

Training Workshop on Sustainable Mechanization for Smallholder Farmers in Asia and Africa in Support of the Sustainable Development Goals



12 – 18 May 2019, Nanjing, China

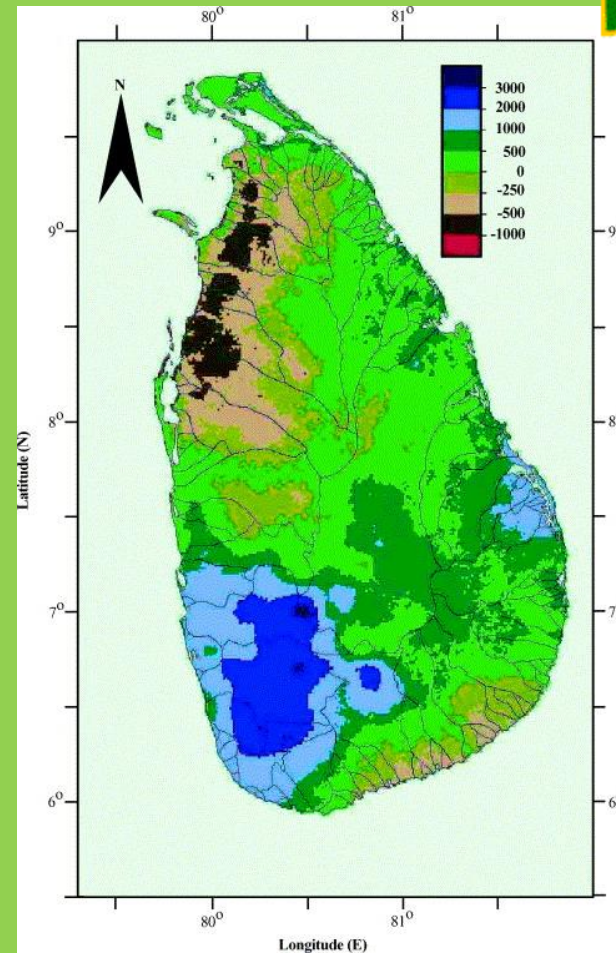
Nadeesh Ekanayake

Technical Assistant

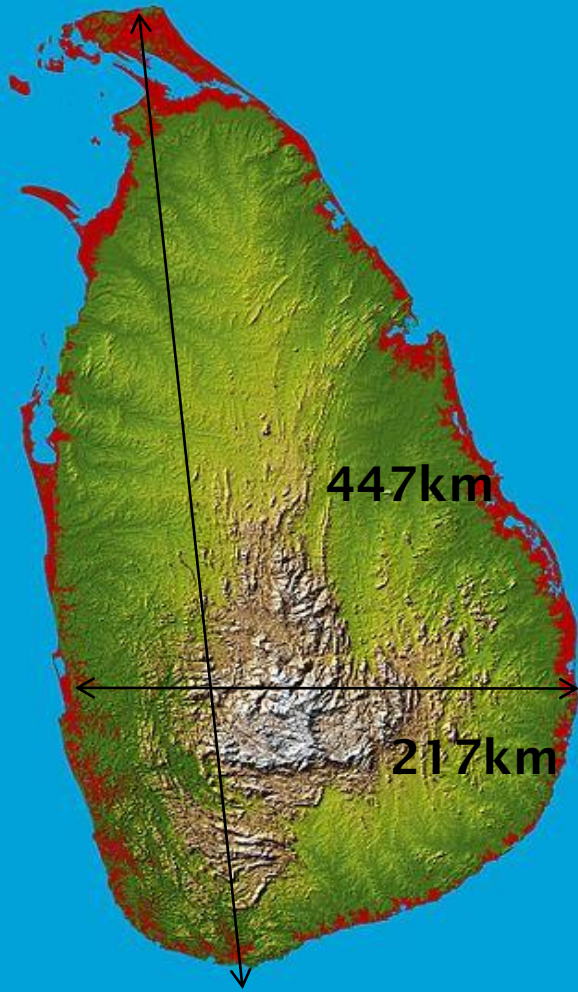
Department of Agriculture

Srilanka

GEOGRAPHY



05. 50' to 09. 75' North Latitude
79. 50' to 81.75' East Longitude



Total Area : 65,610 sq. km

Land : 64,740 sq km

Water : 870 sq km

Coastline : 1,340 km

Topography : Mostly low, flat to rolling plain

Mountains in south-central interior

Elevation Extremes:

Lowest point : Indian Ocean 0 m

Highest point : *Pidurutalagala* 2,524 m
mountain



FARM AGRICULTURE MECHANIZATION, IN SRI LANKA: ITS GROWTH AND CONSTRAINTS



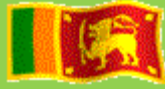


HISTORICAL BACKGROUND

Agro climate: two Zones: Dry (2500mm)

- **Peasant agriculture: Historically irrigated rice cultivation and slash and burn agriculture mostly in the DZ. Goes back to 3 centuries BC.**
- **Since 16th Century foreign colonization WZ dominated by plantation crops and DZ neglected .**
- **Since 1940's with restoration of DZ irrigation systems and transfer of people from the WZ, peasant agriculture in the DZ restored.**

Past Mechanization Policies (1940- 1977)



- **At the beginning mechanization limited to irrigated rice farming: use of machines in non-rice cultivation was limited since, it was mostly slash and burn type**
- **To popularize mechanization: formation of state run tractor pools for hire, hire services by cooperative societies, preferential import duties, low interest credit. 4 WT use for rice cultivation became popular beginning 1940/50s.**
- **Use of two wheel tractors started in late 1960's**

Change to a liberalized economy from late 1970's, gathered momentum



- **Demand for machines increased in late 70's for other Field crops**
- **Labour migration to service and manufacturing sector.**
- **Youth reluctant to engage in agriculture**
- **Other Field crops (OFC's) allowed in irrigated lands, during minor season (yala), & Slash and burn ("chena") outlawed, resulting in the beginning of mechanization for OFC**
- **Achieving rice self sufficiency by mid 2000.**
- **Increased emphasis on other field crop production.**



- **Resulted in increased demand for mechanization for non-rice sector as well.**

- **But no concessions in terms of taxes etc. for mechanization since late 1970's. But increased use of 2wt for both rice and OFC's 1940- 1950 1960 1970 1980 1990 2000 2010 2015 4wt Introduced/imported since late 1940's and continue to today. Earlier mostly**



TIMELINE OF CHANGES IN MECHANIZATION

	1940	1950	1960	1970	1980	1990	2000	2010	2015
4WT	Introduced/imported since late 1940's and continue to today. Earlier mostly European makes, presently mostly, Indian, Chinese machines. For both ploughing and threshing (wheel treading) of paddy lands. Since 1980, It has been used to plough OFC fields as well.								
2WT				Sri Lankan Designed British Land Master introduced in later 1960's. Thereafter Japanese, Chinese, Indian makes became very popular. Used for ploughing, transportation, threshing etc.					
Threshers (rice)/winnowers				2wt driven threshers for paddy introduced in 1970's. FMRC designed and locally manufactured.					
Threshers (OFC)							From early 2000, green gram and maize threshing machines introduced.		
Combine Harvesters								Introduced for paddy after the war ended	
Water pumps				Mainly driven by 2wt engines introduced in 1970's and has been used extensively since 2000 for OFC's.					



Cumulative Registrations of Tractors



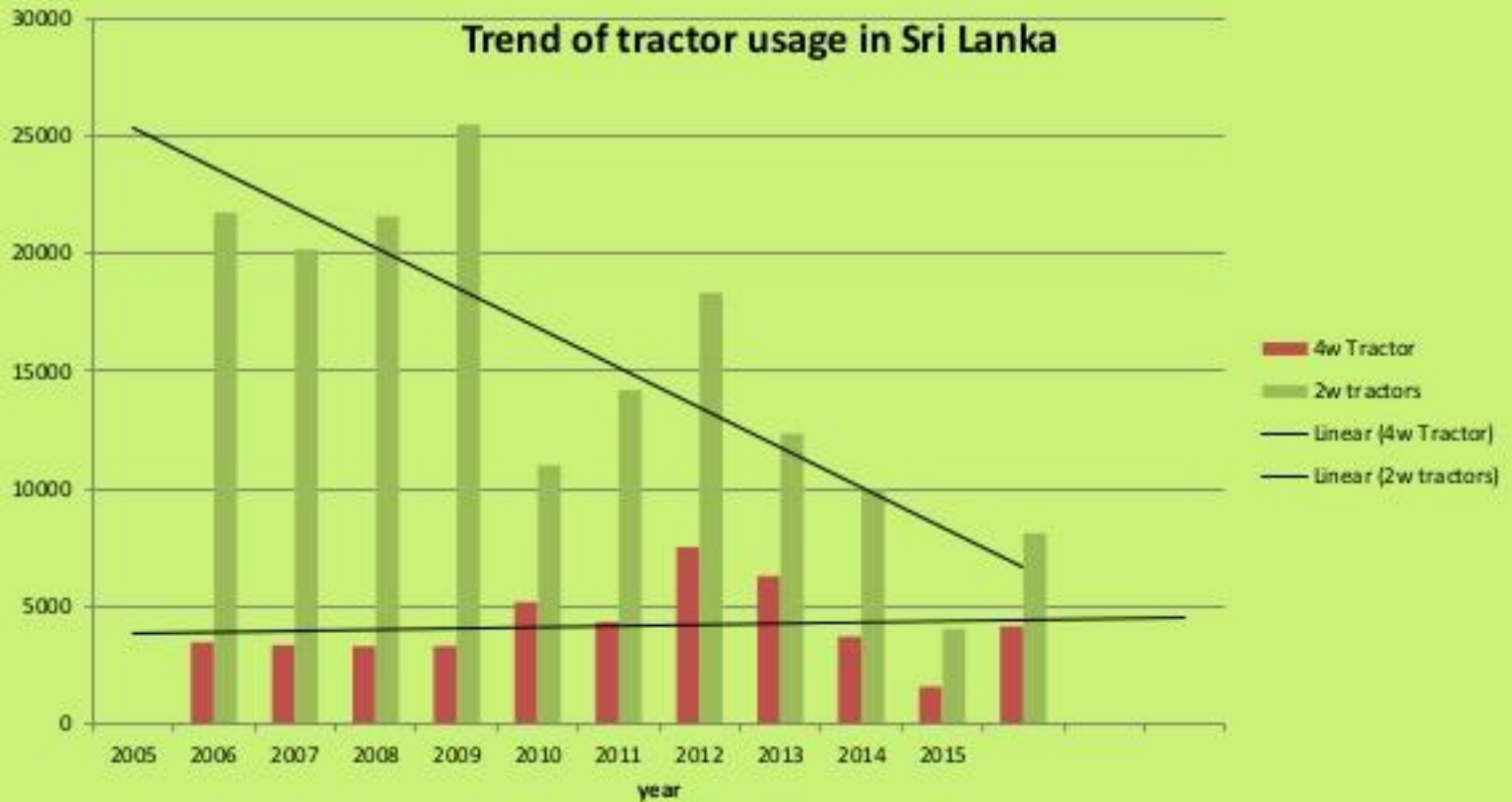
Tractors Imported 2005-2015



Tractor imports											
Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
4w Tractor	3472	3351	3308	3308	5175	4338	7519	6291	3709	1580	4156
2w tractors	21758	20199	21603	25503	10993	14200	18336	12344	9990	4049	8109
Total		25230	23550	24911	28811	16168	18538	25855	18635	13699	12265
Registered			21346	34357	13751	17363	20073	18450	17772	7070	9977
Total Registered			221326	245683	259634	276997	297070	315520	326292	333362	343,263



Trend of using tractors





Annual sales of farm Machinery

Year	2 wheel tractors	4 wheel tractors	Combine harvesters	Sprayers	Trans planters
11/12	14,445	7184	2160	26093	N/A
12/13	9,664	5141	1099	6240	23
13/14	2783	1479	N/A	N/A	87

Source: Bandara (2013)

DRIVERS FOR MACHINERY USE IN RICE CULTIVATION



- **Introduction of tractors for rice cultivation since 1940's**
- **Machines (4wt & 2wt) easily could be use for both plouging and threshing.**
- **Large extents of contiguous lands in the eastern province enabled use of combine harvesters.**
- **Labor shortages met with mechanization.**



MACHINERY USE FOR OFC

Positive drivers:

- a. Labor wages: Driving Force**
- b. Technology: maize (high yielding variety)**
- c. Cropping system: Mono crop/chena mixed crop, and banning of Forest clearing.**
- d. High Value crops: maize**
- e. Versatility of 2 wt (use indifferent terrain, different uses: ploughing, seeding, threshing, winnowing, transportation, pumping water)**



Constraints

- **Import policies: Mung bean (quality and prices)**
- **Terrain: Hilly areas, sparsely used**
- **Different requirements: Lack of precision /Risk averseness**
- **Awareness about machinery**

DRIVING FORCE FOR MECHANIZATION



- **Unwillingness of Youth:**
 - **drudgery, low social status, higher educational qualifications, migration, diversification of economy**
 - **Labor wages rising: approx. Rs 1000/day (Rs 20/day in 1980)**
 - **Labor, Land ratio: Decreasing favor mechanization**
- I. **Arable land (He/person) Constant at 0.06 over the period, 2001 to 2015 (World Bank, 2016), but the population engaged in agriculture has reduced to 27% in 2016 compared to around 53% in 1953(DCS, various years).**
 - II. **Increasing ageing population: 2001 it was only 10.2 %, 12% in 2015, but by 2051 it will be 55.8%**
 - III. **Female labor less use: opportunities for employment outside**

KINDS OF MACHINERY AVAILABLE



- **Manufactured locally (Accessories)**
- **Imported, modified or fabricated versions of imported equipment and**
- **Imported equipment modified by innovative farmers themselves to suit their needs.**

Of this, imported machinery are in the majority

- **Seeders: The FMRC, has introduced three types of seeders for field crops which are either manually or tractor driven. Several local manufactures have produced these and are been sold to farmers.**
- **Threshers: Several threshers have been introduced by the FMRC as well as imported types are available. In many instances, farmers themselves have modified to suit their needs. But unfortunately these modified machines are not produced in large scale, mainly due to the small market in the country.**
- **Multiple crop thresher**
- **2wt operated Maize thresher**
- **4 wt operated maize thresher**
- **Finger millet thresher**
- **Combine harvester altered**

Import/purchasing Policies: Earlier there were incentives, presently no. New Govt. proposed some positive policies.

- **Concerns of Quality and need: (land classes, operations and types of crops, harvest losses)**

1. **Need for imports of quality tested machinery.**

2. **The need for regulatory mechanism for imports.**

3. **Legislative Provisions to safe guard all ; producers, suppliers and farmers**

- **Ownership: mostly private ownership, Farmers Concerns: distribution skewed, hire rates and availability not efficient.**

Concerns of owners who hire:

- a. **Lack of awareness by farmers,**

- b. **very high competition (in certain areas large numbers concentrated , hiring rates reduced and low profit margin.**

- c. **introduction of new technology (Track type combines are preferred over wheel type),**

- d. **involvement of middle men (brokers).**

- **Local manufacturing: Concerns**

- a. **Small market,**

- b. **low tax imports; cannot compete,**

- c. **Testing/certification takes time,**

- d. **lack of skilled labor,**

- e. **risk averseness of farmers on new technology.**

FACTORS CONSTRAINING THE HIRE MARKET



- **Larger machinery: combine harvesters and 4 wheel tractors are mostly owned by large farmers and businessman.**
- **Distribution and availability not in the best interest for the hire market.**
- **Hire services by cooperatives or state owned enterprises have not been very successful in the past.**
- **Needs methods to increase awareness.**

How best the limited machinery available of the required quality can be hired out at reasonable costs ?

Better organized hiring service need to be introduced, through: individual or group ownership, PPP Models, soft loans to hiring centers, and training of operators.



WAY FORWARD: POLICY INCENTIVES

The Vision 2025: Policy Statement of The Government:

- **Promote agri-business development and establishment of large scale agro-enterprises and creating the background needed to enter the global value chain system and an incentive structure for SME agri-businesses.**
- **Promote private sector participation and PPP's where ever possible. Encourage small and large farmers and enterprises to participate in the global economy**
- **Tax holidays for new technology (ex. drip irrigation, green houses, tax removal for mechanization).**

Hence, all these are incentives for mechanization, where value addition is emphasized.

ADDITIONAL ASPECTS



- **Small Farms:** Though consolidation is desirable, small farms will exist, showing the importance of small machinery. (support schemes, importance of owning land, farm income supplemented)
- **Youth aspirations:** Mechanization is an attraction: better social status, higher wages, less drudgery
- **Gender.** Release females for other productive employment, but need skills development and opportunities.
- **Productivity:** better synchronization, incorporation of organic matter
- **Environment:** soil compaction is an issue with large machines.
- **Others:** Additional time to repair bunds, crop loss due to mechanical harvesting by large machines

CONCLUSIONS



- **Demand side: drivers: Labor wages, Technology: (high yielding variety), Cropping system: Mono crop/chena mixed crop, and banning of Forest clearing, High Value crops, Versatility of 2 wt.**
- **Constraints: small holdings, low market value of crops, low productivity of crops, hilly terrain, unavailability of precision machines, and unawareness about the available technology, had constrained the increased use of mechanization. Supply side: low quality imports a major issue. Machinery production is constrained by policies of low taxes on imports, lack of skilled workers, and the small market for machinery.**
- **Machinery mostly owned by individuals, mechanisms are needed to increase the hire market, which is constrained by factors such as, lack of awareness on technology available, spatial concentration, ownership more skewed towards large land owners resulting in an uncompetitive hire market.**
- **The new government has acknowledged these problems, and have formulated a policy to address many of the issues, especially with regard land holding size, worker skills, incentives for SME Industries and technology development.**



THANK YOU...