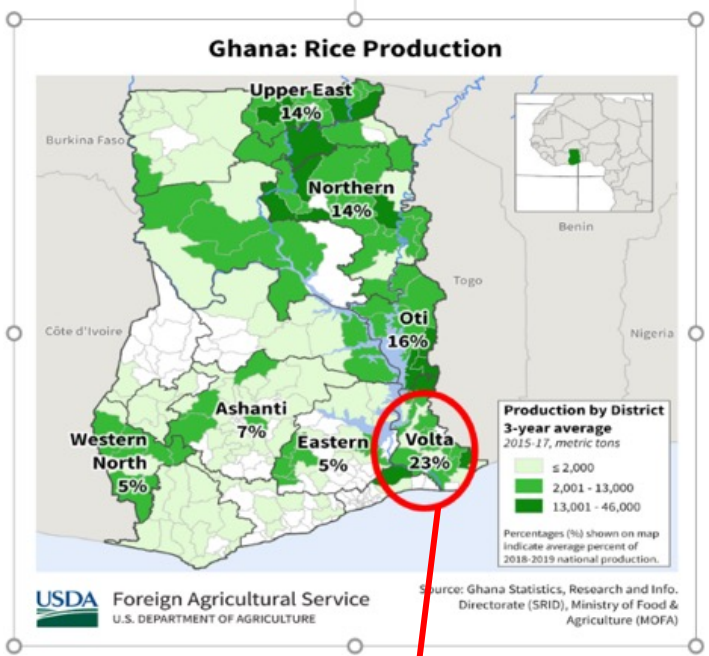
- To demonstrate, at the farm scale, the different configurations between workforce, tasks to be completed, and intensification practices
- Considering the evolution of farming systems in relation to its effects on work organization on the farm.

MATERIAL & METHODS / Study area and sampling

STEP 1 District selection

The Volta Region in Ghana and the Greater Accra Region : the main rice-producing regions in the Southern belt of Ghana

- 6 districts to cover a variety of rice production systems
  - In the southern districts => irrigation schemes with two rice growing seasons per year, or on lowland areas with water control systems with mostly one rice season per year.
  - In the northern districts => rice production mostly without water control or with low water control, on lowland and upland areas with 1 cycle/year



MATERIAL & METHODS / Sampling

STEP 2 Farm typology on their structures and activities

Quantitative survey of 134 farmers

Identification of 4 farm types by water access, assets, diversification, size

=> enable us to identify farms with different patterns of work organization in terms of technical sequences (the work to be done), workforce (categories of workers involved: family/hired, men/women) and levels of intensification of rice production (access to irrigation, chemical inputs, and mechanization).

STEP 3 In-depth interviews on work organization at farm level

40 farms =>10 farms within each type sampled according to the age and gender of the farmer, and the location of the farm (district)

MATERIAL & METHODS / data collection

The QuaeWork method — who does what? (Hostiou and Dedieu 2012; Dedieu et al. 2025)

Semi-structured interviews (2–3 h per farm) on annual work duration and distribution of tasks among worker categories — with attention to gender.

Worker categories

- Farm manager (head — man or woman)
- Family members
- Permanent wage workers
- Temporary wage workers
- Contractors / service providers
- Mutual aid (fidodo, noboa)

Two types of work

- **Routine work (RW)** — daily, non-postponable (e.g. animal feeding, irrigation). Measured in hours/day.
- **Seasonal work (SW)** — flexible, postponable (e.g. ploughing, harvesting). Measured in days/year.

Each task is broken down by worker category and gender.

MATERIAL & METHODS / data analysis

1. Two datasets built on working time (RW and SW) and workers performing the tasks

Farm-level (n=40): mechanization, irrigation, area

Plot-level (n=77): herbicide applications

2. Descriptive stats

Indicators on **working time:**

- SW (total and rice) at the farm level
- SW/ha at the farm level (mechanization, irrigation, cultivated area)
- SW/ha at rice plot level (chemical inputs)

Indicators of **work distribution** (e.g., working time disaggregated by categories of workers who performed the tasks and gender)

3. Multivariate analysis (FAMD + HCA)

To build a typology combining farming systems and work variables

- **labor demand** (mechanization, % irrigated, area)
- **work supply** (% SW by worker category)

Farm features — a snapshot of 40 rice farms

4.4 ha
Average cultivated area (range 0.4 – 18 ha)

2.9 ha of rice
The main crop

83%
Farms using mechanization

50%
Farms with irrigated areas

327 d/yr
Average seasonal work (range 42 – 817)

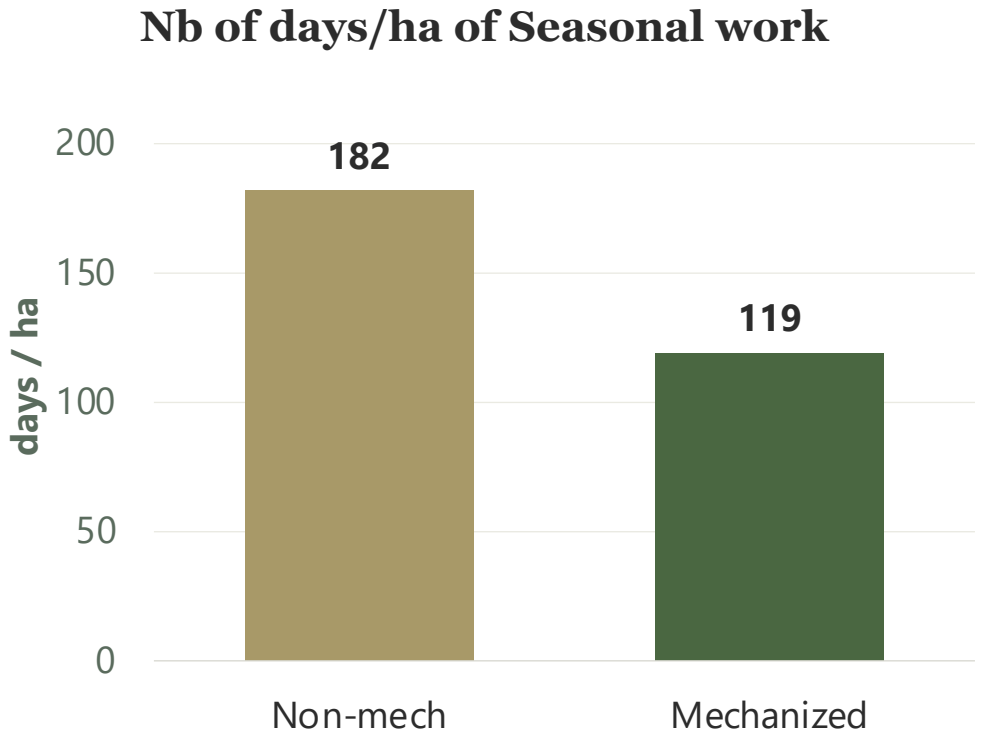
76% of SW with rice

45%
Seasonal work performed by temporary workers

RESULTS · 2

Intensification practices and land expansion related to working time and work organization on rice farms

Mechanization & irrigation reshape labor demand



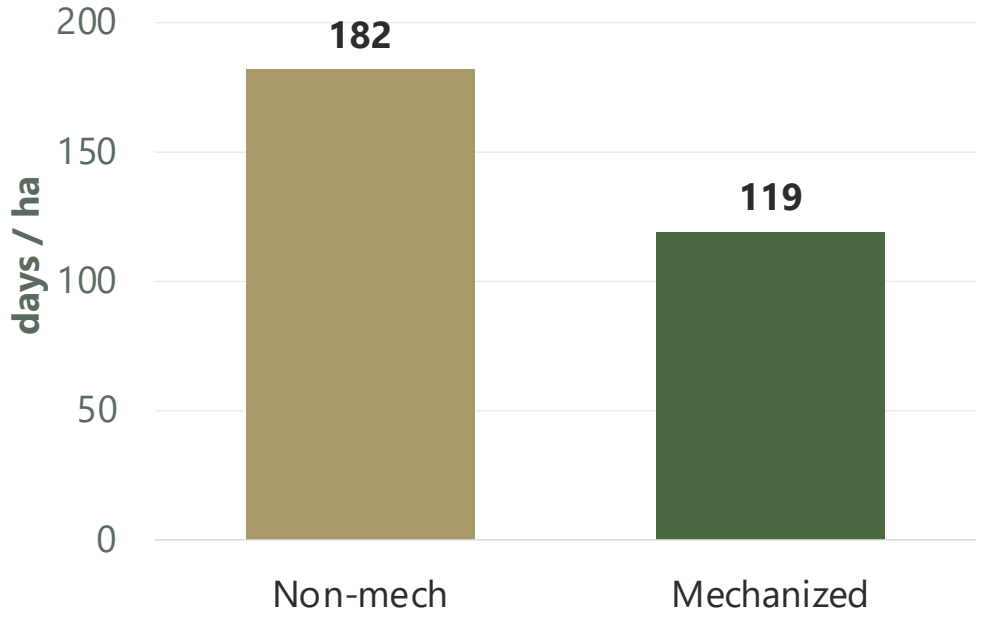
Combine harvestor for rice harvesting

- **Mechanization concerns preparation of land and / or harvesting**
- **Mechanization is associated with less working time per ha**

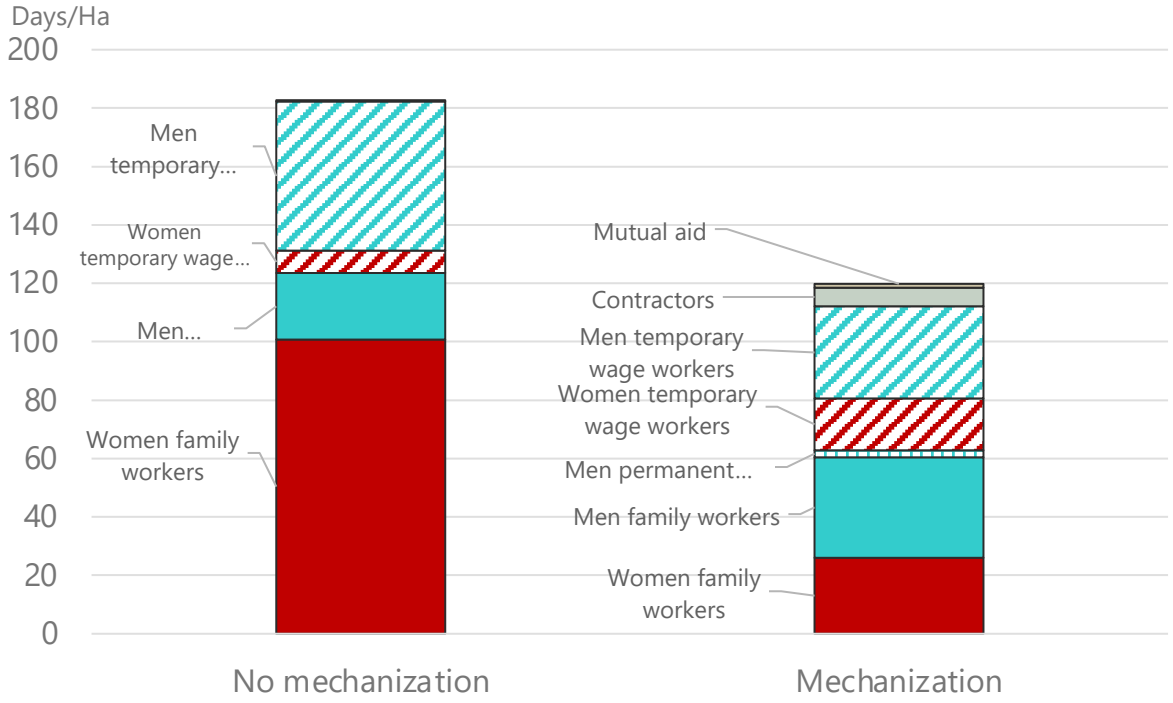
power tiller for land preparation

Mechanization & irrigation reshape labor demand

Nb of days/ha of Seasonal work



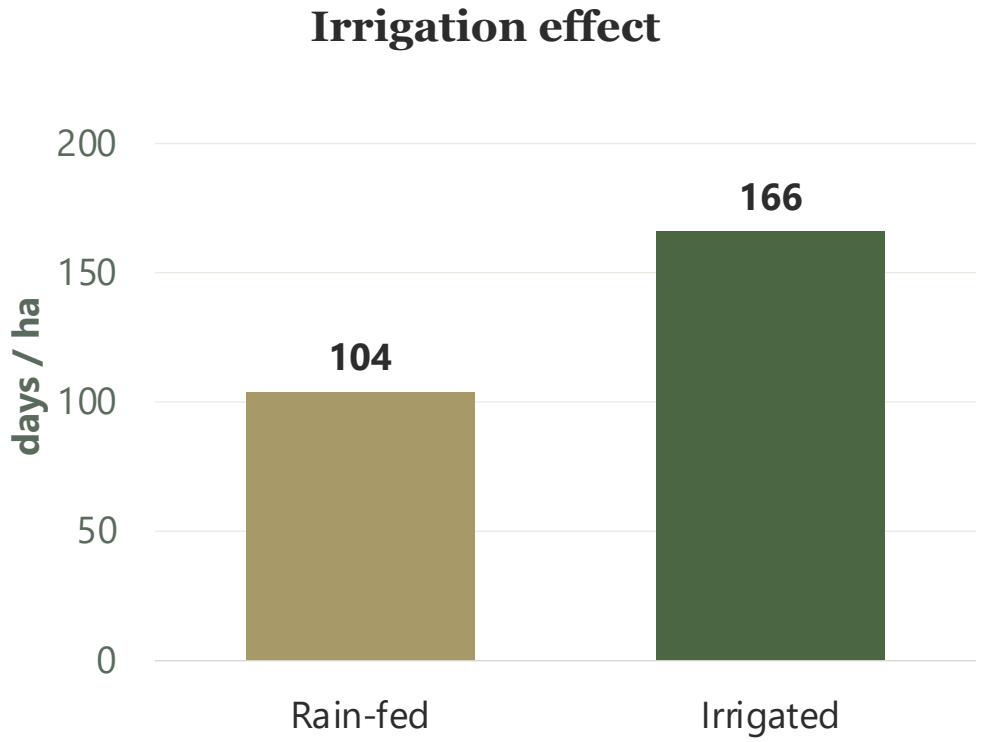
Work organization



- **Mechanization concerns preparation of land and / or harvesting**
- **Mechanization is associated with less working time per ha**

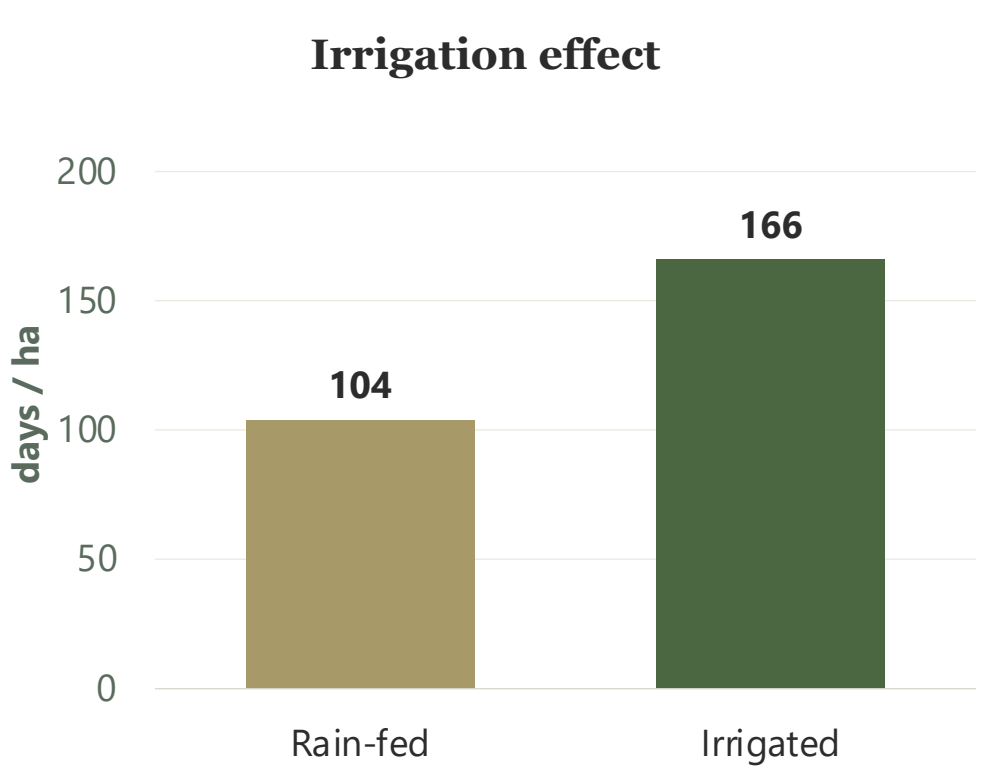
- **Farms that mechanize delegate work to temporary workers (41%)**
- **On non-mechanized farms, most of the work is done by women from the family (55%)**

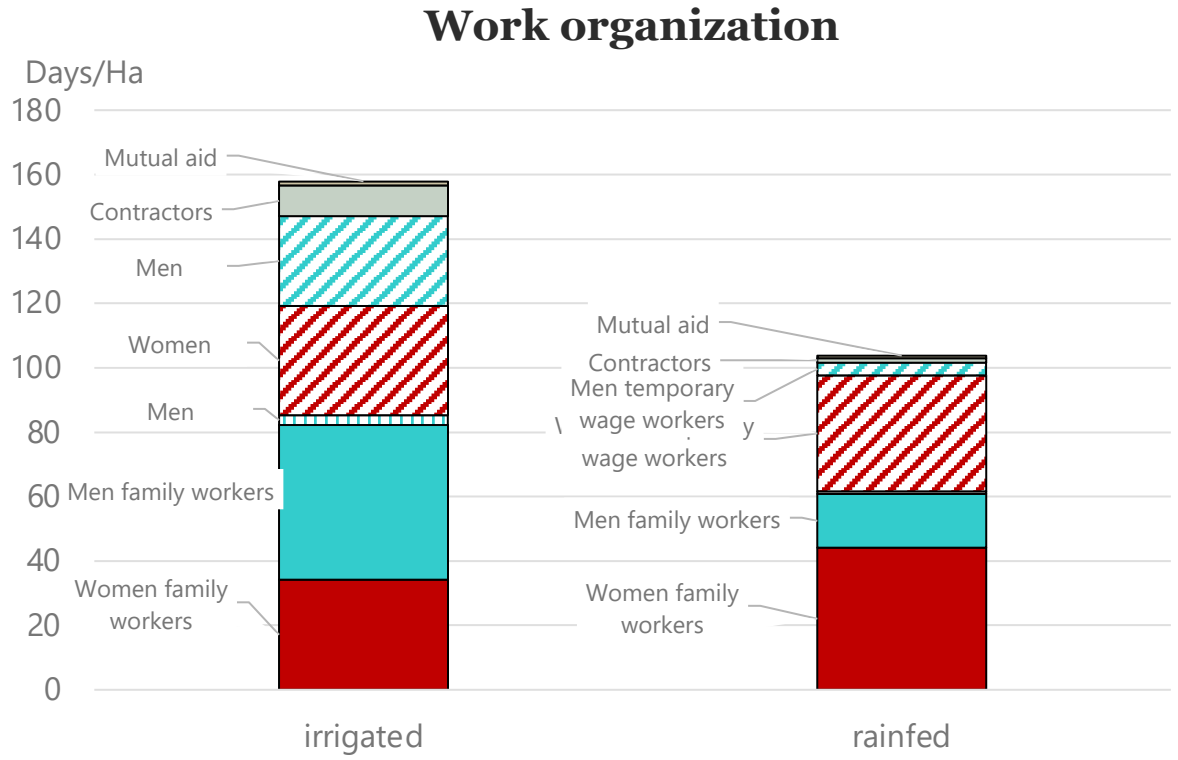
Mechanization & irrigation reshape labor demand



- **Irrigated farms are more labour demanding per ha (more rice cycles over a year)**

Mechanization & irrigation reshape labor demand





- **Irrigated farms are more labour demanding per ha (more rice cycles over a year)**

- **In irrigated farms : temporary workers + contractors for mechanization contribute more to work**
- **A lower contribution of women (family and temporary wage workers)**

KEY FINDING

- A clear effect of intensification (through irrigation) on working time per hectare. Mechanization also has a strong effect on working time per hectare

- A change in the distribution of work, particularly in terms of the contribution of temporary workers, notably men

RESULTS · 3

Three patterns of farm work organization related to use of irrigation, mechanization, and area cultivated

FAMD + hierarchical clustering on 40 farms — three distinct strategies emerge.

T1 Family-hired work organization in medium-scale rain-fed and non-intensified farms

7 farms

SYSTEM

Rain-fed, 1 cycle/year

No mechanization

High proportion of non-rice activities

WORKERS

A balance combination : family 60% · Temp 40%

No permanent workers no contractors

50% of seasonal work by women

T2 Family based work organization in small-scale irrigated and mechanized farms

20 farms

SYSTEM

Highly irrigated (63%), mechanized, rice-specialized

AREA

Small (2.3 ha avg)

WORKERS

High contribution of family 61% and service providers 7%

Lower Temp 28%

T3 Temporary hired based work organization in larger mechanized farms

13 farms

SYSTEM

Mixed irrigation, mechanized, diversified

AREA

Large (7.8 ha avg) — highest workload

WORKERS

Temp 73% · Family 17%
Only 19% performed by women

RESULTS 4 Task distribution and women's work

Where rice labour goes, and who carries it.

SPOTLIGHT — BIRD SCARING

~35%
of total rice working time in intensified farms (T2 & T3)

A persistent manual bottleneck despite mechanization

Mainly performed by women — up to 40% of women's working time on T3 farms

WOMEN'S SHARE OF SEASONAL WORK

Drops as farms intensify and grow

50%	balanced	19%
T1 — rain-fed	T2 — intensified	T3 — large mech.

Mechanized tasks (ploughing, harvesting) are outsourced to male service providers. Women shift toward **post-harvest tasks** — winnowing, drying, bagging

DISCUSSION

Four insights from a farming-system approach on work organization

Identification of factors at the farming system level that influence the labor demand and the work supply

Intensification (nb of rice production cycles linked to irrigation, mechanization and use of herbicides) + degree of specialization + size of cultivated area

Intensification is multi-dimensional

Irrigation, mechanization and farm size are interrelated — strategies (T1–T3) emerge from their combination, not from a single driver.

Not gender-neutral

Women's share decreases as farms intensify. Their work shifts from harvest toward post-harvest and persistent manual tasks.

Invisible bottlenecks remain

Bird scaring — ~35% of rice work on T2/T3 — is mainly female and rarely targeted by innovation.
Increased use of pesticides, which may impact health and safety at work

CONCLUSION

Rice intensification reshapes work — and is not gender neutral

01 — TAKE-HOME

Importance of adopting systemic approaches at the farm level to analyze agricultural change, considering the interactions between technologies, farming practices, work organization, and gender dynamics

02 — POLICY

Not only increase productivity but also support decent employment within farming systems

Should address invisible bottlenecks (bird scaring, post-harvest), and account for gendered impacts

03 — FUTURE RESEARCH

Health and safety effects of pesticide intensification

Evolving roles of women and hired workers

Territorial labor markets created by service providers

Thank you — questions welcome