



Social and Technical Implications in Improving Post-harvest Operations – linking value chain

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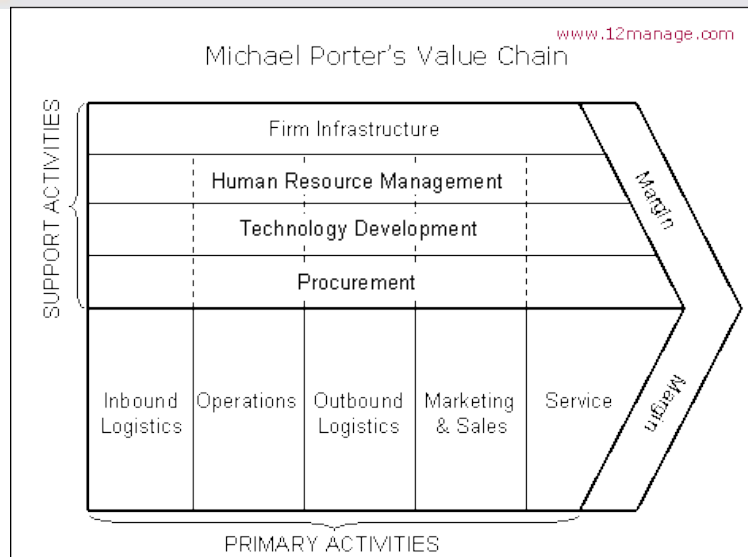
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What's Value Chain?


Michael Porter's Value Chain

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 Value Chain for Rice Farmers


- Inbound Logistics
- Operations
- Outbound Logistics
- Marketing and Sales
- Services




- Inbound Logistics
 - Land and resources
 - Seed and variety selection
- Operations
 - Crop management
 - Soil management
 - Water management
 - Pest management
 - Weed management
- Outbound Logistics
 - Processing
- Marketing and Sales
 - Product design

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 Where can farmers find margin?

- Less production cost
- High yield
- High farm gate price
 - Highly demanded variety
 - Less broken rice
 - Less damaged rice
 - Less foreign matters
 - Uniform moisture content



Farm work changes rice quality!



What Determines Rice Value & Quality?

- Processed (Parboiled, Pre-washed, Cooked, etc.)
- Taste
- Aroma (Flavor, Odor (negative))
- Brand (Variety, Place, Year, Organic, etc.)
- Color (Whiteness, Shining, Crystal, Red, Black, etc.)
- No external matters (Stones, husks, colored grains, other seeds, etc.)
- Single or Mixed Variety
- Sorted size (length)
- Ratio of broken rice
- Moisture content
- Damaged (cracked, insect bit, molded, etc.)



Rice quality = Market driven requirements

Can rice milling machines improve rice quality?



Does mechanization work for quality rice?

- Pre-harvest mechanization contributes mainly to labor productivity improvement, but also ...
 - Quick operation contributes uniform growth and timely harvest
 - Uniform planting depth contributes uniform growth
 - Timely harvest keeps grain quality
- Post-harvest mechanization contributes directly to rice quality improvement
 - Uniform moisture content
 - Less fissuring of grain
 - Uniform whiteness
 - Uniform size by graders and sorters
 - Removing stones and foreign materials
 - Milling mechanization can preserve whole grain



Harvesting Rice



Rice Drying in the Field





Threshing Operation



Drying Operation

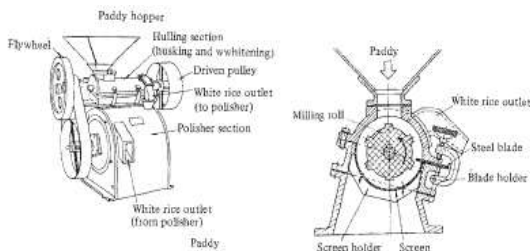






Social Aspects of Rice Post-harvest

- Why rice processing industry has successfully progressed in Asia?
- Why rice millers changed their mills from Engelburg type huller more improved one?
- The innovation took place as a result of competitive commercial transactions among private rice millers.



Development of milling technology

- A unit of Engelberg huller used both for husking and whitening.
- Two units of hullers, one for husking and the other one for whitening.
- Rubber role type husker replaced the husking machine.
- Air-blowing friction type whitener replaced the whitening machine.
- Two units of rubber-roll huskers successively.
- Use of paddy separator to eliminate un-husked grains.
- Two units of air-blowing friction type successively to reduce broken rice and better finish of white rice.
- Use of an abrasion type whitener to reduce pressure.
- Use of paddy cleaners, broken rice separators, graders, etc.



What happened by milling mechanization?

- It deprived rural women of job opportunities.
- Rural women released from drudgery work.
- Farmers attain commercially **higher value** white rice with **cheap milling charge**.
- Nation wide white rice marketing brings more homogeneous quality.
- Wide spread of small rice mills is a trigger for rural mechanization.



Mechanizing Pre- or Post-harvest Operations?

- The wage of farm labor is associated with those of non-farm labor regardless to its productivity.
- Preserving labor of low productivity to secure job opportunity cannot be realized.
- Co-existence of agriculture and other industries, farm operations will be mechanized.
- Mechanization of pre-harvest operations mainly improves labor productivity.
- Mechanization of post-harvest operations **improves the quality of products** and labor productivity.
- The performance of equipment has decisive influence over the quality of products with economic value.
- Post-harvest mechanization occurs if there is a difference in rice economic value in its quality even the existence of abundant farm labor.

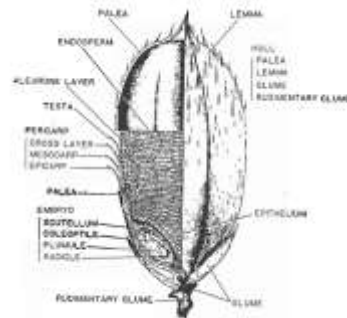


Rice Quality Matters



Manual Pounding vs Mechanical Milling

- Same Quality?
(Whiteness? Broken?)
- Milling recovery?
- What is the meaning of
“Postharvest loss?”





Timely Harvesting

- Too early = immature grains
- Too late = fissured grains
- High moisture content gives poor separation of grains from chaff

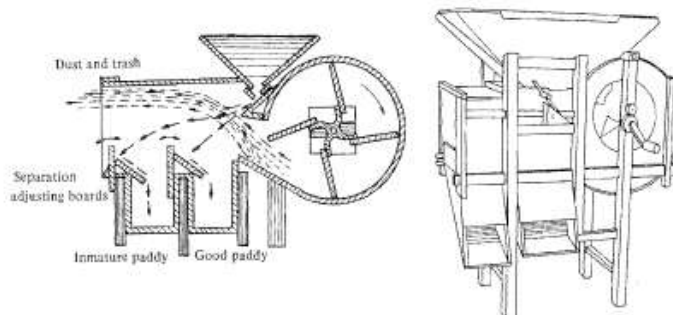


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Why cleaning paddy?

- To separate straw, trash, dust, and immature .



- To effectively use winnower, paddy should be dried well

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JICA Drying is a key to reduce fissuring

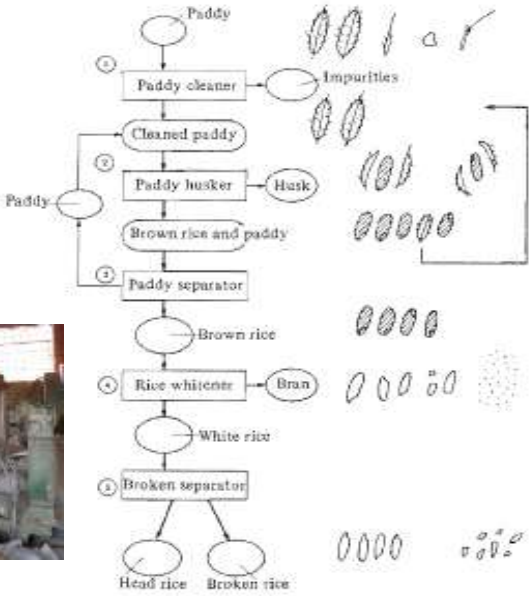





Slow drying and tempering

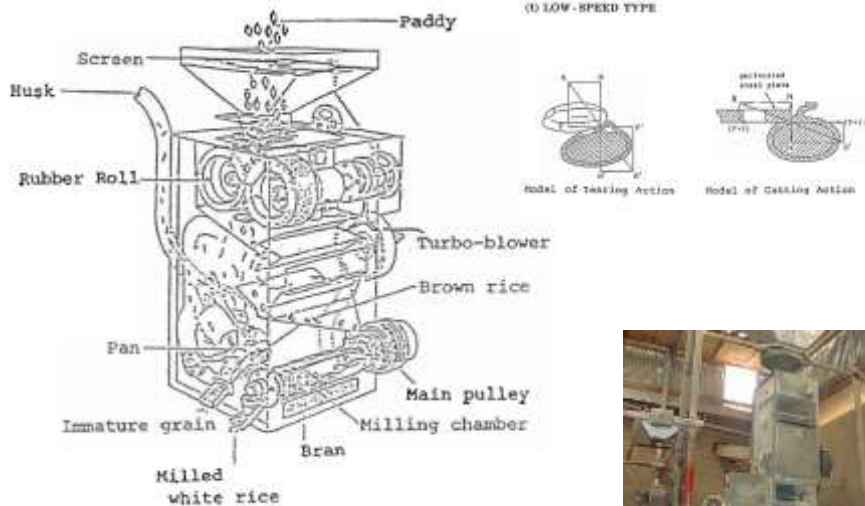
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JICA Process of Rice Milling



Milling machine combined with husker



Role of Government in Post-harvest

- Why too few rice mills?
 - Not profitable scale
 - Difficulties in energy source
 - Difficulties in services and maintenance
 - Difficulties in publicity
- Should we protect existing ones?
 - Promoting post-harvest industry
 - Regulating and controlling industry – **NO**
- Standardization of rice quality?





Broken Rice for Sale

- How much can we pay for head rice?



- 1700 UGX/kg for broken mixture
2000UGX/kg for head rice (June 2010)



Stone Free Rice for Sale

- How much can we earn from rice cleaning?

4,000Sh/100kg → 4,000,000Sh/100t

Can we buy a de-stoner?





How can we improve rice quality?

- Who determines the quality?
- Who pays for the improved quality?

- Can we change the quality?
- Who can change the quality?



Rice Industrialization

- Prices of agricultural commodities are remain low unless it is changed as food products.
 - Paddy is sold at almost same price regardless to the quality with different value.
- What can be changed if a farmer can sell milled rice to the market?
 - The farmer realize the rice quality and value.
 - The farmer buys machines to improve quality.
 - The farmer obtains skills and knowledge.
 - The farmer improves farming practices.
- Quality conscious farmers promote rice industry.



Future Alternatives for Farmers

- Farmer can change the rice quality only if the market pays for it.
- What post-harvest operation can be done by farmers?
- Post-harvest mechanization by farmers?
 - A group of farmers or individual farmer?
 - Own fund or external fund?
 - Opportunities and risks!



What can be done by the government?



“RICE IS LIFE”

