

RICE IN INDIA : ENVIRONMENT,
ECONOMY AND SOCIETY :
'MESHING' AND 'MASHING'
DISCIPLINES

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BBMAWH
www.alamy.com



ORIGIN - INDIAN DEBATE about CLIMATE CHANGE RESPONSE

Majority view:

- Stock argument : justice
- Flow argument : right to remove poverty (with 70% thermal)

VERSUS

Minority view / conclusion / starting point :

- FF based development is luxury India can't afford
 - rate of degradation of natural resources
 - rate of addition to workforce (jobless growth) requires leapfrogging to clean devt – **low C transition** - TO WHAT?
- New development models / new incl revn / AC+DC / BUT **baseline** is needed appropriate to conditions where over 90% of employment is unregistered, where anywhere between 35-70% is estimated **informal** and 25-62 % is estimated black.

How to develop methods to

1. measure the economy as a system of capital and labour using materials to produce commodities and physical – solid, liquid and gaseous - waste

2. in the informal economy with no reliable data



Jc CompTech
Computer Education

13 Sharoff Bazaar, Arni
Cell : 9994470998
www.Fhifak1.blogspot.in

An advertisement for Jc CompTech Computer Education. The ad features a laptop and a person, with the text "Jc CompTech Computer Education" and contact information: "13 Sharoff Bazaar, Arni", "Cell : 9994470998", and "www.Fhifak1.blogspot.in".

- 3. scope technological alternatives according to several incommensurable criteria (environmental / social / economic) which generate trade-offs between criteria.

- 4. to mainstream social relations of work – quantity and quality of labour



CLIMATE CHANGE AND AGRICULTURE

– WHY AGRICULTURE?

- Agriculture innocent? Small proportion of global GHG emissions? 10-14%

versus

- USDA (2011) estimate that entire food-system production-distribution-(transport-processing-storage)-consumption-waste

PLUS land use change (burning forests for agriculture) = **+/- 33 - 45% global GHGs**

AND agriculture as an emissions floor is 'poorly understood' (Anderson, 2011)

CLIMATE CHANGE AND RICE

- **Vulnerability** – temperature, weeds and pests; rain and crop failure -> yield declines expected -> critical impact on food /feed prices and food security/ availability esp if no change in access and utilisation (S Asian prodn/nutn paradox)
- **Agenda of adaptation in rice:** crop-livestock stress research; irrigation management; biotech innovations (inc. GM and hybrids) ;collective action/farmers' groups (info – dissemination)
- -> funds in new revolutionary **high-tech** frontier rather than **farming systems**; focus on **adaptation** rather than **mitigation**
- Sources: Nelson et al, IFPRI, 2009; Alagh, 2013



RICE AS A CASE STUDY – HERE -1

- **NOT** because a big polluter [though food system and all land-based activity thought to account for up to 45% GHG] **BUT**
- Rice is **bio-physically complex** – emitting various GHGs as well as sequestering them – so **scientifically interesting**
- Rice is **socio-technically complex** – 4 **production systems** 4-5 **marketing systems** → **social scientific interest**

RICE AS A CASE STUDY - 2

- **Resources, employment and poverty** are entwined in production-distribution systems – **>policy interest**
- Production and distribution weave in and out of **the informal economy** → **theoretical and policy interest**
- Food is generally exempt from the scenarios lowering emissions (Anderson/Royal Society 2011) i.e. something of a **political special case** – **but how special ?**

PERSPECTIVES NEEDED FROM SEVERAL DISCIPLINES



DISCIPLINARITY

Choi and Pak 2006 helpful - not systematic review but very large review.

<https://www.ncbi.nlm.nih.gov/pubmed/17330451>

DISCIPLINES = KNOWLEDGE BRANCHES WITH HISTORIES

- **TRANS** - > “Transdisciplinarity integrates the natural, and social sciences in a humanities context, and transcends their traditional boundaries.”
- **MULTI** -> “Multidisciplinarity draws on knowledge from different disciplines but stays within their boundaries.”
- **INTER** -> “Interdisciplinarity analyzes, synthesizes and harmonizes links between disciplines into a coordinated and coherent whole.”

MESHING DISCIPLINES and LEARNING WORKSHOPS



DISCIPLINES VS KNOWLEDGE FIELDS

climate change – climate policy – agro-ecology – life cycle assessment –
informal economy – value / supply /
commodity chain analysis – science and
technology studies – policy studies –
labour studies – agriculture – rice -
agricultural markets

Selecting knowledge fields

For 1. and 2. – the materiality of the economy - fuse **life cycle assessment (LCA)** with value / **supply chain analysis (SCA)** - politicise the frontier between formal regulation/policy and social regulation

For 3. the evaluation of incommensurable dimensions of technological choices - use **multi-criteria mapping (MCM)** and

For 4. the study of livelihoods and labour – start with **Decent Work (DW) / Standard Work** of trades unions

Developing practical methods for LCA-SCA-MCM generates **cross-cutting themes**

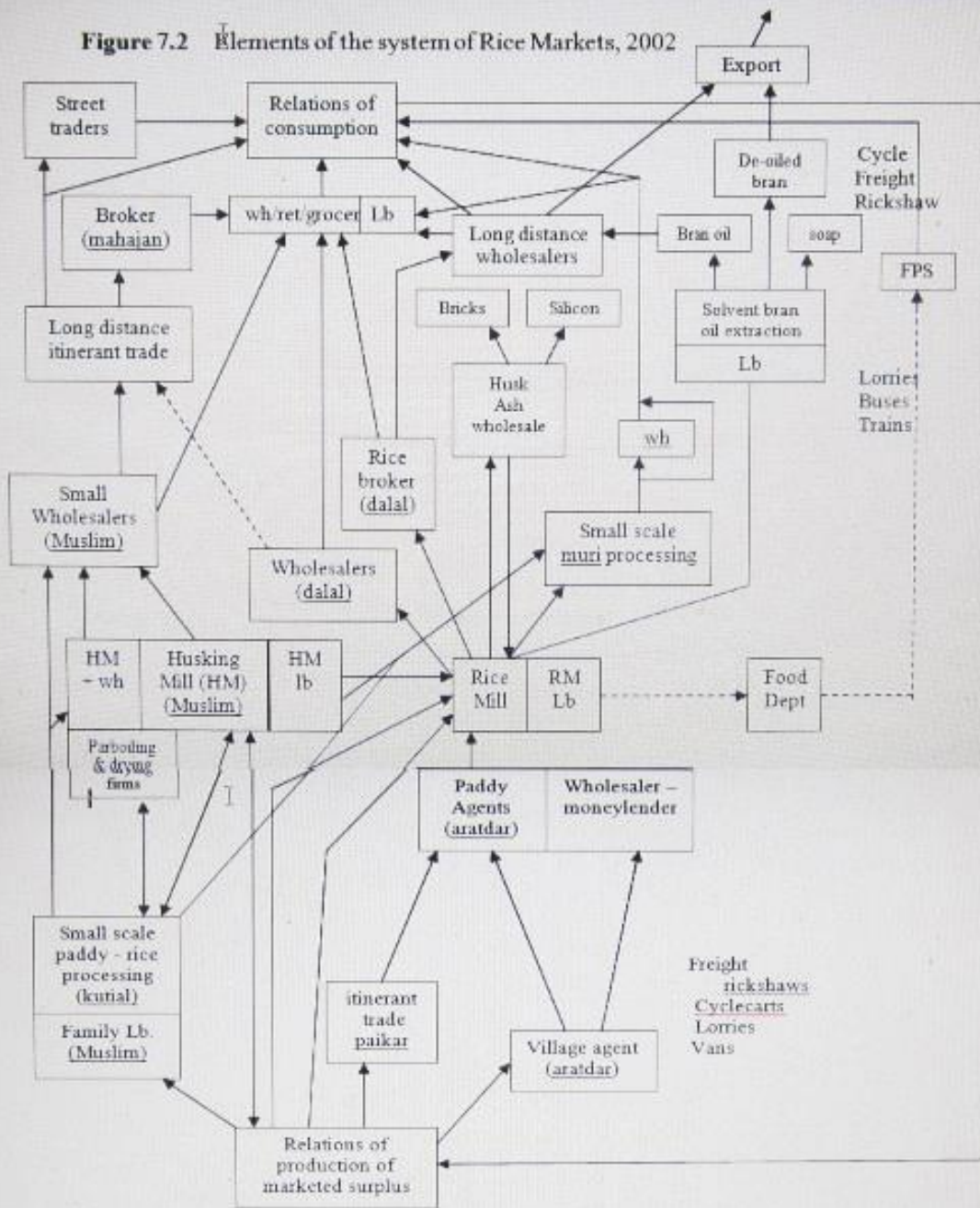
- **How is the informal economy ordered? Socio-political limits to the reach of state regulative policy, the interface and forms of regulation of the informal economy** (Aseem Prakash) https://www.mids.ac.in/rdcxxii_1.pdf
- **The means whereby UNorganised labour makes gains in the informal economy** (BHW/ trade union researchers (NTUI/CWM))
- <https://www.epw.in/journal/2014/9/perspectives/micro-political-economy-gains-unorganised-workers-india.html>
- **Does innovation and technical change happen in the informal economy? Could it gear to adaptive/mitigative innovations ?** (BHW with Gilbert Rodrigo)
- <https://www.cambridge.org/core/journals/modern-asian-studies/article/rethinking-institutions-innovation-and-institutional-change-in-indias-informal-economy/C2BBBCBA2D44BE1C50857F189B7391C5>



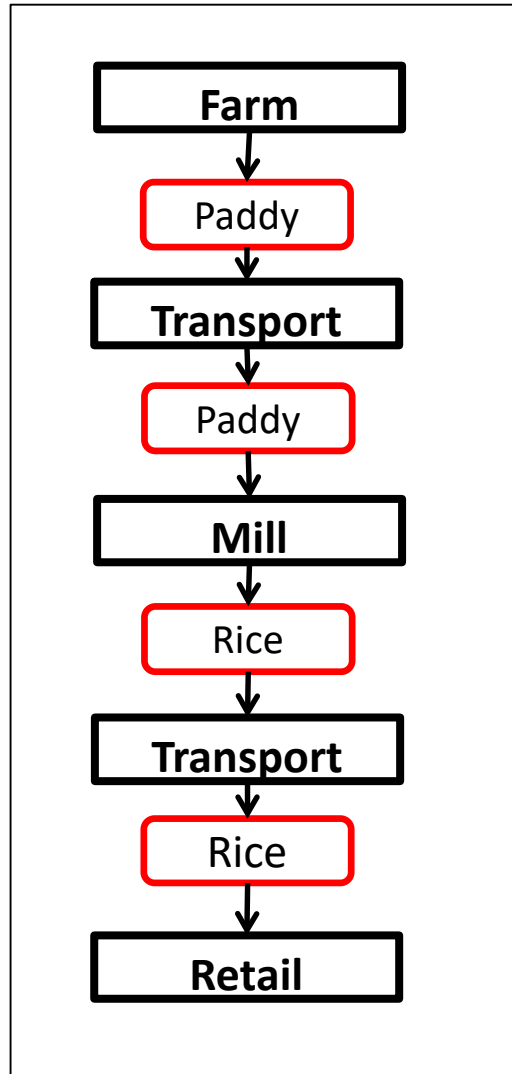
MASHING DISCIPLINES

- **PRIMACY OF SCIENCE** – T.I.N.A. TO BOLTING APPROPRIATE SOCIAL SCIENCE TO SCIENCE
- 1. LCA (**environmental science**) and SCA (**operations**) (NB VCA (Business) -SCA (operations) versus 'systems' (political economy) distinctions)
- 2. MCA (**engineering/S&T studies**), micro-economics , agrarian sociology.

Figure 7.2 Elements of the system of Rice Markets, 2002



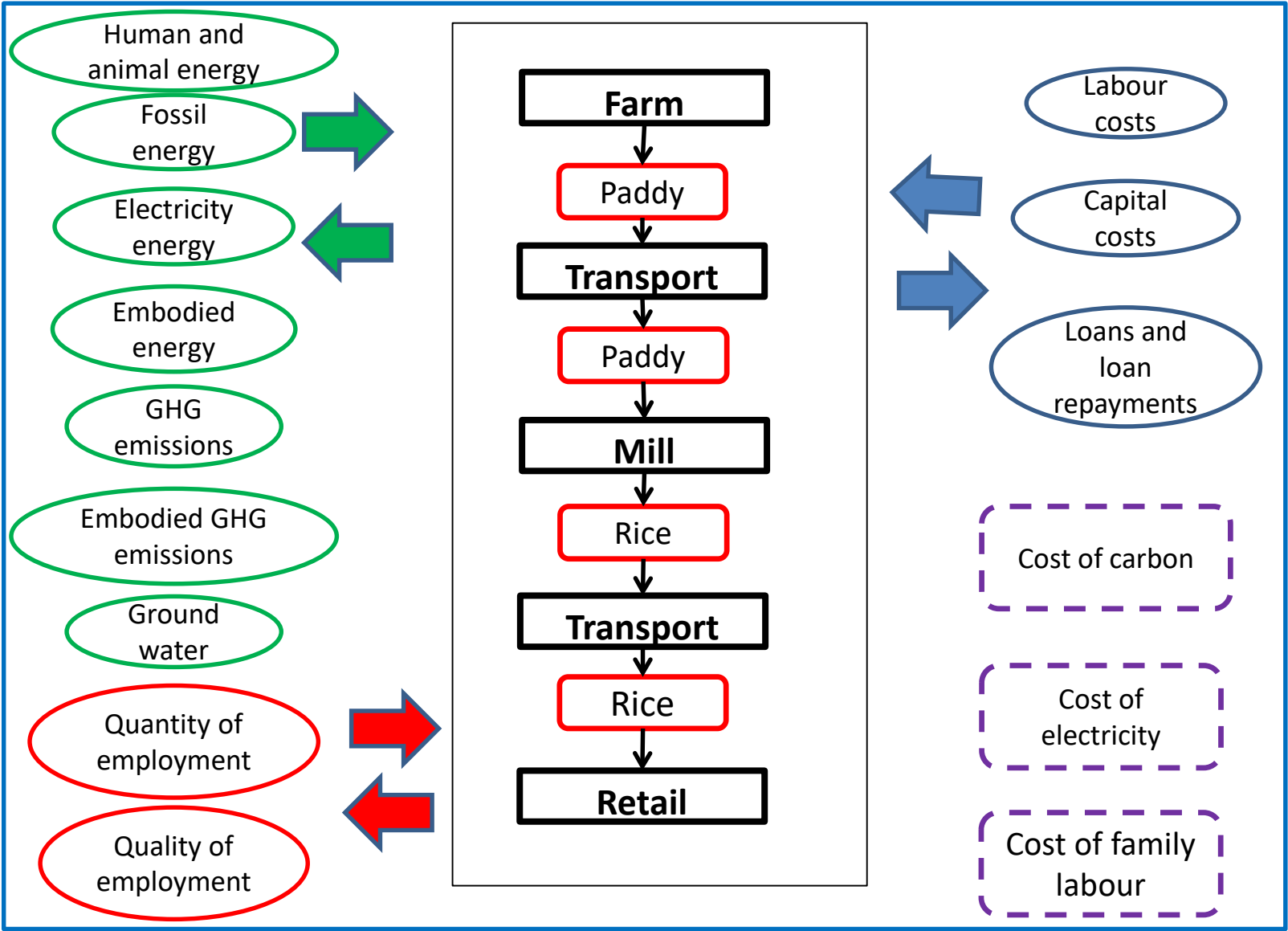
A stylised model



Embodied water

Embodied labour

Embodied human/animal energy



SCA uses firms as analytical units while
LCA measures finest grain of tasks in
agricultural production



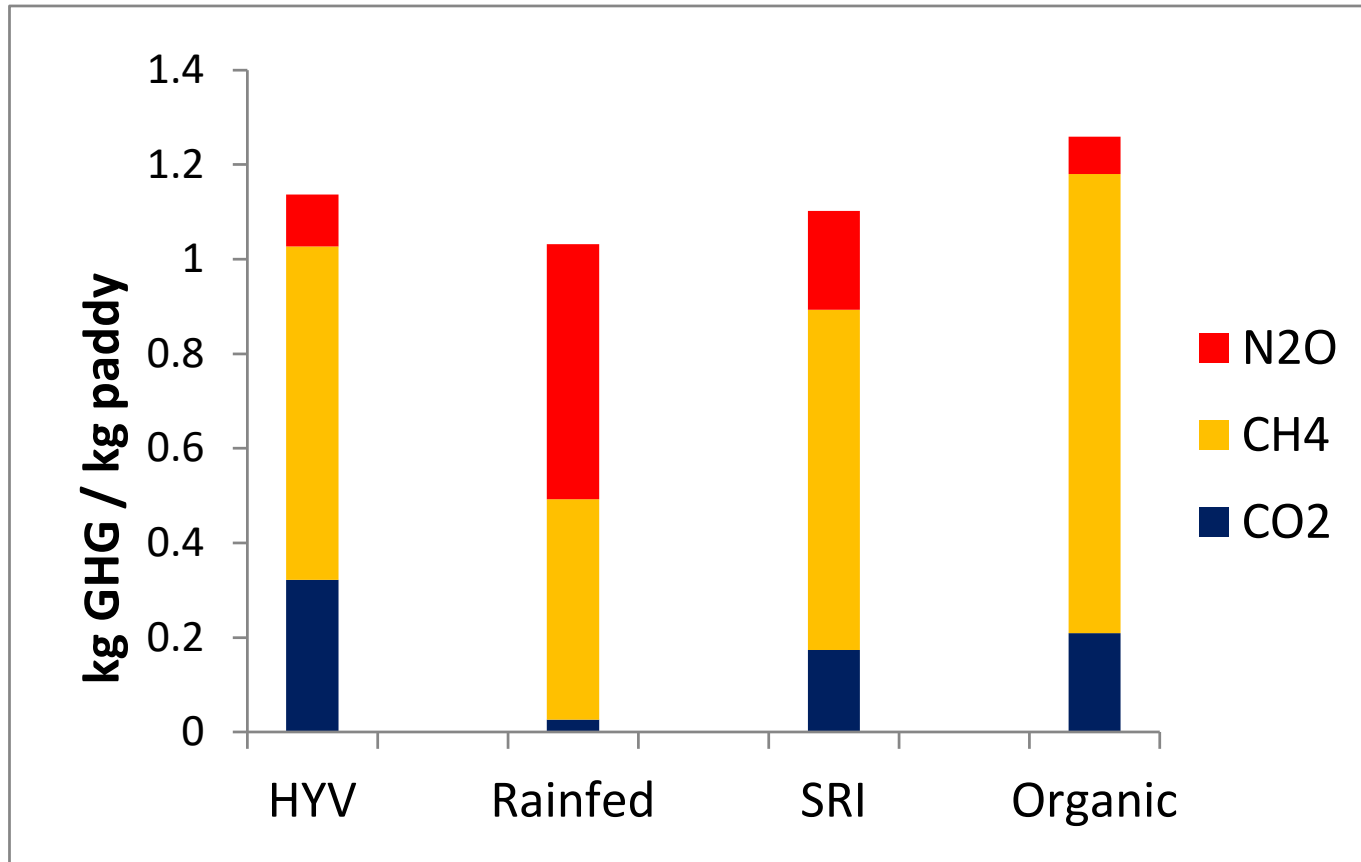
Stages measured in agricultural production

Seed	Embodied and transport
Seedbed cultivation	Tractors, diesel, bullocks,
Bund repair	Zero – all human
Cultivation	Tractors, diesel, bullocks,
Synthetic fertiliser	Embodied energy, transport
Manure	Transport and embodied
Pesticides	Embodied energy
Pumping	Electricity/diesel
Soil methane	Obligate anaerobic bacteria
Nitrous oxide	Soil bacteria, ~aerobic
Harvest	Tractors, diesel, bullocks

RESULTS – INTENSIVE RICE – production-distribution



Approximate constituent emissions

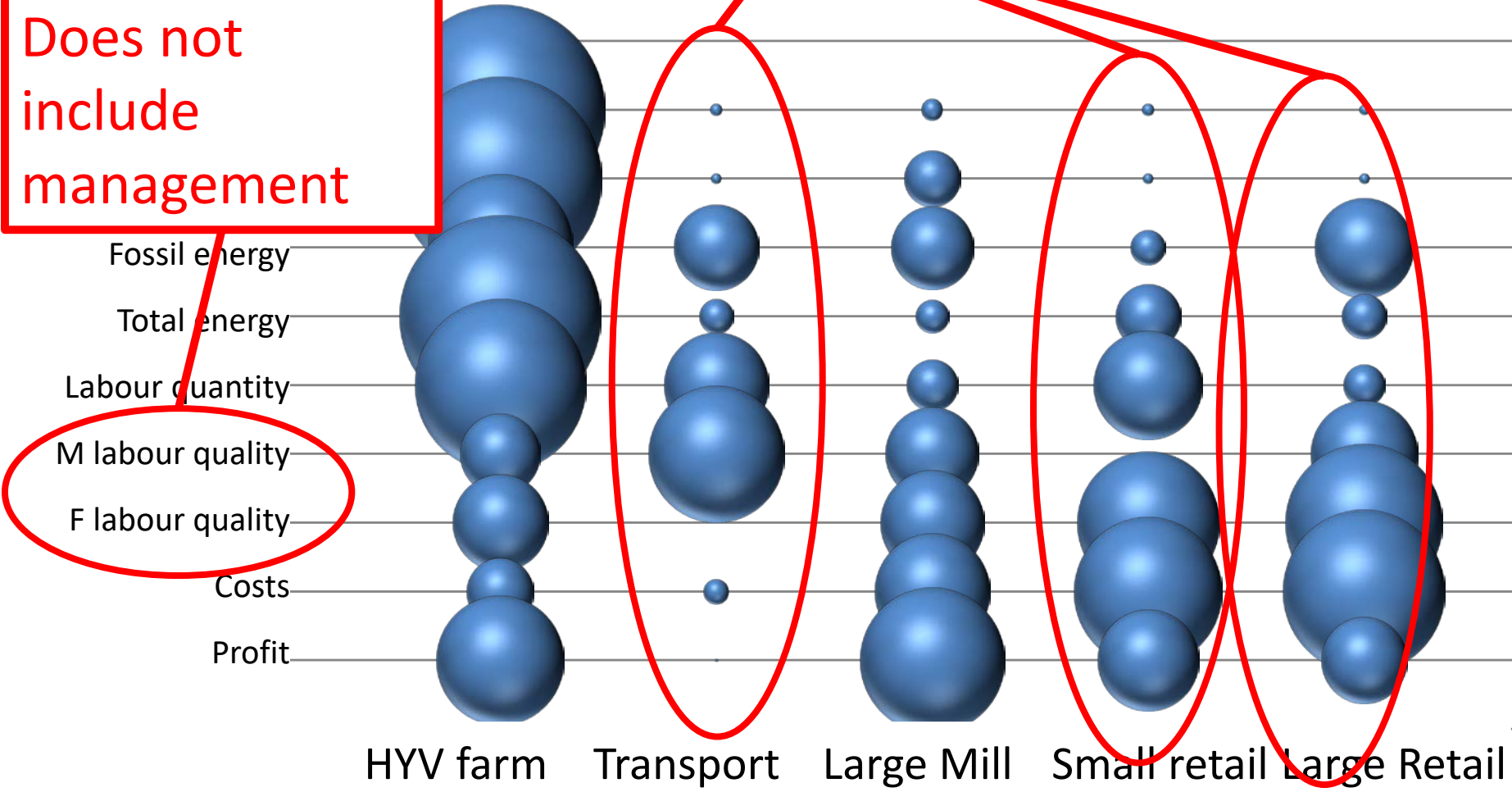


- Methane from HYV, SRI and Organic from **soils**. Rainfed methane from **draught animals**.
- Very little CO₂ from rainfed as no irrigation and minimal use of tractors (some tractors were used for manure transport in rainfed, but most cultivation and harvesting did not use tractors/harvesters)

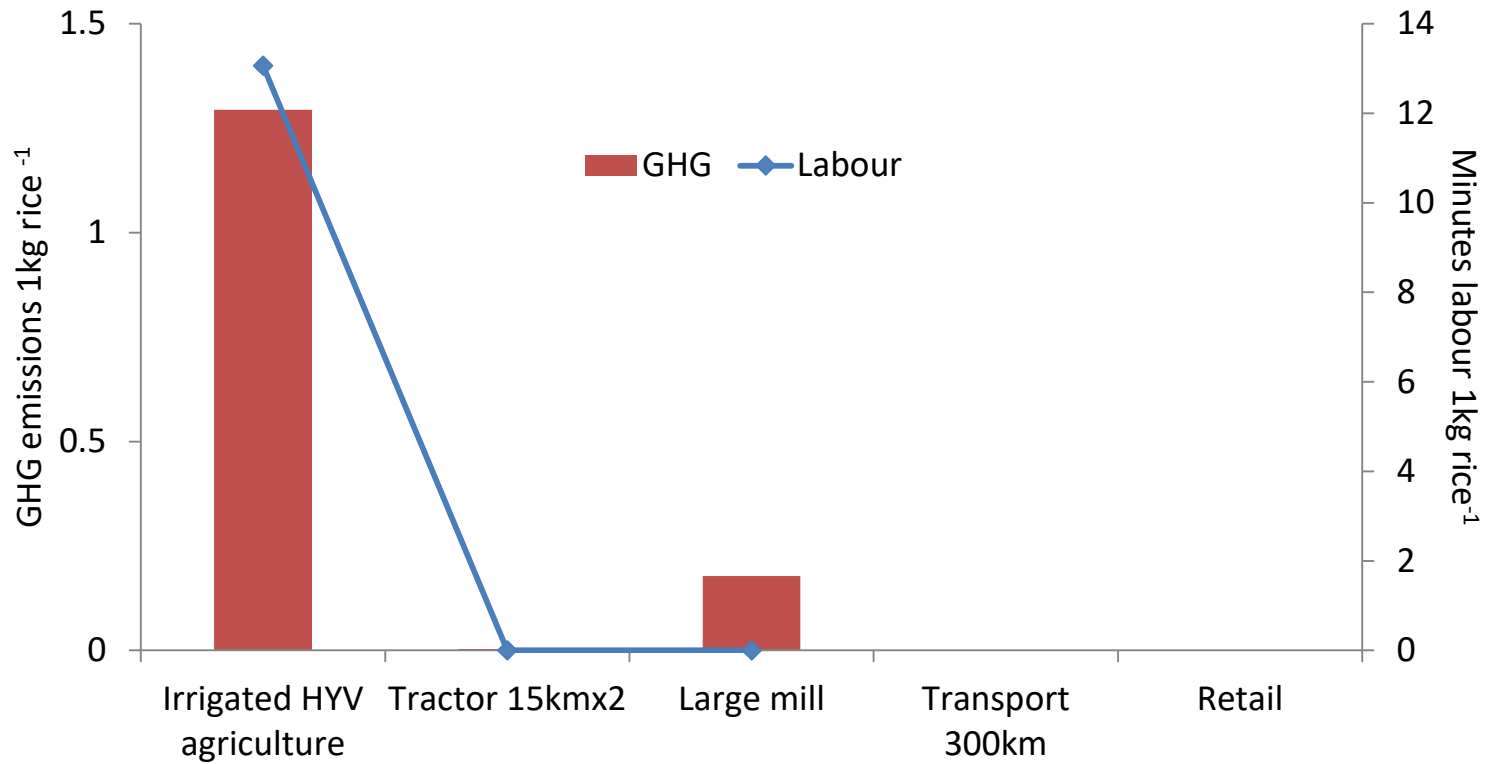
small samples – treat with caution

Does not include management

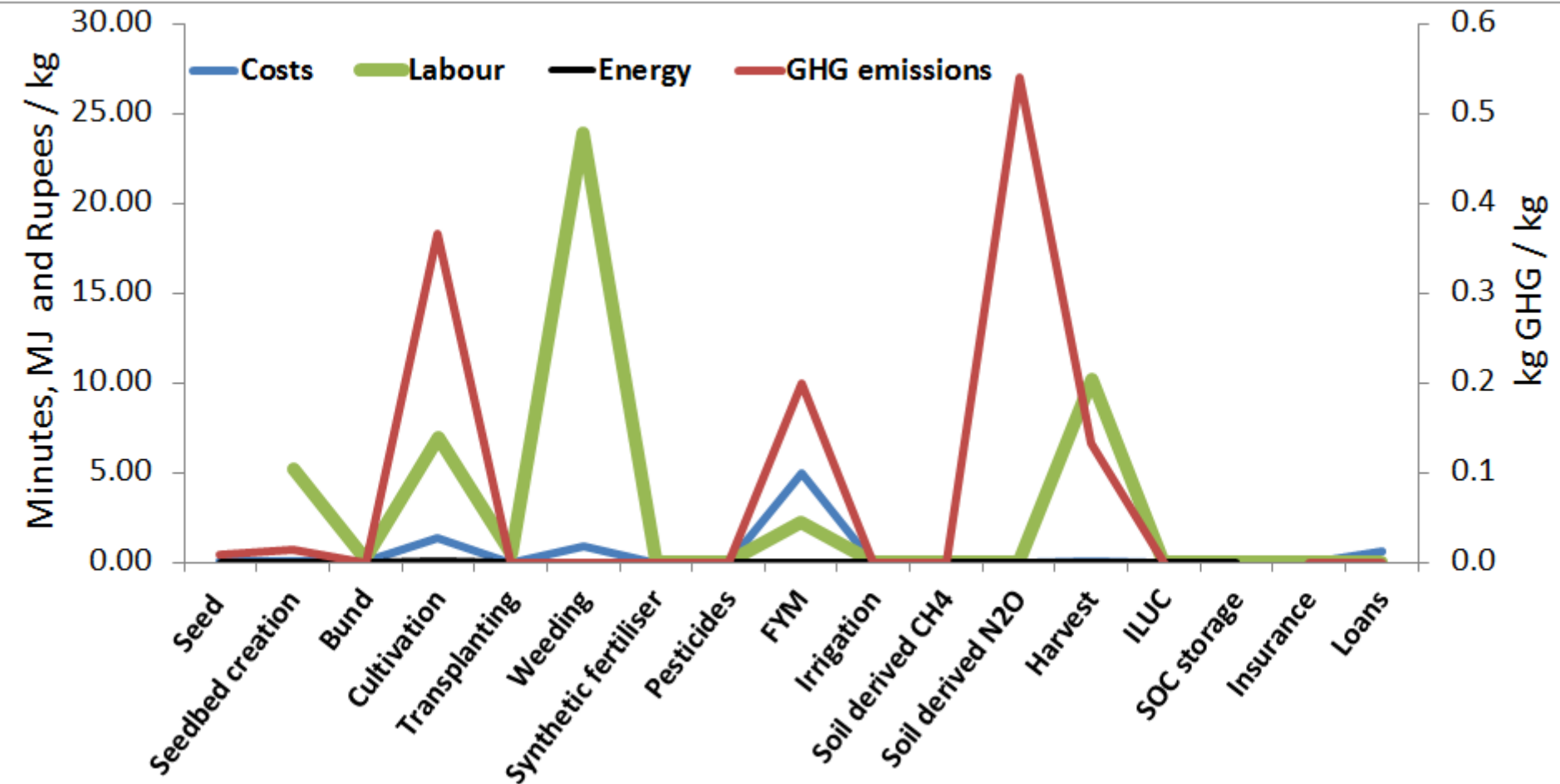
M labour quality



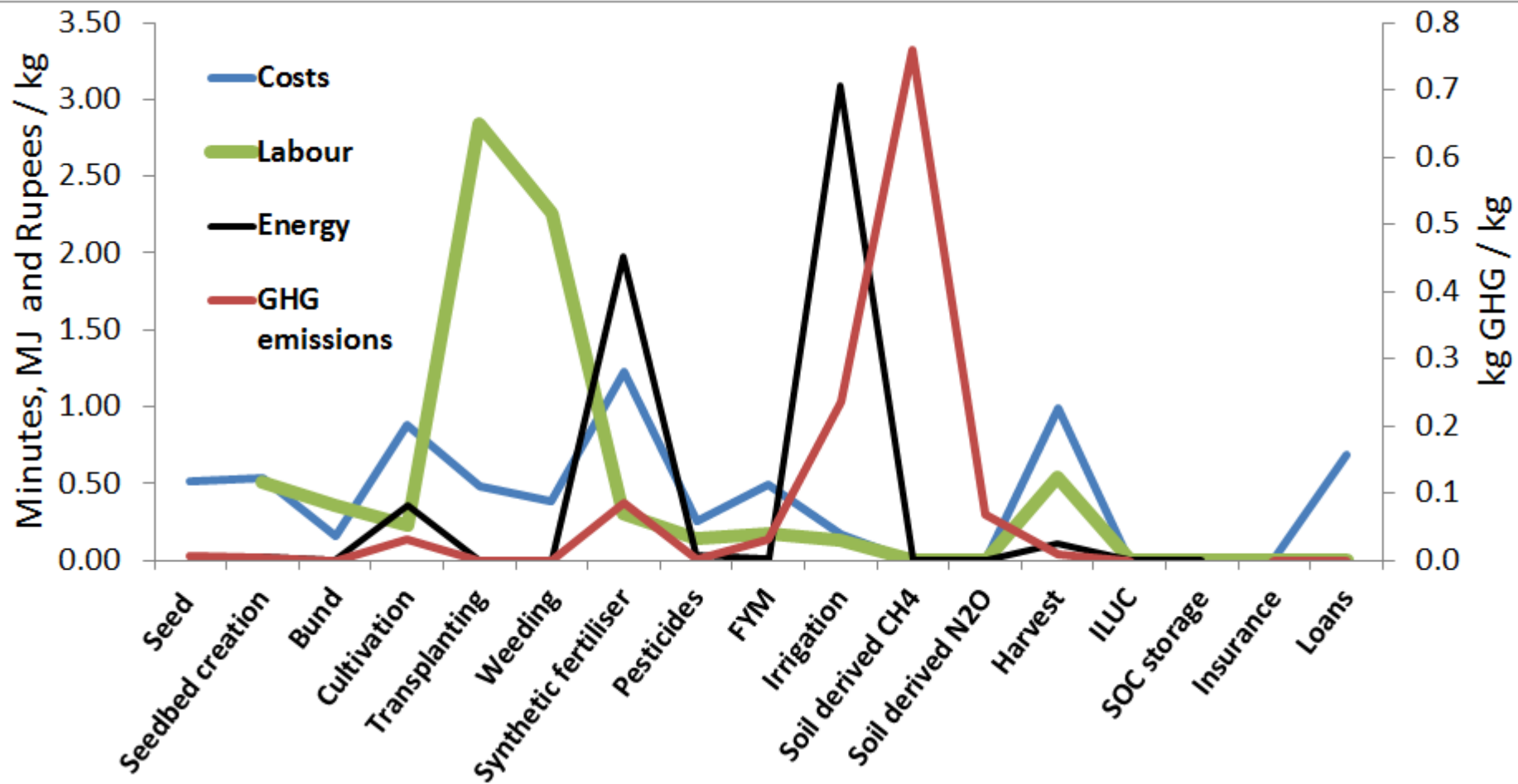
IN A SINGLE DIAGRAM - HYV RICE

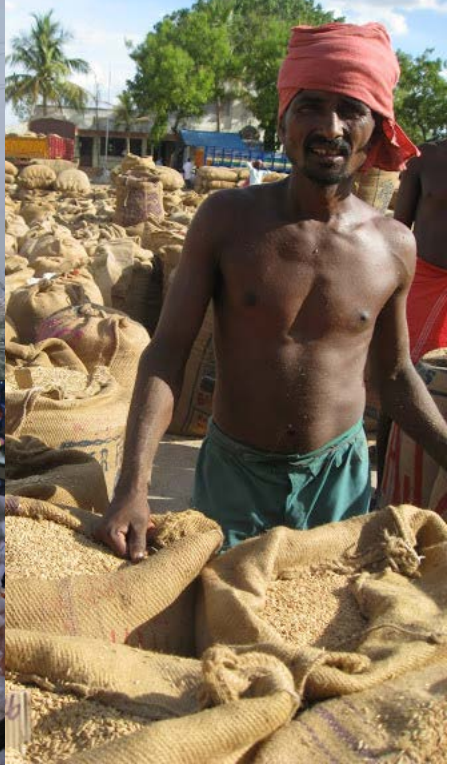


Interaction of rainfed labour and GHGs



Interaction of HYV labour and GHGs





LABOURIST APPROACH TO SUPPLY CHAIN (Labour studies /economics)

Mohan Mani, Gautam Mody and Meghna Sukumar with BHW) 'Provisioning Chennai: Labour in the Rice Supply Chain'.

Labour process in **processing overwhelmingly unregistered**

Capital biased tech change with logistical limits -> rates of return that could accommodate higher wages

Labour process in **retail**

Informal retail labour earns more than supermarket labour

in (ed) A. Narayanamoorthy and V. Bhavani *Agriculture and Rural India after the Economic Reforms* (New Delhi, Tulika Pub)

MULTICRITERIA MAPPING -

<http://www.sussex.ac.uk/spru/impact/mcm>

i) Options – from LCA and technology scoping
pro-poor, rain-fed rice; ii) SRI; iii) solar pumping; iv) halving T and D losses v) respondents' own

ii) Criteria – from project
GHGs; ii) costs; iii) labour/livelihoods iv) respondents' own

iii) Stakeholders – theory? inclusivity ?
language ? literacy ?



RANGES AND RANKINGS – ALL 40 STAKEHOLDERS , SITUATED KNOWLEDGE, EXPERT KNOWLEDGE

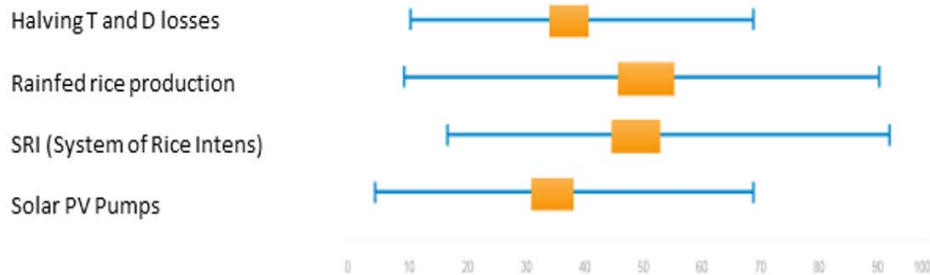
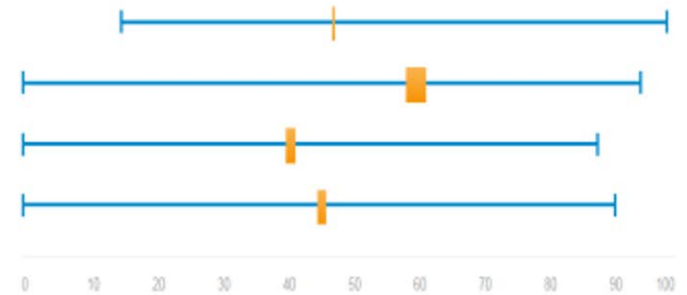


Halving T and D losses

Rainfed rice production

SRI (System of Rice Intens)

Solar PV Pumps



SEE OUR WEBSITE

- <https://www.southasia.ox.ac.uk/research-projects/resources-greenhouse-gases-technology-and-jobs-in-indias-informal-economy-the-case-of-rice>

