Orissa Rice Value Chain Analysis and Recommendations

July 2013
Executive Summary (1 of 3)

- **While India is now self-sufficient in rice, continued yield improvement required** to meet growing demand
  - India has managed to attain **rice self-sufficiency** (~99 million MT production in 2012 vs. ~95 million MT consumption) and amass sizeable rice stocks (~20 million MT+ in recent years), and is even emerging as a major rice exporter (~7+ million MT exports in 2012)
  - Domestic demand is projected to increase, and **yields must increase significantly** if production is to keep pace

- **Orissa can emerge as a national supplier** due to its **comparative advantages** in water and labour; this will enable significant poverty reduction and enhance food security
  - Several states still deficit in rice, especially in west (e.g. Maharashtra) and south of country (e.g. Tamil Nadu, Kerala)
  - Orissa can emerge as a national supplier due to its competitive advantages: it has **good rainfall and high groundwater table**, and relatively better labour availability
  - This would have a significant impact on poverty reduction, given **rice cultivation affects highest number of households in Orissa** (rice has by far largest area under cultivation: 4.2 million ha, ~double next highest crop, pulses)
  - It will also enhance food security for ~25% of Orissa population who are food insecure, and enable their latent demand to be satisfied
  - For this to be achieved, **rice productivity growth in Orissa will have to accelerate**: yield currently below national average (2.0T/ha vs. 2.3T/ha India average) and growing very slowly

- At a broad level, smallholder farmers can be segmented into geographic **tribal areas** and **surplus areas**
  - **Tribal areas**: ~2.5M paddy farming households; typically marginal (~0.4-0.5 ha), with lower incomes, growing for self-consumption, and with weaker value chain linkages, particularly in terms of input supply and extension
  - **Surplus areas**: ~4M paddy farming households; typically small-to-medium (1-1.5 ha), with relatively higher incomes, growing at least partially for market, and with relatively stronger value chain linkages

- For farmers in **surplus areas**, **key constraints** across the value chain are **seeds** (~20% yield; ~60% income uplift if resolved) and **mechanization/labour** (~5% yield; ~40% income). **Secondary constraints** are **fertilizer** (~20% yield; ~35% income), **irrigation** (~50% yield, ~100% income for 30-35% farmers without irrigation), **agronomic practices** (~20% yield; ~35% income), **post-harvest practices** (~15% income) and **market access** (~35% income). Pesticide usage, credit, milling and infrastructure are not major constraints
  - **Seeds**: Monopoly HYV seed provider Orissa State Seed Corporation (OSSC) has an ineffective distribution network, leading to unavailability of seeds at the right time; bulk of OSSC seed production is still Swarna, an older variety which is increasingly pest and disease-prone
  - **Mechanization/labour**: Level of basic farm mechanization (tractors, power tillers, combine harvesters) low, with no effective distribution models for providing these services to smallholders; mechanization challenge sent to intensify due to labour prices
  - **Secondary constraints**: While agronomic practices have improved somewhat with intense focus on line planting, effectiveness of govt. extension still a constraint, and awareness of proper fertilizer, soil mgmt. practices remains low. Govt. procurement inefficient and bureaucratic, with most farmers receiving ~15% discount to MSP
  - **Non-constraints**: No govt. distortion in pesticides; reasonable infrastructure; sufficient milling capacity.
For farmers in **tribal areas**, constraints tend to be more severe. **Key constraints** are seeds (~25% yield; ~65% income uplift if resolved) and agronomic practices (~35% yield; ~70% income). **Secondary constraints** are fertilizer (~25% yield; ~20% income), irrigation (~50% yield, ~145% income for ~70% farmers without irrigation) post-harvest practices (~15% income) and market access (~40% income). Pesticides, credit, and milling are not major constraints. Infrastructure is poor in tribal areas but a priority improvement area for the govt.; requires sig. and long-term investment

- **Seeds**: OSSC's distribution network does not reach remote, tribal areas, leading to a poor availability of certified seeds
- **Agronomic practices**: Reach and quality of government extension services particularly poor in tribal areas
- **Mechanisation**: Low penetration of mechanisation in tribal areas. This is less of a constraint than in surplus areas due to low cost and greater availability of labor. However, making mechanisation more easily available in tribal areas will enhance productivity and income
- **Secondary constraints**: Awareness of proper fertilizer, soil mgmt. practices even lower than in surplus areas; Poor post-harvest practices (hand threshing, limited on-farm storage) leads to wastage of ~5%; Even poorer price realization than surplus areas
- **Non-constraints**: No clear economic case for pesticides; sufficient milling capacity via village mills

**Both Central & State governments** increasing agriculture spend and focused on rice productivity enhancement

- Central govt. increasing agri. spend at ~7% CAGR (04-12), and has launched several flagship schemes to enhance cereals productivity, of which rice is a central component: National Food Security Mission (NFSM); Bringing Green Revolution to Eastern India (BGREI)
- Orissa state govt. agri. spend has increased >5 times over last 5 years, and is focused on improving seed availability, irrigation, mechanization and extension services

**Govt. active at most stages of rice value chain**, but key policy constraints are in seeds, market access & milling

- **Seeds**: Significant subsidies on high-yielding variety (HYV) seeds distributed through govt. channels and limited subsidies on hybrids crowding out private sector, who command <5% of market
- **Market access**: Govt. commits to buy all paddy at Minimum Support Price (MSP) and runs large-scale procurement network, but due to inefficiency and ineffectiveness, many farmers do not receive this MSP; Under the recent BGREI* scheme, the government is offering a 50% subsidy for set up of new rice hulling (mini rice mill) operations in Eastern India
- **Milling**: Govt. regulations do not allow both custom milling for the govt. and open market milling; however, in practice, most custom millers partake in informal milling ‘on the side’, creating a large ‘unofficial’ market - ~40% of all paddy produced

*BGREI: ‘Bringing Green Revolution to Eastern India’
Executive Summary (3 of 3)

- Based on these constraints, a **number of intervention priorities emerge**:
  - **Seed commercialization** for both segments; **mechanization** for both segments, and **agronomic practices** for tribal areas
  - **Fertilizers & post-harvest practices** are secondary concerns for both segments, and can be folded into broader package of practices*
    - While more challenging to address, enabling farmers to achieve MSP via procurement reform would improve incomes considerably

- Constraints should be tackled through an **integrated intervention approach** focused on 4 areas of (A) Seeds; (B) Extension; (C) Procurement; and (D) mechanization
  - Government co-operation should be facilitated through a broad-based MoU with State Govt. and an embedded PMU
  - Over time, expand partnership from relatively uncontroversial issues (e.g. seed supply) to more sensitive ones (e.g. procurement)

- **(A) Seed commercialization** via entry of private player(s) in seed distribution and capacitization of OSSC
  - Directorate of Ag. willing to enable private sector participation in seed distribution by expanding access to HYV subsidy
  - Allow for more competitive and customer-focused seed distribution systems by directly giving farmers subsidy for use in seed purchase.
    - Concurrently, donors could offer technical assistance to incumbent player OSSC to make it more competitive

- **(B) Integrated package of practices** (including agronomic, post-harvest practices, input supply) via **govt. extension**
  - Donors can work with Govt. to introduce ICT, innovations and new models to increase extension effectiveness and reach at lower cost.
  - Can also leverage govt.-supported cooperatives PACS (Primary Agricultural Cooperative Societies) and TDCC (Tribal Development Co-operative Corporation) to assist in input supply

- **(C) Improve efficiency of procurement and facilitate vertical integration** to increase price realization for farmers
  - Improving efficiency (timely payments, reduced bureaucracy, less wastage/corruption etc.) and reach of procurement mechanisms will enable more farmers to directly access government procurement points and achieve MSP
  - Formalising informal market through regulatory reform will lead to greater transparency and disintermediation
  - Facilitating investment in a cluster of farmer-owned mini rice mills/ hullers in aromatic rice growing areas will enable milled aromatic rice to be marketed by the farmer/ FPO-owned mills to capture higher value

- **(D) Increase mechanization via service provider model in both tribal and surplus areas**
  - Support development of a service provider model, whereby entrepreneurial farmers are linked to equipment manufacturers, and given training, support and access to credit so that they can purchase equipment and rent it out to others

- **If executed and scaled effectively**, interventions can have a **sig. income impact** on ~5.5M farming households
  - For **surplus farmers**, addressable population of ~3-3.5M farming households, with a **theoretical full potential ~50% yield and ~180% income impact** (add. Rs. 21,600 / $400) on current baseline (~2.8-3.0T rice yield/ha; ~Rs. 12,000 / $220 income/ha); translates into on-farm stretch target of ~35% yield and ~110% income impact (add. Rs. 13,200 / $240)
  - For **tribal farmers**, addressable population of ~2.5M farming households, with a **theoretical full potential ~70% yield and ~195% income impact** (add. ~Rs. 16,900 / $305) on current baseline (~1.7-1.8T rice yield/ha; ~Rs. 8,600 / $155 income/ha); translates into on-farm stretch target of ~50% yield and ~120% income impact (add. Rs. 10,100 / $185)

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*Integrated set of crop cultivation practices from land preparation to post-harvest management*
Agenda

Project approach

Supply-demand dynamics

Value chain & constraints

Policy & government context

Prioritized interventions
**Approach: A 3-step approach was followed**

**Diagnostic**
- **Oct-Nov 2012**
  - **Key activities**
    - Understand *overall market context*
      - Supply-demand dynamics
      - Policy context
    - **In-depth snapshot of Orissa rice value chain**
      - Farmer behavior and segmentation
      - Revenue & profit build-ups
      - Value chain inefficiencies

**Intervention design**
- **Dec 2012**
  - **Key activities**
    - Develop interventions to address key constraints
    - Prioritize interventions based on impact and ability to implement
      - Yield and income increase
      - # farmers impacted
      - Feasibility

**Validation & synthesis**
- **Jan 2013**
  - **Key activities**
    - Test and refine intervention hypotheses with *key stakeholders*
      - Validate interest and feasibility
      - Refine based on feedback

**Key sources (see next slide for detail)**
- **Stakeholder/expert interviews**
- **Fieldwork across 4 districts**
- **Secondary research**
- **Test and refine intervention hypotheses with key stakeholders**
  - Validate interest and feasibility
  - Refine based on feedback

**Outcomes**
- **Key constraints across rice value chain in Orissa**
- **Prioritized set of interventions**
- **Preliminary implementation plan**
- **Final, validated set of recommendations**
## Approach: Wide range of stakeholders consulted

### STAKEHOLDER INTERVIEWS
- **Government**
  - Principal Secretary of Agriculture, Orissa
  - Director of Agriculture, Orissa
  - Director, NABARD
  - Orissa State Civil Supplies Corporation
  - Orissa State Seed Corporation
  - Chairman, Commission on Agricultural Costs & Prices (CACP)
- **Private sector**
  - President, Orissa Rice Millers Association
  - Large millers (e.g. SNM Agro Group, Mangalam Agro-Tech etc.)
  - Input providers (e.g. Bayer, Syngenta, Pioneer, MetaHelix etc.)
  - mechanization providers (e.g. Mahindra etc.)
- **NGOs**
  - Pradan, Livolink, Reliance Foundation etc.
- **Institutes / Universities**
  - International Food Policy Research Institute (IFPRI)
  - Central Rice Research Institute (CRRI)
  - International Rice Research Institute (IRRI)
  - Cereal Systems Initiative for South Asia (CSISA)
  - Orissa University of Agriculture & Technology (OUAT)
  - Xavier Institute of Management, Bhubaneswar (XIMB)
- **BMGF Program Officers across R&D, Policy, and Markets**
- **Ministry of Agriculture data**
- **Directorate of Agriculture & Food Production, Orissa data**
- **Govt. of India Planning Commission**
- **National Sample Survey Organisation (NSSO)**
- **United States Department of Agriculture (USDA)**
- **European Commission Agricultural Commodity Markets Outlook**
- **International Food Policy Research Institute (IFPRI) reports**
- **Food & Agriculture Org. (FAO)**
- **Food and Agricultural Policy Research Institute (FAPRI)**
- **Govt. websites (e.g. OSCSC, FCI)**

### FIELDWORK
- **120+ farmers** across four districts
  - Surplus: Bargarh, Bhadrak, Bolangir
  - Tribal: Keonjhar
- **100+ other value chain players**
  - Traders, millers, wholesalers, retailers
- **Local government officials**
  - District Agriculture Officers
  - District extension officers
  - Primary Agriculture Cooperative Society officers
  - Regulated Marketing Committee officers
- **Field teams** of various private/NGO players
  - Input provider field teams
  - NGO fieldworkers
Agenda

Project approach

Supply-demand dynamics

Value chain & constraints

Policy & government context

Prioritized interventions
India is largely self-sufficient in rice, though domestic demand will continue to increase, and yields must increase significantly if production is to keep pace.

**DOMESTIC DEMAND EXPECTED TO INCREASE**

TO KEEP PACE WITH DEMAND, YIELD HAS TO INCREASE SIGNIFICANTLY

- Area under rice cultivation is at maximum
  - Relatively ~flat last few decades
  - May even decline due to competing demands for land from urbanization, industrialization

- Therefore, any increase in production must be driven by yield improvement

- Yield improvement must be achieved in the face of several constraints:
  - **Groundwater depletion**: Groundwater suffering from over-exploitation in most of the states, particularly in the north-west ‘rice bowl’ where water table is depleting drastically
  - **Declining soil quality**: Driven by indiscriminate use of fertilizers; again, more pronounced in north-west India
  - **Labour shortages**: Decreasing availability of agricultural labour; rising labour prices

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**FAPRI* Rice demand forecast**

<table>
<thead>
<tr>
<th>Year</th>
<th>Milled rice (Millions, Mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>99/00</td>
<td>80</td>
</tr>
<tr>
<td>00/01</td>
<td>85</td>
</tr>
<tr>
<td>01/02</td>
<td>90</td>
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<tr>
<td>02/03</td>
<td>95</td>
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<tr>
<td>03/04</td>
<td>100</td>
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<tr>
<td>04/05</td>
<td>105</td>
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<tr>
<td>05/06</td>
<td>110</td>
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<tr>
<td>06/07</td>
<td>115</td>
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<tr>
<td>07/08</td>
<td>120</td>
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<tr>
<td>08/09</td>
<td>125</td>
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<td>09/10</td>
<td>130</td>
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<td>10/11</td>
<td>135</td>
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<td>11/12</td>
<td>140</td>
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<td>12/13</td>
<td>145</td>
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<td>13/14</td>
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<td>14/15</td>
<td>155</td>
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<td>15/16</td>
<td>160</td>
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<td>16/17</td>
<td>165</td>
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<tr>
<td>17/18</td>
<td>170</td>
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<tr>
<td>18/19</td>
<td>175</td>
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<tr>
<td>19/20</td>
<td>180</td>
</tr>
</tbody>
</table>

**Other demand projections**

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Est. demand (Mil. MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kumar, NCAP* (2009)</td>
<td>2021</td>
<td>~113</td>
</tr>
</tbody>
</table>

*FAPRI = Food and Agricultural Policy Research Institute; *NCAP = National Centre for Agricultural Economics and Policy Research, New Delhi

Note: Key assumptions FAPRI: ~7% real GDP growth; 1.2% population growth. Planning Commission: 8-9% GDP growth; 1.48% population growth; Per capita consumption as per NSSO 2009-10; High-case scenario takes into account seed, feed, wastage at 7.6% of gross output. NCAP: 9% GDP growth; includes SFW at 9.5%; based on survey data from NSSO 2004-05 Source: USDA Foreign Agricultural Service, Korbel School of Int'l Studies and Indian Journal of Economics and Business joint paper, Food and Agricultural Policy Research Institute, Int'l Food Policy Research Institute report; 12th Planning Commission
But India has not matched yield achievements of other Asian countries

**INDIA LAGS BEHIND ASIAN COUNTERPARTS IN RICE PRODUCTIVITY**

Rice paddy yield (kg/ha) of various Asian countries, 1961-2010

- **DUE MOSTLY TO LATER/LESS EXPANSIVE ADOPTION OF HYV AND HYBRID SEEDS**
  - India’s rice productivity is lower than that of nearly all of its rice-producing Asian neighbors, with exceptions such as Thailand, Nepal, etc.
  - Average rice yield across Asia in 2010 was 1.3x higher than India’s average yield
  - Productivity improvements typically driven by govt. promotion of HYVs – and in China’s case, hybrids
    - **China**: Rapid expansion of hybrid rice since mid-1970s; now ~ 50% of rice area is under hybrid rice cultivation vs. <6% for India
    - **Vietnam**: Productivity boost came after govt. established a rice market system in 1986 (vs. farming communes/controlled prices) incentivizing productivity increases; also helped by modern early maturing rice varieties and better water and nutrient management
    - **Indonesia**: Due to govt.’s investments in irrigation, disseminating HYV along with subsidized fertilizer, pesticides, and credit as well as technical assistance

Source: FAOSTAT, FAO
Orissa can emerge as a national supplier due to its comparative advantages

Still a number of rice deficit states

Orissa has several comparative advantages vs. other states

- **Good rainfall** and high groundwater table
  - ~1,500mm annual rainfall vs. ~1,200 India average
  - ~5.6m pre-monsoon depth to water level vs. ~8.9m India average

- **Relatively better labour availability** in rural areas during rice cropping season
  - Agriculture is by far primary occupation of rural population

Note: *2009-10 figures

Source: Census of India; Department of Agriculture and Cooperation; Household Consumer Expenditure Survey; Central Groundwater Board Handbook (2011-12)
For Orissa to become a national supplier, rice productivity growth will have to accelerate

**PRODUCTIVITY STILL BELOW INDIA AVERAGE**

- Best available estimate (based on expert interviews, fieldwork)
- Officially reported

**PRODUCTIVITY INCREASING, BUT RELATIVELY SLOWLY**

**ORISSA**

- Officially reported
- Best available estimate

**Area**

- -1% CAGR (04-11)

**Yield**

- 4% CAGR (04-11)

**Production**

- 3% CAGR (04-11)

2002 monsoon failure

Note: Interviews and fieldwork suggests Orissa State Govt. statistics on yield and production are significantly understated due to political reasons e.g. to keep government procurement targets low; to continue receiving funds from central government due to being a ‘lagging’ state

Source: Department of Agriculture, Orissa; Directorate of Economics & Statistics
This would have a significant impact on poverty reduction…

One of the highest poverty levels in country

% of Population below poverty line (based on Planning Commission definition, 2009-2010)

Note: 2009-10 is the most recent state-wide poverty data. The all-India poverty line (daily per capita consumption expenditure) is Rs.22 in rural areas and Rs..28 in urban areas. The poverty line varies by state and in Orissa it is Rs.19 in rural areas and Rs.24 in urban areas. World Bank definition of poverty is less than US$1.25/day, PPP adjusted.
Source: Govt. of India; Govt. of Odisha; Planning Commission
....and enhance food security

**SIGNIFICANT FOOD INSECURITY WITHIN ORISSA**

**RICE A CENTRAL PART OF ORISSA DIET**

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Note: *Consuming less than 1,800 kcal per day (less than 75% of the recommended minimum intake); ^Consuming between 1,800-2,400 kcal per day.*

Source: Directorate of Economics and Statistics, GoI; "Household Consumer Expenditure in India", National Sample Survey Org.; Orissa Economic Survey; FAO
Even if yield improvement was so significant such that state and national demand could be met, export potential could be tapped on world market.

**Source:** European Commission Agricultural Commodity Markets Outlook (2010), OECD, FAO, FAPRI, USDA

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**INDIA EXPORTS SURGED AFTER LIFTING OF BAN**

- Severe drought in many parts of India in 2009-10

**EXPORT GROWTH EXPECTED TO CONTINUE**

- India’s quick capture of export market was propelled by its price advantage relative to other rice exporters.
- Price advantage partly due to fact that exporters were liquidating stocks accumulated during ban period.
- While this dynamic is ending, price advantages of ~$100/MT vis-à-vis Thailand and Vietnam likely to remain.
- Government likely to continue with current rice export policy given domestic surplus and large stocks.

**INDIAN RICE IS PRICE COMPETITIVE**

<table>
<thead>
<tr>
<th>Country</th>
<th>Average price 2011* ($/MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>India (non-Bas.)</td>
<td>360-450</td>
</tr>
<tr>
<td>Vietnam</td>
<td>450-550</td>
</tr>
<tr>
<td>Thailand</td>
<td>575</td>
</tr>
<tr>
<td>Pakistan</td>
<td>480</td>
</tr>
</tbody>
</table>

*Price on world market

Source: European Commission Agricultural Commodity Markets Outlook (2010), OECD, FAO, FAPRI, USDA
Agenda

Project approach

Supply-demand dynamics

Value chain & constraints

Policy & government context

Prioritized interventions
One can broadly distinguish between farmers in tribal areas vs. surplus areas, both in terms of profile and value chain linkages.

<table>
<thead>
<tr>
<th>Landholding size</th>
<th><strong>SURPLUS AREAS</strong></th>
<th><strong>TRIBAL AREAS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg.</td>
<td>Avg. ~1-1.5 ha</td>
<td>Much smaller: ~0.4-0.5 ha</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Avg. annual income* (2011 est.)</th>
<th><strong>SURPLUS AREAS</strong></th>
<th><strong>TRIBAL AREAS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rs. 45,000 (~$900) per capita</td>
<td>Rs. 25,000 (~$500) per capita</td>
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<table>
<thead>
<tr>
<th>Season</th>
<th><strong>SURPLUS AREAS</strong></th>
<th><strong>TRIBAL AREAS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Predominantly <em>kharif</em> (Aug-Nov/Dec)</td>
<td>Small amount of <em>rabi</em> (Dec/Jan-Mar/Apr) rice grown in irrigated areas (~15% production)</td>
<td>Predominantly <em>kharif</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Common cropping systems</th>
<th><strong>SURPLUS AREAS</strong></th>
<th><strong>TRIBAL AREAS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice-rice (if irrigated)</td>
<td>Rice-pulses (if non-irrigated)</td>
<td>Typically only grow one <em>kharif</em> crop - Rice only; Maize only; Rice &amp; maize</td>
</tr>
<tr>
<td>Typically use entire landholding for rice when grown</td>
<td>Small amount of farmers take a small <em>rabi</em> crop of millet, gram</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Subsistence vs. commercial characteristics</th>
<th><strong>SURPLUS AREAS</strong></th>
<th><strong>TRIBAL AREAS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average annual rice consumption is ~145kg per capita</td>
<td>Most sell at least some of the paddy grown</td>
<td>Slightly higher demand (~170-80kg per capita avg. annual consumption)</td>
</tr>
<tr>
<td>Most growing for subsistence only</td>
<td></td>
<td>Most growing for subsistence only</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Irrigation</th>
<th><strong>SURPLUS AREAS</strong></th>
<th><strong>TRIBAL AREAS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Canal and borewell irrigation (~50-55% of area); rest is rainfed</td>
<td></td>
<td>Limited irrigation facilities; predominantly rainfed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Value chain linkages</th>
<th><strong>SURPLUS AREAS</strong></th>
<th><strong>TRIBAL AREAS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Relatively stronger, with better access to inputs and extension</td>
<td>Partly enabled by better infrastructure (better road connectivity; higher electrification)</td>
<td>Weaker value chain linkages, particularly in terms of input supply and extension</td>
</tr>
<tr>
<td>Poorer infrastructure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Total income; not just income from paddy cultivation.  
Source: Planning Commission Estimates, 2011 Census
Tribal areas are clustered in the north and south of the state, with northern tribal belt coinciding with severe drought-prone zone.

**TRIBAL VS. SURPLUS AREAS**

- **Tribal** (~40%+ tribal population throughout district)
- **Semi-tribal** (mix of tribal and non-tribal areas within district)
- **Non-tribal**; typically surplus

**AGRO-CLIMATIC CONDITIONS**

- **Tribal areas** largely upland
- **Western surplus** areas largely mid-land
- **Eastern surplus** areas largely lowland

Source: Govt. of Odisha; Team analysis
Agenda

Project approach

Supply-demand dynamics

Value chain & constraints

Surplus areas

Tribal areas

Policy & government context

Prioritized interventions
Average farmer in surplus areas earns ~Rs. 12,000 per ha, with labour representing largest cost

Note: Estimation based on field interviews in Bhadrak, Bargarh and Bolangir districts. Entire sample not using “SRI” practices. Analysis assumes all paddy sold. Opportunity cost of family labour estimated at Rs. 13,200.

Sources: Primary interviews; Team analysis
For these farmers, key constraints are seeds and mechanization

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Severity</th>
<th>Issues</th>
<th>Est. yield impact if resolved*</th>
<th>Est. income impact if resolved^</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seeds</td>
<td>1a</td>
<td>• Insufficient supply of newer (non-Swarna) HYVs and stress-tolerant varieties due to poor distribution network of Orissa State Seed Corp.</td>
<td>~20%</td>
<td>~60%</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>1b</td>
<td>• Though knowledge, availability and affordability are all issues, knowledge / awareness is the key constraint</td>
<td>~20%</td>
<td>~35%</td>
</tr>
<tr>
<td>Pesticides/herbicides</td>
<td>1c</td>
<td>• Usage is reasonable for India; less of a constraint as there is no government distortion in this sector i.e. no subsidies.</td>
<td>~5%</td>
<td>~5%</td>
</tr>
<tr>
<td>Irrigation</td>
<td>1d</td>
<td>• While irrigation coverage is below national average, what facilities are in place are reasonably maintained</td>
<td>~50%</td>
<td>~100%</td>
</tr>
<tr>
<td>Access to credit</td>
<td>1e</td>
<td>• Not preventing farmers from using improved inputs/practices; vast majority of farmers do take loans for paddy cultivation</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Agronomic practices</td>
<td>2a</td>
<td>• Improvement in recent years, particularly in line planting, though effectiveness of govt. extension services still a constraint</td>
<td>~20%</td>
<td>~35%</td>
</tr>
<tr>
<td>Mechanisation/labour</td>
<td>2b</td>
<td>• Level of basic farm mechanization low; NREGA (National Rural Employment guarantee Act) likely to place continued pressure on labour prices and availability</td>
<td>~5%</td>
<td>~40%</td>
</tr>
<tr>
<td>Post-harvest</td>
<td>3</td>
<td>• Lack of proper storage facilities at farm level leads to wastage and reduction in quality</td>
<td>~5%^</td>
<td>~15%</td>
</tr>
<tr>
<td>Market access</td>
<td>4</td>
<td>• Govt. procurement system bureaucratic and inefficient; many farmers unable to access it directly. However, most farmers able to sell paddy at a min. of ~10% below MSP via traders</td>
<td>NA</td>
<td>~35%**</td>
</tr>
<tr>
<td>Milling</td>
<td>5</td>
<td>• Currently sufficient processing capacity in the state and no significant constraints to setting up additional units.</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>6</td>
<td>• Reasonable roads and electrification; not preventing further development of milling industry, better market linkages etc.</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

*Full potential / theoretical impact (not actual on-farm impact); ^Income impact calculated based on income from paddy (~Rs. 12,000 per ha), not total farmer income; **Assuming farmers could achieve full MSP; ^Due to less wastage
These two constraints have significant income impact and relatively high addressability.

Source: Primary interviews; Team analysis
Seeds: Availability of the right varieties of seed at the right time a problem even for farmers in surplus areas

ORISSA’S RICE SEED REPLACEMENT RATE ALMOST LOWEST IN INDIA

KEY ISSUES ARE SEED SUPPLY AND APPROPRIATENESS OF VARIETIES GROWN

<table>
<thead>
<tr>
<th>Issues</th>
<th>Severity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability</td>
<td></td>
<td>• Govt. monopoly on HYV seeds</td>
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<tr>
<td></td>
<td></td>
<td>• Unavailability of seeds at right time due to lack of clear ownership and accountability for distribution to farmers</td>
</tr>
<tr>
<td>Affordability</td>
<td></td>
<td>• High govt. subsidies on HYV seeds (~40-50%) ensure affordability for vast majority of farmers (though subsidy only to OSSC crowds out private sector)</td>
</tr>
<tr>
<td>Awareness</td>
<td></td>
<td>• Most farmers aware of benefits of replacing seed every 3-4 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Some also aware of benefits of newer varieties vs. Swarna</td>
</tr>
<tr>
<td>Appropriate-ness</td>
<td></td>
<td>• Predominant variety is Swarna, an older variety which is becoming increasingly pest-prone; newer, improved varieties are available</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bulk of farmers in drought and flood-prone regions not using stress-tolerant varieties</td>
</tr>
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Not an issue
Sig. issue
Mechanization/labour: Level of basic farm mechanization still low, with severe adverse effects on farmer incomes.

Significant gap in mechanization penetration in Orissa:

<table>
<thead>
<tr>
<th>Category</th>
<th>No. of tractors/1000 ha, Orissa vs. India, 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orissa</td>
<td>20.00</td>
</tr>
<tr>
<td>Non Tribal</td>
<td>3.24</td>
</tr>
<tr>
<td>Semi Tribal</td>
<td>2.24</td>
</tr>
<tr>
<td>Tribal</td>
<td>2.11</td>
</tr>
<tr>
<td>India</td>
<td>20.00</td>
</tr>
</tbody>
</table>

Labour largest cost for farmers; once family labour included farming is unprofitable.

Source: Govt. of Odisha, Lit. Search, Primary Interviews
Mechanization/labour: Mechanization solutions exist for smallholders which would result in significant cost savings, though these have not been popularized.

<table>
<thead>
<tr>
<th>LAND PREPARATION</th>
<th>TRANSPORTING</th>
<th>HARVESTING</th>
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<tbody>
<tr>
<td>Cost Per Hectare (INR)</td>
<td>Cost Per Hectare (INR)</td>
<td>Cost Per Hectare (INR)</td>
</tr>
<tr>
<td>Traditional Plough</td>
<td>Power Tiller</td>
<td>Tractor</td>
</tr>
</tbody>
</table>

Smaller 45 HP tractors and 12 HP power tillers are ideal for smaller land holdings < 2 Ha.

Walk-behind transplanters with a 4-stroke petrol engine and 2-speed transmission are a cost-effective option for small land holders.

Self-propelled wheel harvesters are an efficient option for small landholders.

- Mechanization can also lead to higher yields (through timely and more accurate agronomic practices) and less wastage.
- Despite benefits, no formal service provider model linking entrepreneurial farmers to equipment providers, such they can access equipment and credit, and provide rental services to other farmers.

Note: The above analysis assumes that power tillers, tractors, and transplanters are rented on an hourly or daily basis; Land Preparation includes ploughing and harrowing; Rental rates for power tillers are Rs.300/hour, and those for tractors, transplanters and harvesters are Rs.500/hour. ‘Manual labour’ costs include opportunity costs of family labour.

Source: Primary Interviews, NABARD, Mahindra and Mahindra.
Mechanization would also directly lessen the burden on women in rice production

Women’s role in rice production in Orissa

**Production**
- **Land preparation**
  - Carried out by men
  - Both by physical (plough) and mechanical (tractor) means
  - Majority work done by women
  - Carried out in or near household
  - Requires careful supervision
- **Nursery preparation**
  - Majorly work done by women
  - Carried out in or near household
  - Requires careful supervision
- **Planting**
  - Majority work done by women
  - Carried out in or near household
  - Requires careful supervision
- **Weeding**
  - Majority work done by women
  - Delicate, careful work
  - For tribal/subsistence farmers, entire household is engaged
- **Harvesting**
  - Majority work done by women, and is generally done manually
  - Men dominate the process if it is done mechanically
- **Threshing**
  - Both men and women
  - Men typically thresh and women carry paddy; collect loose grains etc.
- **Milling**
  - Typically carried out by men
  - Includes parboiling process

Preference for female labour often driven by lower wage rate

Source: Primary interviews
Agenda

Project approach

Supply-demand dynamics

Value chain & constraints
  Surplus areas
  Tribal areas

Policy & government context

Prioritized interventions
Profitability per hectare in tribal areas ~Rs.8,600, ~70% that of surplus areas

Note: Entire sample not using “SRI” practices. Analysis assumes all paddy sold. Opportunity cost of family labour estimated at ~Rs. 15,000 per ha
Sources: Primary interviews (Keonjhar district); Team analysis

Avg. yield: ~2.6-2.8T per ha (paddy)/ ~1.7-1.8T per ha (rice)
Avg. land holding: 0.4-0.5 ha

Represents ~34% margin
For farmers in tribal areas, key constraints are seeds and agronomic practices

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Severity</th>
<th>Issues</th>
<th>Est. yield impact if resolved*</th>
<th>Est. income impact if resolved^</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seeds</td>
<td>1a</td>
<td>• OSSC’s distribution network does not reach many tribal areas, leading to a poor availability of certified seeds (Swarna or otherwise), and extremely low seed replacement rate (&lt;20%)</td>
<td>~25%</td>
<td>~65%</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>1b</td>
<td>• Even lower usage than in surplus areas primarily driven by lack of awareness; affordability also a key issue</td>
<td>~25%</td>
<td>~20%</td>
</tr>
<tr>
<td>Pesticides/ herbicides</td>
<td>1c</td>
<td>• Unclear whether pesticide/herbicide application makes economic sense for small, marginal farmers operating on a low cost base</td>
<td>~5%</td>
<td>~15%</td>
</tr>
<tr>
<td>Irrigation</td>
<td>1d</td>
<td>• Majority of farmers in tribal areas are rainfed, with a large number of districts also drought prone</td>
<td>~50%</td>
<td>~145%</td>
</tr>
<tr>
<td>Access to credit</td>
<td>1e</td>
<td>• Not preventing farmers from using improved inputs/practices</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Agronomic practices</td>
<td>2a</td>
<td>• Reach and quality of government extension services particularly poor in tribal areas, and limited interest from the private sector</td>
<td>~35%</td>
<td>~70%</td>
</tr>
<tr>
<td>Mech./ labour</td>
<td>2b</td>
<td>• Mechanization is low; However availability of family labour and smaller landholding sizes renders mechanization less of a constraint</td>
<td>~5%</td>
<td>~5%</td>
</tr>
<tr>
<td>Post-harvest</td>
<td>3</td>
<td>• Predominantly hand threshing and limited storage capacity on farm leads to significant wastage</td>
<td>~5%</td>
<td>~15%</td>
</tr>
<tr>
<td>Market access</td>
<td>4</td>
<td>• Farmers able to sell paddy, but with slightly poorer price realization than surplus areals (~5% price penalty vs. surplus areas)</td>
<td>NA</td>
<td>~40%**</td>
</tr>
<tr>
<td>Milling</td>
<td>5</td>
<td>• While milling efficiency and quality is low, sufficient capacity available even in tribal areas through small, village mills</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Infra-structure</td>
<td>6</td>
<td>• Infrastructure is very poor and a constraint from several angles – input provision, access to information etc.</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

*Full potential / theoretical impact (not actual on-farm impact); ^Income impact calculated based on income from paddy (~Rs. 6,000 per ha), not total farmer income; assumes farmers selling all their produce; **Assuming farmers could achieve full MSP
These two constraints have significant income impact and relatively high addressability.

Source: Primary interviews; Team analysis
Seeds: OSSC reach limited in tribal areas with insufficient distribution points; awareness and appropriateness also issues

TRIBAL DISTRICTS TEND TO HAVE LOWER HYV COVERAGE

<table>
<thead>
<tr>
<th>KEY ISSUES ARE SEED DISTRIBUTION, AWARENESS AND APPROPRIATENESS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Issues</strong></td>
</tr>
<tr>
<td>Availability</td>
</tr>
<tr>
<td>Affordability</td>
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<tr>
<td>Awareness</td>
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<td>Appropriateness</td>
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</tbody>
</table>

PACS = Primary Agriculture Cooperative Societies
Source: Govt. of Orissa; Primary Interviews
**Agronomic practices**: Most farmers still using out-dated practices, even if they have sufficient family labour.

<table>
<thead>
<tr>
<th>SERIOUS YIELD GAP TO SURPLUS AREAS; POOR PRACTICES A SIG. CONTRIBUTOR</th>
<th>USE OF OUT-DATED PRACTICES MAINLY DUE TO KNOWLEDGE GAP</th>
</tr>
</thead>
</table>
| Tribal area yield <65% of surplus areas | • Many farmers still using traditional agricultural practices due to **lack of knowledge**
  - Limited govt. extension services in many tribal districts |
| • These practices include **conventional (non-line) transplanting**, **broadcasting** and **erratic weeding** |
| • Even for those farmers who were aware of some improved practices, general feeling that the increase in productivity due to use of newer practices is **not enough to compensate for the additional effort and costs incurred** |
| • **Lack of irrigation facilities and risk of crop failure** also made farmers unwilling to invest in new practices |

“Due to our remoteness and poor state of road network, we **don’t get extension support** and have to rely on our own decision making or input dealer’s advice for the practices to be followed and quantities of inputs to be applied.”

Paddy farmer, Keonjhar

Source: Primary interviews; Govt. of Odisha
Agenda

Project approach

Supply-demand dynamics

Value chain & constraints

Policy & government context

Prioritized interventions
Central and state government both stepping up agriculture spend

GOI AG. SPEND GROWING AT ~7%; FOCUS ON EXTENSION AND POST-HARVEST MGMT

ORISSA STATE GOVT. SPEND HAS INCREASED >5X OVER LAST 5 YEARS

GOI = Govt. of India
Note: Crop husbandry includes funding for Rashtriya Krishni Vikas Yojna (RKVY) and extension (including promotion of seeds, fertilizer, farm mechanization etc.);
Figures exclude subsidies (considered non-Plan expenditure)
Source: Planning Commission; Ministry of Agriculture, GoI; FCI; Union Budget 2012-13; Budget of Agriculture Department, Govt. of Orissa
Significant subsidies on high-yielding variety seeds distributed through government channels

**GOVT. PROVIDES SIGNIFICANT SUBSIDIES ON HYV SEEDS**

- Central government provides subsidy on **fixed amount** of HYV seeds to each state
  - Subsidy has been ~Rs. 5 per kg in recent years
- State governments tend to supplement this **subsidy** with additional subsidy of their own
  - Also get to decide which varieties receive subsidy
- In Orissa, Central and State govts. combined provide a subsidy of ~40-50% **on HYV paddy seeds**
  - HYV seed cost to farmer Rs. ~12-20 / kg
  - Seeds released in last 10 years given priority
- Large subsidy has created a **near government monopoly** in HYV seed sector
  - Subsidy only available to seeds distributed through Orissa State Seed Corporation, the key government agency, which the private sector’s HYV seeds cannot compete with.

**PRIVATE SECTOR CROWDED OUT**

Private sector accounts for <5% of total seed sales

Source: Govt. of Odisha, Primary interviews
Government is ambivalent about hybrids and not providing subsidies on large scale

GOVERNMENT CAUTIOUS IN PROMOTING HYBRID SEEDS

- In **1996**, State Govt. made an unsuccessful attempt to promote hybrid seeds
  - Government provided seeds, procuring indiscriminately from numerous sources without proper quality control
  - Some was adulterated, with hybrids and non-hybrids mixed
  - Promoted hybrids in all areas (drought prone, submerged), and as a result had several instances of crop failure

- Since then, government has been far more cautious

- Furthermore, **no public sector variety has been a great success** on farm
  - Karnataka’s KRH-2 did not perform well on farm
  - Recently, CRRI has released Ajay and Rajlaxmi, but too early to gauge success (early indications suggest these underperform private sector hybrids like Bayer’s 6444)

LEVERAGING HYBRID SCHEMES, BUT ON FAR SMALLER SCALE THAN NEIGHBOURS

- **Rs. 32.9 million (~$0.6M)** govt. sponsored project to popularize hybrid paddy via PPPs during 2012-13 Kharif season, a fraction of other states
  - Provision of subsidized hybrid seed (Rs. 200/kg)
  - Implemented in 4,000 ha across 8 districts
  - Bihar’s program ~15x size (in terms of targeted area)

- Aims to increase yields by **2.5MT/ha** and incomes by **Rs. 25,000 / ha** for project areas

- Partners across government, private, academic and NGO sectors
  - Govt.: ATMA, Directorate of Ag. and Food Production
  - Private: 3 hybrid seed companies: Dev Gen Seeds, J.K. Agri Genetics, UPL-Advanta

“We’re **not against hybrids**, but we need to focus on agronomic practices first. We should fully exploit the potential of HYVs, and we need to be cautious about the extra risk hybrids introduce for farmers. Hybrids should be grown in a maximum of around **16% of area** under paddy”

Director of Agriculture, Orissa
Govt. causes significant distortion in rice marketing through imposition of floor price and large scale procurement and distribution

### MINIMUM SUPPORT PRICE

**Central guidelines**
- Before each *rabi/kharif* harvest season **MSP announced by central government**
  - Based on recommendation of Commission of Agricultural Costs and Prices (CACP)
  - Takes into consideration cost of various agri. inputs and reasonable margin for farmers for their produce
- **Food Corporation of India (FCI) acts as nodal central agency** to oversee procurement of paddy under price support scheme

**State interpretations**
- State government **free to set MSP higher than central recommendation**
  - Recently Orissa State Govt. has not announced ‘bonus’ above MSP,
- Many states – including Orissa – **take leading role in government paddy procurement at MSP under ‘decentralized procurement scheme’**
  - Orissa State Govt. through Orissa State Civil Supplies Corporation (OSCSC) **undertakes direct purchase of paddy and procurement of levy rice on behalf of central government**

### PUBLIC DISTRIBUTION SYSTEM

- Every month, central government releases a **prescribed amount of stocks to each state for distribution under PDS** which sells rice at subsidized prices to target populations
  - FCI responsible for transport of rice from surplus states to deficit states
- **Beneficiaries include BPL (Below Poverty Line), APL (Above Poverty Line), and AAY (Antyodaya Anna Yojna)**

**State interpretations**
- State government **free to price PDS rice below centrally-set rate**
  - Orissa is one of these states, selling rice at Rs. 2/kg (vs. centrally-set price of Rs. 5.65/kg for BPL and Rs. 7.95/kg for APL)
- **OSCSC manages distribution of PDS rice via Fair Price Shops and all inter-district transfers**
  - Hands over any surplus to FCI for export to other states

Source: FCI, OSCSC websites; Lit. Search
These issues in government procurement cause inefficiency in the value chain

Low quality parboiled rice, govt. procurement, Bhadrak district

Equivalent to ~Rs. 950 / qtl of paddy, a ~12% discount to Rs. 1080 MSP

Farmer

Trader

PACS -> Miller -> Rice Receiving Centre

Fair Price Shop

1.5 qtls paddy

1 qtl rice

Note: Estimation based on field interviews and market visits (farmers n = 83; traders n = 22, millers n = 7). Interviews in Bhadrak, Bargarh and Bolangir. Sources: Primary interviews; Team analysis.
In milling, ~40% of paddy passes through ‘unofficial’ channel.

**Custom milling**
OSCSC (primarily via PACS) procures rice; millers mill rice for government using a ‘fee-for-service’ model.

**Levy**
Miller procures rice from farmers at or above MSP but must deliver 75% to government; is free to sell remainder on open market.

**100% Open market milling**
If a miller completely disassociates from custom milling, then miller can mill 100% for open mkt.

**‘Unofficial’ milling**
Either milled informally by custom millers ‘on the side’ or leaves state for milling (this inter-state trade is also ‘unofficial’ i.e. not taxed).

**Milling for self-consumption**
Done in small village mills / rice hullers on a fee-for-service basis.

---

*Based on estimated paddy production in state of ~13 million MT paddy (vs. officially reported ~10.5 million MT paddy).

^PACS = Primary Agricultural Cooperative Society; OSCSC = Orissa State Civil Supplies Corporation – govt. agency responsible for procurement.
Custom milling is profitable for millers, though less profitable than ‘unofficial’ route – strong incentive for custom millers to also engage in informal trade

**CUSTOM MILLING**

Healthy margin, low-working capital requirement

---

**LEVY**

Very unprofitable, driven by low price for 75% of output

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**‘UNOFFICIAL’ ROUTE**

High margins, highest risk

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* The Odisha Govt assumes that rice millers achieve a 68% out-turn ratio, whereas in reality they only achieve ~65-66%

Note: In practice, millers operate under multiple models (e.g. custom milling + ‘unofficial’) in order to boost returns. The “unofficial” model analysis shown above does not account for bribes and other hidden fees that millers pay to operate informally.

Source: Primary Interviews, Govt. of Odisha, All Odisha Rice Millers Association
Agenda

- Project approach
- Supply-demand dynamics
- Value chain & constraints
- Policy & government context

Prioritized interventions
Given prioritized policy and value chain constraints we suggest an integrated intervention approach

### Key value chain constraints

- **Seeds** – for both surplus & tribal areas: Poor distribution network of Orissa State Seed Corporation
- **Mechanization** – for surplus areas and tribal areas: Level of basic farm mechanization low; continued pressure on labour prices
- **Agronomic practices** – for tribal areas: Reach and quality of govt. extension services poor

### Key policy & govt. considerations

- **Seeds**: High HYV subsidies available only to OSSC crowding out private sector
- **Market access**: Inefficiency and ineffectiveness in govt. procurement mean many farmers do not receive MSP
- **Milling**: State govt. regulations driving large informal market. However, under BGREI*, govt. is offering a 50% subsidy for setup of rice hulling operations

*BGREI: ‘Bringing Green Revolution to Eastern India’*

### Interventions

**Sign overarching MOU with State Government to drive integrated set of interventions**

**A. Seed commercialization**
- Facilitate entry of private sector into HYV seed distribution (e.g., seed subsidy given to farmer v. OSSC)
- Provide technical assistance to OSSC to fast-track commercialization of new HYV & stress-tolerant varieties

**B. Integrated package of practices model**
- Support program design of govt. extension services—maximize effectiveness of govt. spend through identifying interventions with highest ROI
- Pilot more cost-effective and scalable extension models leveraging ICT

**C. Procurement capacitation, reg. reform and vertical integration in aromatic rice (niche) market**
- Improve efficiency and reach of procurement mechanisms to improve farmer price realization; Expand storage capacity
- Formalize informal market via regulatory reform, allowing greater transparency and disintermediation
- Facilitate setup of farmer/ FPO-owned rice hulling mills for aromatic rice, to also be marketed and distributed by the mills

**D. Mechanization service provider model**
- Link entrepreneurial farmers to equipment manufacturers and provide them with training, support and access to credit to purchase equipment and rent it out to others
- Leverage existing govt. subsidy schemes
This set of interventions will address all key constraints identified

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Key policy constraint?

Key VC constraint – Tribal

Key VC constraint – Surplus

Seed commercialization

Integrated PoPs

Procurement capacitation, reg. reform & vertical integration

Mechanization service provider model

**Degree to which constraint addressed**

- [ ] Fully addressed
- [ ] Partially addressed
A broad-based MoU with State Govt. and independent Project Management Unit would be the best way to drive cooperation & capacity-building across multiple areas

### INDEPENDENT PMU ONE HIGH POTENTIAL ROUTE TO BUILD CAPACITY AND TRUST

- **Broad-based MoU** at State Govt. level would provide platform for co-operation
  - Ideally medium term engagement of ~5 years

- An independent **Project Management Unit (PMU)** consisting of professionals will provide technical, managerial and design support

- Initial focus on seed commercialization; can later expand to other areas (PoP program development, regulatory reform etc.)

### Potential PMU structure

#### Steering Committee
- Composed of senior govt. officials, BMGF officers, and value chain stakeholders (including farmer representatives)
- Cross-departmental/functional representation(Agriculture, Industries, Rural Development, Tribal Development etc.)

#### Project Management Unit ‘CEO’
- Professional (hired from the market) with experience in program management and strong private and public sector linkages

#### Project team
- Staffed by professionals (hired from market)
- Capability to do fact-based, hypothesis-driven diagnostics

### MOU USED IN U.P. TO FACILITATE CO-OPERATION ACROSS HEALTH AND AG.

- In Dec 2012, U.P. Chief Minister (CM) Akhilesh Yadav signed MoU with BMGF, following a meeting between Bill Gates and CM in May 2012

  “The objective of the initiative will be to engage with the Gates Foundation to provide technical, managerial and programme design support in maternal, neonatal and child healthcare, vaccination and other health and agriculture-related programmes, the state government has also promised to lend its support to the foundation’s initiatives to achieve shared objectives and to scale up best practices.”

  Senior U.P. Govt. Bureaucrat, Dec 2012
Donors should capitalize on Directorate of Agriculture’s interest in enabling private sector involvement in seed distribution

DIRECTORATE OF AGRICULTURE OPEN TO LEVELLING PLAYING FIELD ON HYV SEEDS

- High subsidies offered exclusively on OSSC-distributed seeds crowding out private sector in HYVs
- Directorate of Agriculture open to broadening subsidy availability to enable competition with OSSC
  - Directorate of Ag. possesses substantial certified seed stocks of its own, including stress-tolerant Sahbhagi Dhan and Swarna Sub-1
  - Has historically distributed them via OSSC or its own extension network
- Has recently expressed interest in entering into a PPP with a private sector player to distribute its seeds

“We’re keen to reform the input sector, especially seeds. We have substantial stocks of certified seeds – independent of OSSC. If a private partner wanted to procure seeds from us and distribute them through its dealer network, we’d happily facilitate this. Our back-up plan is to distribute them via NFSM or BGREI schemes.”

Director of Agriculture, Orissa

Source: Team analysis
Concurrently, they should offer technical assistance to OSSC, to enable it to become more competitive

**Production**
- Input into state seed strategy to fast-track mix shift
- Facilitate better linkages between OSSC and IRRI, CRRI
  - Ensure adequate supply of breeder seeds
  - Appropriate technical assistance
- Improve technical assistance to seed growers
  - Minimize quality issues
- Enhance quality control processes
  - Minimize leakage, side-selling

**Processing & certification**
- Increase capacity and improve technology at seed processing plants
  - Potential to co-fund with government via RKVY
  - Outsource to entrepreneurs?
- Enhance certification processes
  - Enable all farmers growing certified seed to sell seed as such and realize benefit

**Distribution & marketing**
- Capacitate distribution network
  - Both PACS and OSSC’s own dealer network
- Improve monitoring and tracking
  - Minimize leakage
  - Minimize counterfeit seed by developing low-cost technology to improve supply chain / chain of custody
  - Map demand patterns
- Speed up demand shift by increasing number of demonstrations of new varieties
  - Potential to co-fund with government via NFSM, BGREI

Source: Team analysis
Donors can also support State Govt. in maximizing effectiveness of government extension spend

**DEVELOP MOST EFFECTIVE EXTENSION MODELS FOR GOVT. FUNDING**

- Partner with State Govt. to maximize effectiveness of existing govt. extension spend through better targeting of resources
  - Government funds actual extension efforts (~90% funding); donor only funds program design (~10% funding)
- Design pilots to identify extension models with highest return on investment and scale most successful models
  - Identify which types of farmer training generate best and longest lasting results for each farmer segment
  - Program design, monitoring and evaluation can be carried out by embedded PMU
- Incorporate information and communication technology solutions to improve cost-effectiveness of extension
  - E.g. Digital Green’s human-mediated video model

**LEVERAGE KNOWLEDGE AND ACTIVITIES OF NGO’S WITH EXISTING SCALE**

- NGO’s could be potential partner for extension pilots
  - NGOs such as Pradan, Livolink already have extensive extension operations, particularly in tribal areas
  - However, have not conducted structured evaluations of comparative impact vs. cost of various programs
- Could also be involved as an extension service provider for government, particularly in tribal areas where government extension services are relatively weak

Source: Team analysis
Developing PACS and tribal co-operatives to assist with input delivery (seeds, fertilizer) could also be a highly leveraged play

**GOVT. ACTIVELY PROMOTING FPC’S, FPO’S…**

- **2002** amendment to Companies Act enabled incorporation of cooperatives as companies and created a new legal form, Farmer Producer Company (FPC)
- FPCs received new impetus when nodal agency SFAC (Small Farmers’ Agribusiness Consortium) announced intention to set up **200 Farmer Producer Orgs. (FPO’s)** covering ~200,000 farmers across India during FY 2011-12
  - Mobilization and institution building process are being executed by NGOs/CSOs in close collaboration with State Governments

“My government is committed to transforming the Primary Agriculture Cooperative Societies (PACS) as a one stop shop to meet all the requirements of the farmers under one roof.

Naveen Patnaik, Orissa CM, at East Zone Cooperative Conference, Sep 2012

**…AS WELL AS TRIBAL COOPERATIVES**

- Tribal Development cooperative Corporation (TDCC) was created to purchase tribal products at a fair and remunerative price and arrange for their marketing
- Paddy procurement agent in several tribal districts
  - 14 branch offices, 142 staff & 92 godowns with 37,701 MT capacity
- TDCC receiving significant govt. and donor funding e.g. Orissa Tribal Empowerment & Livelihood Program
  - Jointly funded by IFAD, DFID and UN World Food Program, in partnership with the Government of Orissa
  - Overall goal is to empower tribals and enable them to enhance their food security, to increase their income and improve overall quality of their livelihood
  - Total funding of ~91M USD over 10 years

**NEED TO IMPROVE CO-OP BUS. MODELS & EFFICIENCY**

1. Review co-operative incentives for procurement, input supply
   - Ensure they are driving right behaviour
   - Including adequate focus on tribal areas

2. Develop co-operative business models and business plans
   - Identify core strengths and activities
   - Paddy primary crop; strengthening paddy value chain in interest of vast majority of co-op members

3. Facilitate more transparent operating model
   - E.g. Constitution, reporting, roles and responsibilities

4. Provide support to execute on plans
   - Via NGOs/CSOs in collaboration with State Govt.

5. Facilitate financial and market linkages
   - E.g. NABARD, organized retail

Source: Lit. Search; TDCC website
In the longer term, opportunity to improve efficiency of govt. procurement & liberalize milling sector through regulatory reform

**IMPROVE EFFICIENCY OF GOVERNMENT PROCUREMENT**

- Improving efficiency and reach of procurement mechanisms will enable farmers to access government procurement points directly
  - Improved efficiency: Timely payments, reduced bureaucracy
  - Improved reach: Additional procurement centres, potentially through activating PACS

- **End-to-end computerization solution** was implemented with great success in neighbouring Chhattisgarh
  - Govt. of Chhattisgarh implemented an end-to-end computerization solution for its paddy procurement and PDS system in 2007
  - Enabled same-day payment to farmers and reduction of diversions in milling, PDS

- **Improve efficiency of storage management processes and expand storage capacity**

**FORMALIZE INFORMAL MARKET/ EXPAND MILLING CAPACITY**

- Encourage government to effect regulatory change to formalize informal market, leading to greater transparency and disintermediation
  - E.g. Allow millers to procure at or above MSP once they have fulfilled their custom milling requirements and mill 100% for open market
  - Highlight benefits (e.g., additional tax revenue) and develop risk mitigation strategy (e.g., auditing millers) to ensure farmers receive MSP and ‘mixing’ of rice does not occur

- Enabling regular functioning of private sector in milling will also create incentives to improve quality amongst both farmers and millers
  - Allow farmers and millers to tap growing market for high quality non-aromatic rice and capture price premium
  - Also make outgrower models / contract farming viable

- Avail of the 50% subsidy provided under BGREI to set up clusters of small farmer-owned hulling mills for aromatic rice; Package and market the rice to capture price premiums

Specific implementation plan for these initiatives to be developed after initial 3-4 years engagement with government, once trust is built and deeper diagnostic is complete

Source: Team analysis
Service provider model can be used to deliver mechanization solutions to smallholders

<table>
<thead>
<tr>
<th>SERVICE PROVIDER MODELS EFFECTIVE FOR SMALLHOLDER FARMERS</th>
<th>UNTAPPED OPPORTUNITY FOR PRIVATE EQUIPMENT PLAYERS</th>
<th>TIE-UP WITH GOVERNMENT TO AVAIL GENEROUS SUBSIDIES</th>
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</thead>
<tbody>
<tr>
<td>• Entrepreneurial service provider model</td>
<td>• Opportunity to create specific service provider</td>
<td>“Orissa has embarked upon an ambitious programme of farm mechanization. During this year alone, the State Government is likely to popularize about <strong>14,000 power tillers, perhaps the highest</strong> for any State in the country. In addition to equipment like power tillers, tractors and power threshers are also being promoted.”</td>
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<tr>
<td>- Larger, progressive farmers buy equipment and rent it</td>
<td>- Create a specific service provider ‘module/package’ and market it to smallholder farmers/co-operative groups</td>
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<td>out to others</td>
<td>- Clear articulation of economics</td>
<td></td>
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<tr>
<td>• Co-operative-owned service provider model</td>
<td>- Provide package of business training and</td>
<td></td>
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<tr>
<td>- Similar model, but run by Primary Agriculture</td>
<td>technical support</td>
<td></td>
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<tr>
<td>Cooperative Society (PACS), self-help groups etc.</td>
<td>- Assist with credit linkages</td>
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A donor could bring together consortium of private equipment players to market and promote service provider models through their distribution network

Source: Primary interviews; Lit. Search
Economics are attractive for the service provider

The above analysis assumes a 10% ‘margin’ or down-payment required on total capital cost. All yearly profits are used to repay principal and interest until the entire loan is paid off. Analysis includes land-preparation and haulage rental activities.

Source: Primary Interviews, NABARD, Mahindra and Mahindra
If executed and scaled effectively, interventions could have a sig. productivity & income impact on ~5.5M households

TRIBAL AREAS^  SURPLUS AREAS

Note: *Assumes additional benefit from 'getting everything right'; ^Benefits calculated assuming farmers are producing for market.
Source: Primary interviews; Team analysis
Phased intervention approach will enable progressively deeper and broader cooperation with State Govt. as trust grows

Execute via broad-based MoU with State Govt. and independent PMU

A. Seed commercialization
Start immediately
1-3 years

B. Integrated package of practices
Build and scale
4-6 years

C. Farmer price realization via procurement efficiency improvement, regulatory reform, and vertical integration
Longer-term
7-10 years

D. Mechanization via service provider model

Source: Team analysis