



Critical Factors For Promoting Mechanization

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What Prevents Agricultural Mechanization in Africa?

Farm Power Sources

Manual



Animal



Mechanical

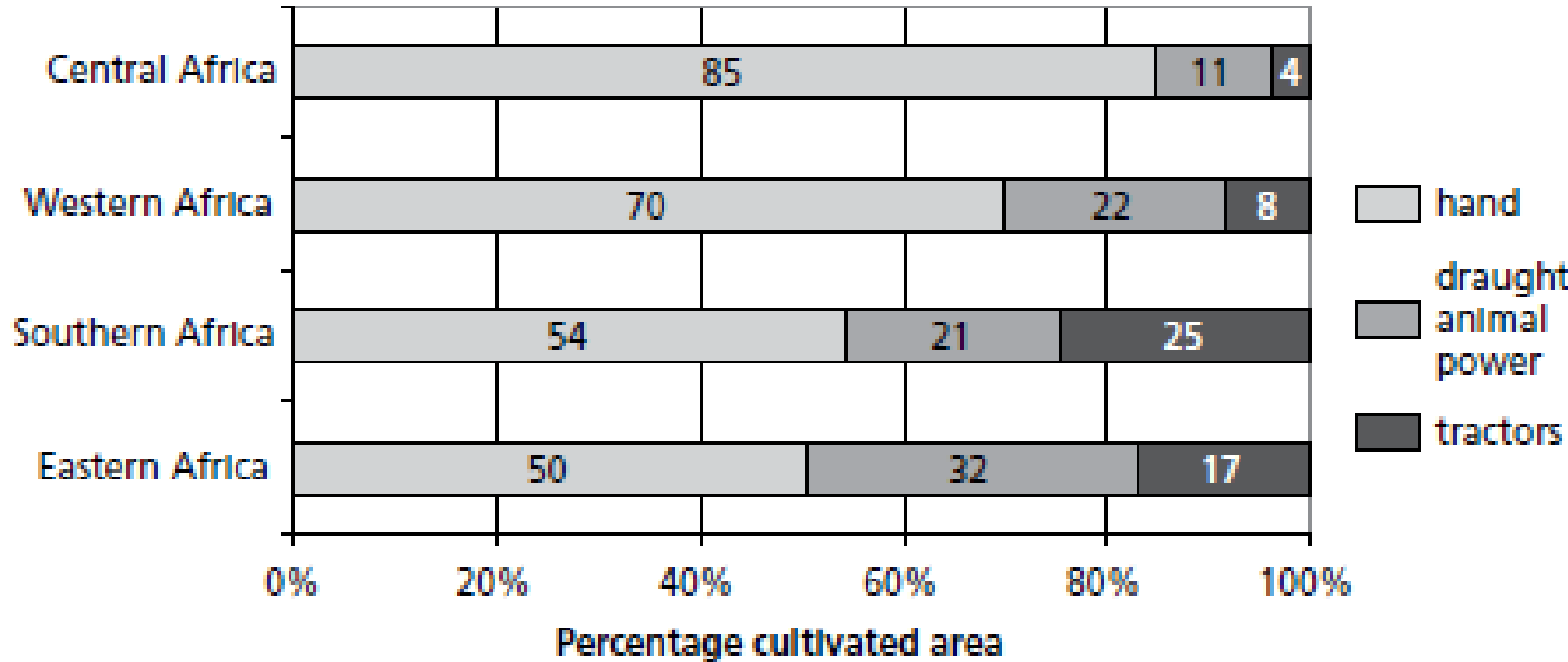


Mechanized technology is available.
Why people don't use mechanical power?



Share of Power Sources in Africa

Figure 7 Estimates of areas cultivated by different power sources by subregion



Source: Bishop-Sambrook (2001) based on FAO (2001), three-year average 1997–1999.



Proposed Farm Equipment Which Would Have Immediate Impacts

(AfricaRice Mechanization Workshop in Senegal in 2011)

- 2-wheel tractors 12-15hp
- Small 4-wheel tractors fitted with rubber and steel wheels
- Mechanical threshers (1-2t/h capacity)
- Small combine harvesters (0.5ha/h)
- Two stage rice mills(250-500kg/h)
- Row seeders





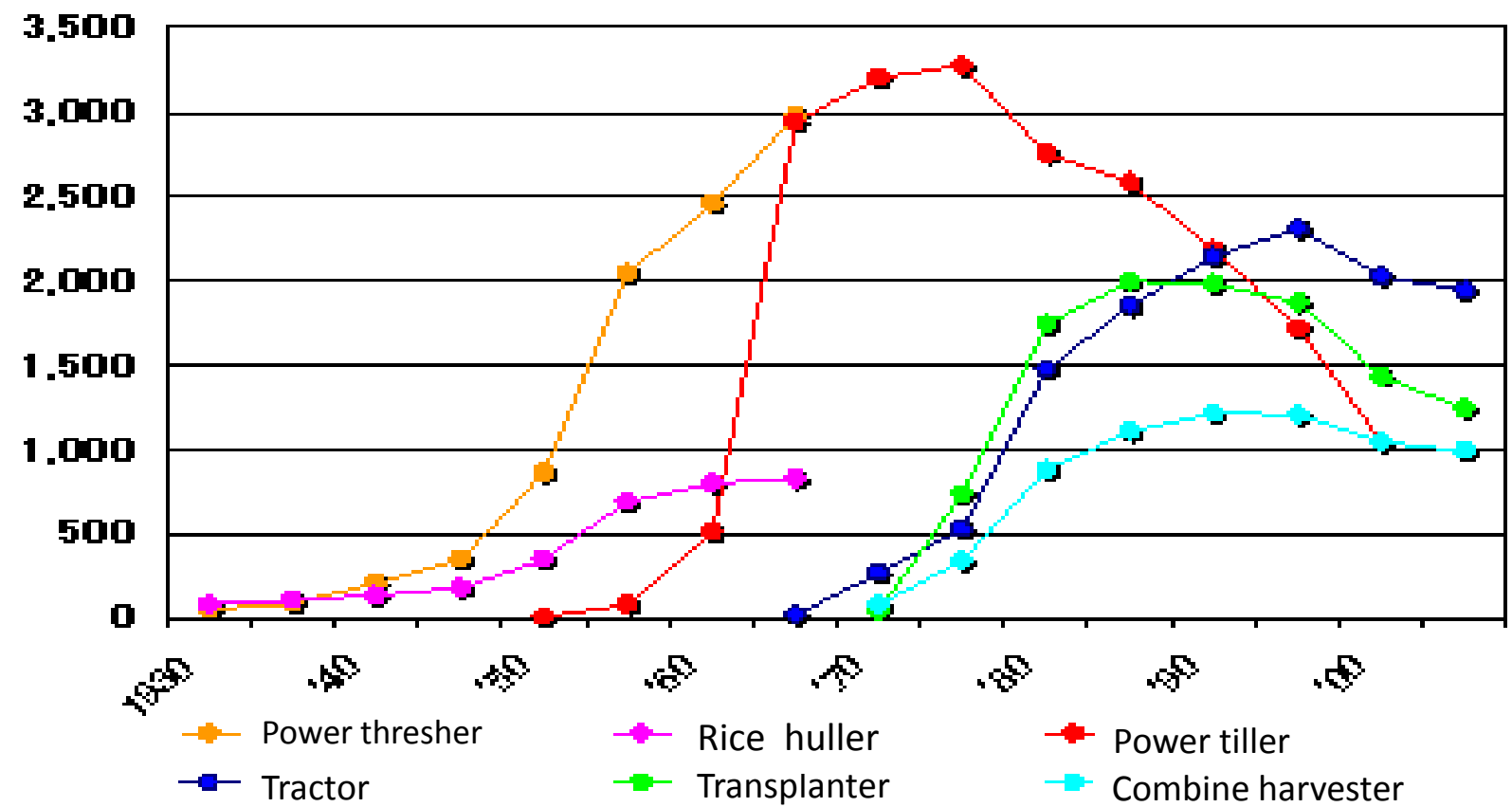
Why small machines are **not** popular in Africa?

- Availability of machines?
- Quality of available machines?
- Non-suitability to field conditions?
- What are the current practices in paddy field?
- Technical Factors
 - Man-machine system
 - Natural conditions



Trend of Major Agricultural Machinery on Farm in Japan

X 1,000 Units



<http://www.ifmma.or.jp/CCP050017.html>



Technical Factors for promoting Mechanization

- Appropriate machines?
 - Size (Engine, Implements, Weight, Width, etc.)
 - Durability (Heat, Sunray, Water, etc.)
 - Cost (Initial cost, Maintenance cost, Multiple use, etc.)
 - Quality (Warranty, GIS, HST, Air conditioned cabin, etc.)
 - Safety (ROPS, Belt Covers, etc.)
- Appropriate ownership?
 - Farmer-Owner-Operator
- Appropriate operations?
 - Operator's skill
 - Selection of implements
- Appropriate services?
 - Availability of spare parts
 - Preventive maintenance





Profitability is a key pre-condition for mechanization


- Profitable if mechanization?
 - Yes, you can mechanize.
- Large machines are too costly
 - You can start from small machines
- Even small machines have extra capacity
 - Recover cost by servicing other farmers
 - Reduce cost by using multiple purposes

Don't mechanize if not profitable!

This applies to all stakeholders.

If any stakeholder loses, the chain misses the link and mechanization will be stagnated.





Mechanization should be started from preferable places

- High agriculturally potential areas
 - Large areas where machines work more hours
 - High value production areas places with better market access
 - Places with better rural infrastructure
- Better service areas
 - Good access to maintenance work
 - Better spare-parts supply
- Scarcity of agricultural labor
 - High mechanization demanded areas
 - Places with human resources in mechanization, though





Enabling Factors for Promoting Mechanization (Japanese experience)

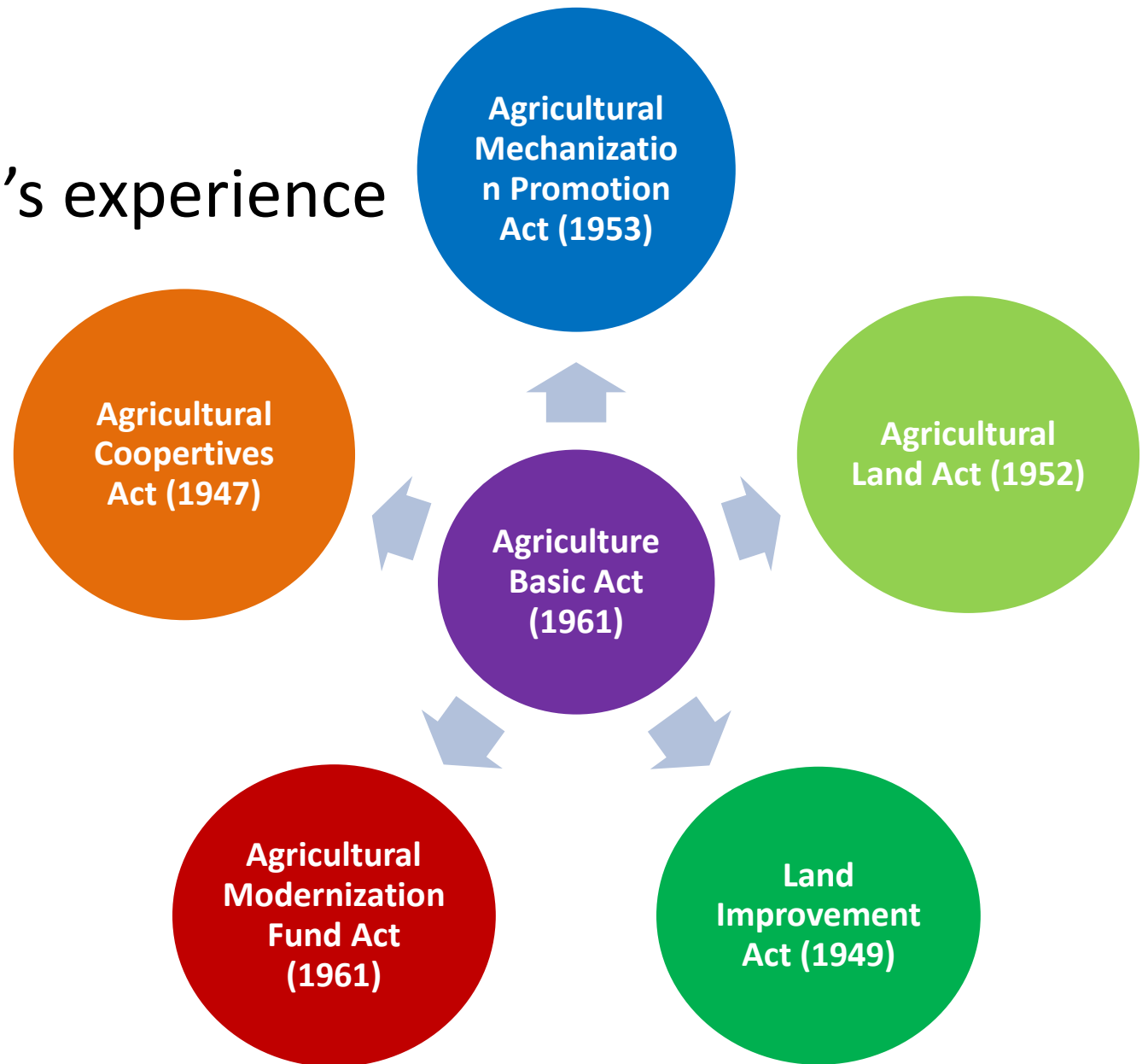
- Clear policy and strategy
 - Preferable subsidies for high quality machinery
 - Balance of imported and domestically produced machinery
- Legislative support
 - Agricultural machinery promotion act
- Machinery industry support
 - Human resources
 - Rural Infrastructure
 - Insurance
- Quality assurance
 - Certification and standardization
 - Warranty for consumer protection
- Financial support
 - Loans with machinery as collateral





Mechanization and Legislative Actions

- Japan's experience





Japanese History and Agricultural Administration

Year	Socio-economic movement in Japan	Agricultural Administration
1942	End of World War II Agrarian Reform and Food production increase	Stable Food Control Act
1945		
1947		Agricultural Cooperative Act
1949		Land improvement Act
1952		Agricultural Land Act
1953		Agricultural Mechanization Promotion Act
1961	Tokyo Olympics Over 1 million farm labor turnover Japanese GNP became world No.2 Land price increase by Industrialization Depopulation in rural area	Agriculture Basic Act, Agricultural Modernization Fund Act
1964		
1967		Self sufficiency of rice
1968		Revised Land Act, Act on Establishment of
1969		Agricultural Promotion Regions
1971	Nickson shock (floating exchange rate)	Controlling rice production (reduced area)
1974		Revised on Agricultural Promotion Regions
1993	GATT Uruguay Round Globalization	
1995		Abolition of Stable Food Act
1999		Food, Agriculture and Rural Areas Act ¹³



Agricultural Mechanization Promotion Act (Roles of Government in Japan)

1. National government
 1. Disclosure of agricultural machinery certified by the Government
 2. Guidance of traded agricultural machinery through Agricultural Machinery Retailers
 3. Disseminate above information to district offices
 4. Coordination of selection process of machinery
2. District government
 1. Form a meeting to disseminate information
 2. Instruction to farmers through Retailers
 3. Coordination of selection of agricultural machinery
 - Making 5-year agricultural machinery utilization plan
 4. Building capacity of instructors for safety use of machines
3. Municipality
 1. Provide access points for farmers and farm producer organization





Stakeholders in Supply Chain





Agricultural Machinery Industry related Associations

- Agricultural Mechanization Assosiation
- Farm Machinery Manufacturer's Association
- Machinery Exporters Union
- Agricultural Machinery Retailers Union
- Agricultural Machinery Bank
- Certified Agricultural Machinery Technicians Association






Quality Assurance and Safety Inspection by Agricultural Machinery Institute

- Institute for research, development and improvement of agricultural machinery, and for testing and evaluation
- Any alternative?
 - Regional Network for Agricultural Machinery
 - Use of test results from qualified institute in other countries



<http://www.naro.affrc.go.jp/english/brain/organization/department06/index.html>



Past interventions and experiences by governments and donors in developing countries

- Subsidized delivery of machinery to farmers
- Importation of agricultural tools, implements and powered machines with tax exemptions
- Promotion of tractor hiring services
- Repair maintenance by machine dealers and entrepreneurs
- Development and production of simple machines
- Education and training of engineers, technicians, extension workers, operators and farmers
- Provision of commercial financing and soft loans
- Regulatory work and standardization



Don't Dos by the Government

- Direct import of agricultural machinery by the government fund or ODA
- Free or highly subsidized distribution of agricultural machinery
- Supply of machines to weak farmer organizations
- Promotion of machines with group ownership
- Importation of poor quality agricultural machinery
- Importation of machines that can be produced domestically
- Protecting or regulating existing agricultural industry
- Any government support without exit strategy



Stakeholders and Enabling Environment

Stakeholders	what to do	Enabling environment needed	Enabling environment that government can provide
International makers	<ul style="list-style-type: none"> ▸ Quality assurance, including warranty on exported machinery ▸ Reliable supply of spare parts 	<ul style="list-style-type: none"> ▸ Large scale market Reliable dealerships 	<ul style="list-style-type: none"> ▸ Policy & strategy on mechanization (MOA) ▸ Test & evaluation, safety inspection and certification of quality of machinery (MOA) ▸ Tax incentives / reduced import tariffs (MOT)
Importing agents	<ul style="list-style-type: none"> ▸ Adequate stocks for immediate delivery ▸ Local assembling 	<ul style="list-style-type: none"> ▸ Quick issue of L/C ▸ Swift custom clearance 	<ul style="list-style-type: none"> ▸ Tax incentives (MOT) ▸ Swift custom clearance (MOT)
Domestic makers	<ul style="list-style-type: none"> ▸ Ability to produce machineries (engineering standard) at reasonable cost ▸ Quality control and warranty of products 	<ul style="list-style-type: none"> ▸ Reduced import duties for raw materials, ▸ Engineering standard ▸ Loans ▸ Delivery network 	<ul style="list-style-type: none"> ▸ Reduce/waive tariff for raw materials (MOT) ▸ Engineering standard (MOI) ▸ Industrial area for SME (MOI, Local Gov't) ▸ Provide Infrastructure (MOI, Local Gov't) ▸ Provide tax holidays for SME (MOI) ▸ Intellectual Property Rights (MOI) educed ▸ Credit facilities for (MOC, MOI)
Dealers	<ul style="list-style-type: none"> ▸ Repair service ▸ Stocks of spare parts ▸ Operator training ▸ In-house credit 	<ul style="list-style-type: none"> ▸ Two step loans and soft loans ▸ Large scale market 	<ul style="list-style-type: none"> ▸ Soft loans (MOI, MOF) ▸ Mechanization promotion (MOA)



Private-Public-Partnership (PPP) Role of Government

Actors on supply chain	Check list - what they have to do (related to capacity needs)
Ministry of Trade (MOT)	Import tariff exemption for agricultural machinery, spare parts and raw materials, Tax reduction on importers, Distribution network for spare parts
Ministry of Industry (MOI)	Engineering standard, Quality control, Training on technicians, SME promotion on agricultural machinery,
Ministry of Commerce (MOC)	Rice quality standard, Rice miller association, SME promotion on agricultural machinery
Ministry of Agriculture (MOA)	Policy & strategy on agricultural mechanization, Agricultural mechanization promotion act, Statistical data on agricultural machinery, Agricultural credit, Farmer organization, Agricultural input subsidies, Extension services, Operator training
Agricultural machinery R&D institute	Safety Inspection, Test & evaluation, Certification, Training for local artisans
Universities	Qualified agricultural engineers



Conclusion



1. Profitability is the most important key for mechanization = Don't mechanize if not profitable
2. Enabling environment to promote agricultural mechanization should be specified for each country
3. Functional farm machinery supply chain = All stakeholders in the chain should gain a certain profit for sustainability
4. Mechanization should be started from postharvest operations that has high value-addition, then followed by field operations
5. Public sector has more important roles to lead agricultural mechanization with sound competitiveness in the private sector through PPP, especially at early stage of mechanization
6. Long term vision and exit strategy are needed to promote sound agricultural mechanization in Africa



Mechanizing Agriculture in Africa



For Better Livelihood of Farmers