An Overview of Agricultural Mechanization in Sub Saharan Africa

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Outline of the Presentation

- *Introduction : The Agric. Mechanization Process*
- Recap on the Evolution of Mechanization in SSA
- *Current Status of Agric. Mechanization in SSA*
- *Some Observations and Lessons from the Past Experience*
- Concluding Comments

The Agricultural Mechanization Process - 2

- The role of **farm power** in increasing agricultural productivity globally first hypothesized in 1965 by Prof. Giles:
  - *Farm power with fertilizers, improved seeds[HYVs], irrigation and pesticides - are interdependent for growth in agricultural productivity and overall growth*
  - *Success of the GR of 1970s in Asia attributed mostly to use of HYVs; fertilizers and irrigation and the role of farm power not factored in*
- Mechanization experience from USA & Europe during 1925 – 65:
  - According to Smith(2000) the tractor was the ***"Unsung Hero"*** of 20th Century USA economic growth – replaced 24 million draft animals during 1925 to 1955.
  - *Similar developments occurred in Europe between 1945 and 1965 which were significantly assisted by the USA funded Marshall Plan*
- At independence in 1960, the advent of mechanization in developing countries of Asia, Africa & LAC was then equated to 'tractorization' was taken for granted by most development experts & politicians

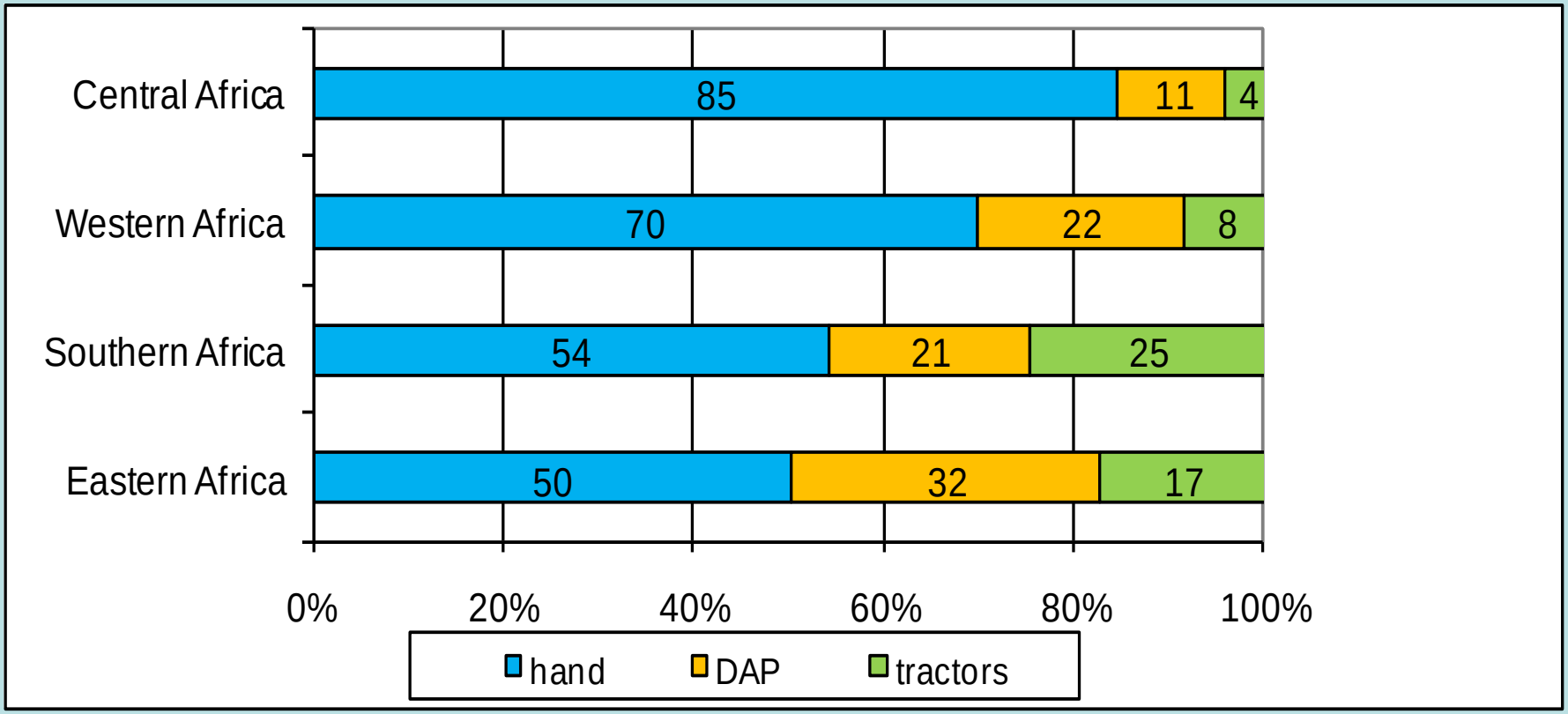
The Agric. Mechanization Process - 3

- Assumed use of tractors would become widespread through
  - *Direct ownership of tractors by farmers*
  - *Or through hire services owned by the public or private sectors*

- Asia had several centuries experience of using draft animal technology [DAT] and the farm power debate was on:
  - *Replacement of draft animals in field operations*
  - *Increasing use of electrical/diesel pumps in irrigation*
  - *Post-harvest processing equipment – threshers etc.*

- Sub Saharan Africa [SSA] situation was different:
  - *Large parts of SSA tsetse infested – difficult to keep livestock except southern part or in pastoral areas - crop production dominated by cutlass and hand hoe cultivation*
  - *Debate was on whether SSA could leapfrog DAT stage and move directly to mechanical power e.g. tractors [Dummont, 1966; de Wilde, 1967; Kline et al 1969 & among others]*
  - *Political desire for rapid mechanization supported throughout SSA*

Sources of power for primary land preparation in SSA



Source: FAO 2001

Evolution of Agricultural Mechanization in SSA -1

- ***History of agricultural mechanization from Colonial period***
  1. **Before 1930 –** Largely hand tool technology – slash & burn and introduction of Draft Animal Technology [DAT] in drier parts
  2. **1930- 45: –** ***Expansion of DAT use*** and introduction of cash crops – mostly perennial – coffee, sisal, tea and annual cotton with DAT.
  3. **1945–60: –** Four–wheel tractors introduced:
     - Great Groundnut Scheme of 1945 to 51 – over 3 million acres mechanized production oilseeds in Tanganyika, Botswana; Ghana and Nigeria – FAILED
     - ***Commercial farming by White settler farmers and African medium scale farmers: Kenya; Zimbabwe; Zambia; Tanganyika; Malawi***
       - » *Cultivation of cash crops and cereals; Subsidies provided*
       - » *Swynerton Plan in Kenya – consolidated surveyed small farms of about 10ha in Kenya Highlands – mechanization important*
       - » *Yoeman Farmers in parts of the colonies – medium commercial scale growing food and cash crops for the market*

Evolution of Agricultural Mechanization in SSA -2

- **Tractor numbers in SSA increased from 23,000 in 1950 to 47,000 by 1960 *cf.***
  - ***India had 9,000 in 1950 and 31,000 in 1960 and***
  - ***South Africa had 48,000 in 1950 and 148,000 in 1960***
  - ***China had 1400 in 1950 and 116 in 196***

4. After independence – First phase 1960-85:

A lot of excitement during period 1960-85: to expand on Mechanization:

- Settlement scheme based on Kibbutz model in Israel established in Ghana; Tanzania; Nigeria ; Uganda were established all over the continent with high mechanized inputs;
- Government tractor hire services [THS] established in many countries to offer services to small scale farmers
- **Block Farms where fields were consolidated into larger blocks and mechanization services offered through cooperative tractor hire services**
- Communal /socialist experiments in agricultural production in some countries e.g. Tanzania; Guinea; Ghana; Mozambique but not successful

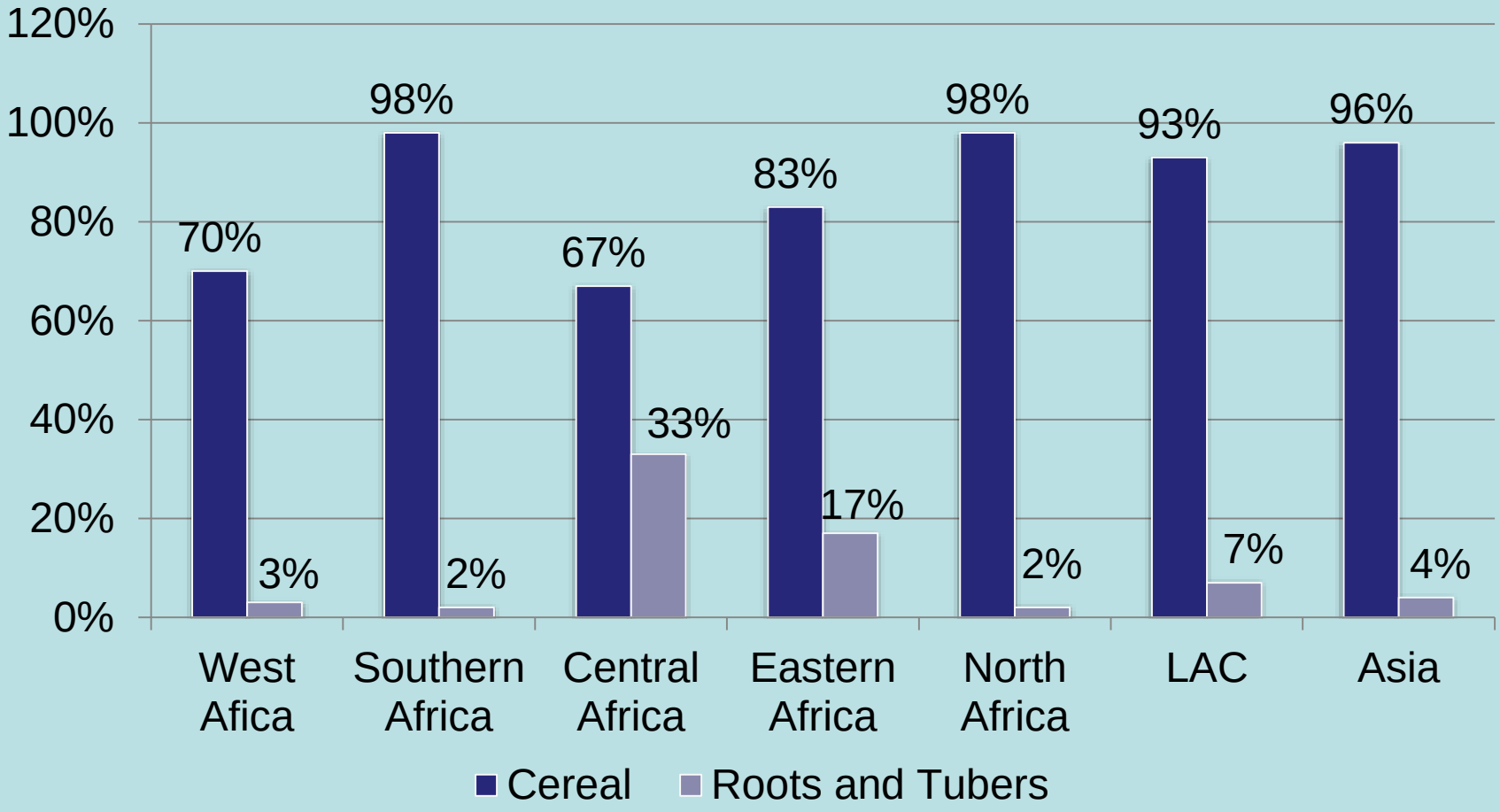
Evolution of Agricultural Mechanization in SSA - 3

- Manufacturing of tractors and farm implements established in some countries e.g. Nigeria; Tanzania etc. mostly in assembling of SKD parts
- DAT promoted in some countries especially drier areas but also in the humid zones focusing on cultivation of cash crops – success limited to drier parts
- **Impact of these early efforts of first quarter century after independence [1960-85] include:**
  - No. of Tractors in use in SSA [excluding South Africa] increased from 47,000 in 1960 to 70,000 by 1970 and 112,000 by 1980 [cf. data for India for 1960, 1970 and 1980 were 31,000; 148,000 and 393,000 respectively]
  - Land preparation by tractors in SSA by 1985 remained low about 10% while DAT was used in about 15% and hand-hoe on 75%
  - Government operated tractor hire services [THS] failed although no of tractors under Government THS not more than 10% of total no. in use
  - Graveyards of broken down machinery had significant impact on thinking on mechanization in the development community e.g. *False Start in Africa* by French Sociologist Rene Dumont quite influential

Current Status of Agric. Mechanization in SSA - 1

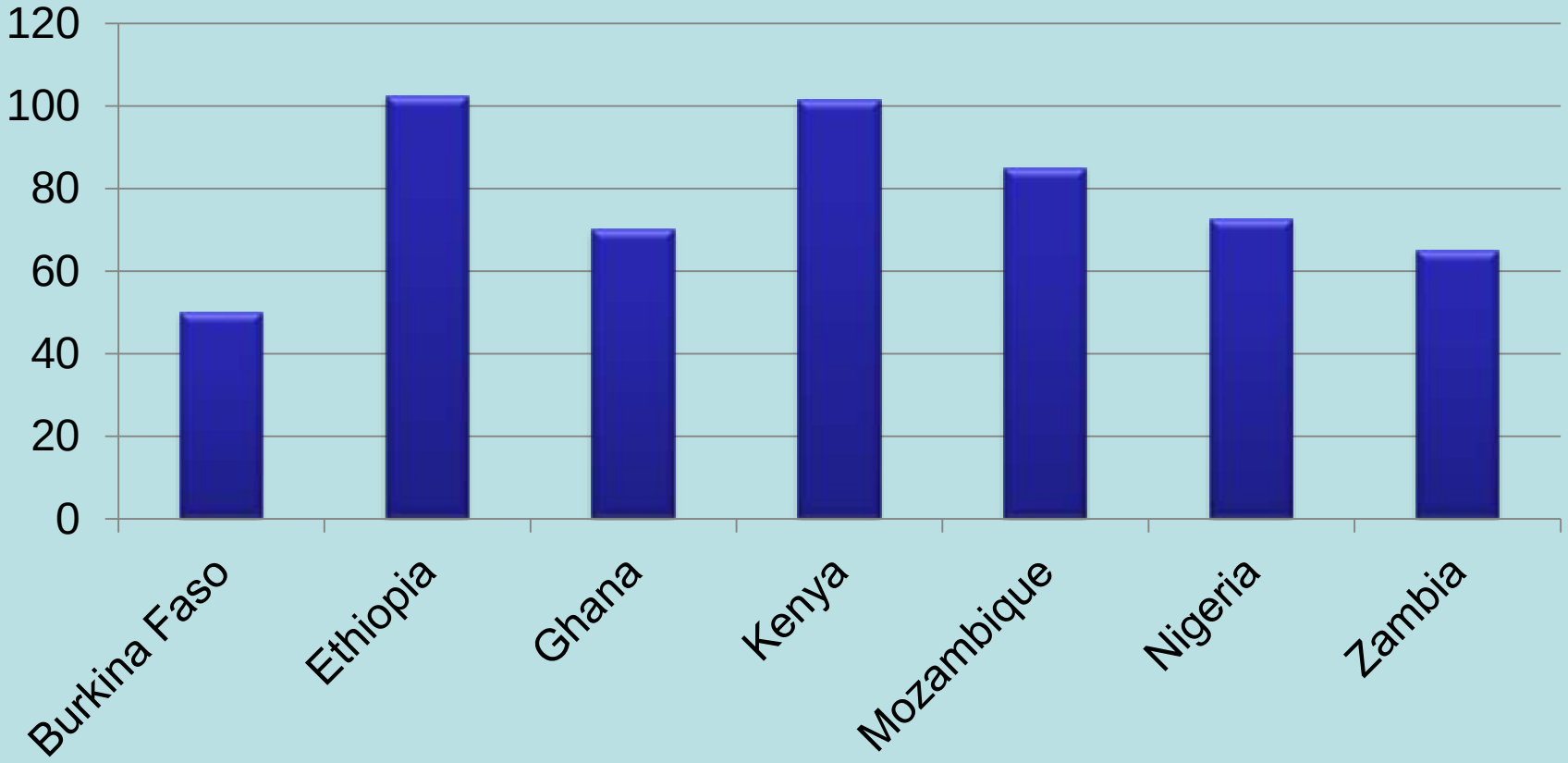
- ***Other issues on current status both +ve & -ve:***
  - *Importation of 4WT has increased since 2005 in many SSA countries. Not clear whether replacing or adding on the 4WT numbers. Need for more accurate data on this.*
  - *Importation of 2WT accelerated since 2005. A new power source use of which is not yet well researched documented*
  - *Both 4WT and 2WT concentrated in a few regions in most countries with the same trend observed for DAT. All these power sources used primarily for tillage and transportation*
  - DAT has severe limitations in many countries – tsetse flies; lack of animal husbandry tradition; increasing demand for livestock products; maintenance load during off-season for feed, herding etc.
  - *Pan territorial & across country utilization of 4WT especially for tillage and also some harvesting equipment is increasing & will have +ve effect on sustainability of the business models for Tractor Hire Services [THS] and also harvesting equipment – but more data required*
  - Period when 4WT and 2WT can be used for land preparation at any one place limited to less than 40 days per rainy season – severely restricts utilization rates - Need for off-farm utilization [in transportation etc.] is critical for business viability & sustainability

Share of cultivated area under cereals and roots/tubers cultivation by region (2004)

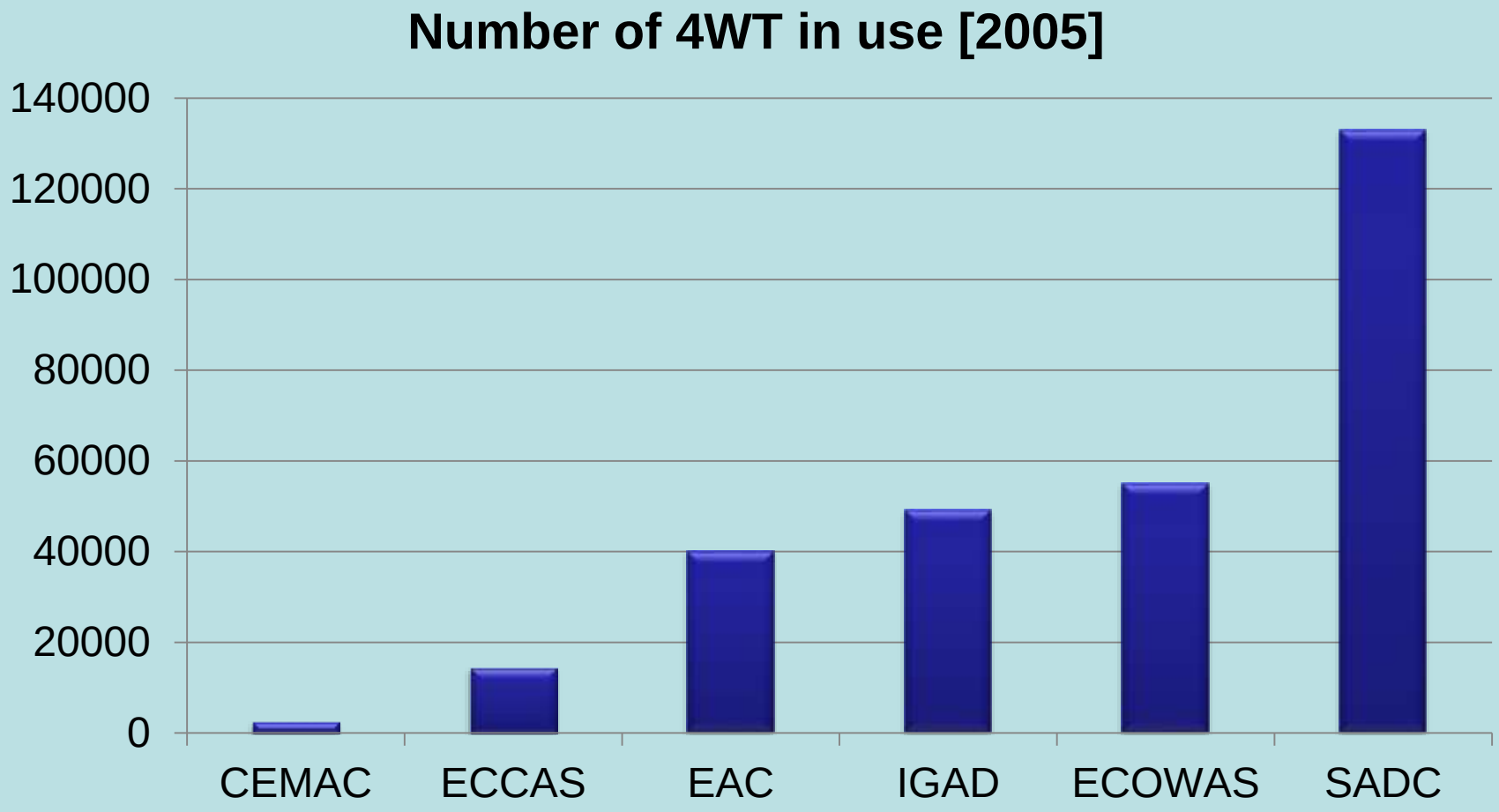


Source: FAOSTAT/IFPRI -2014

Estimated Average Tractor HP

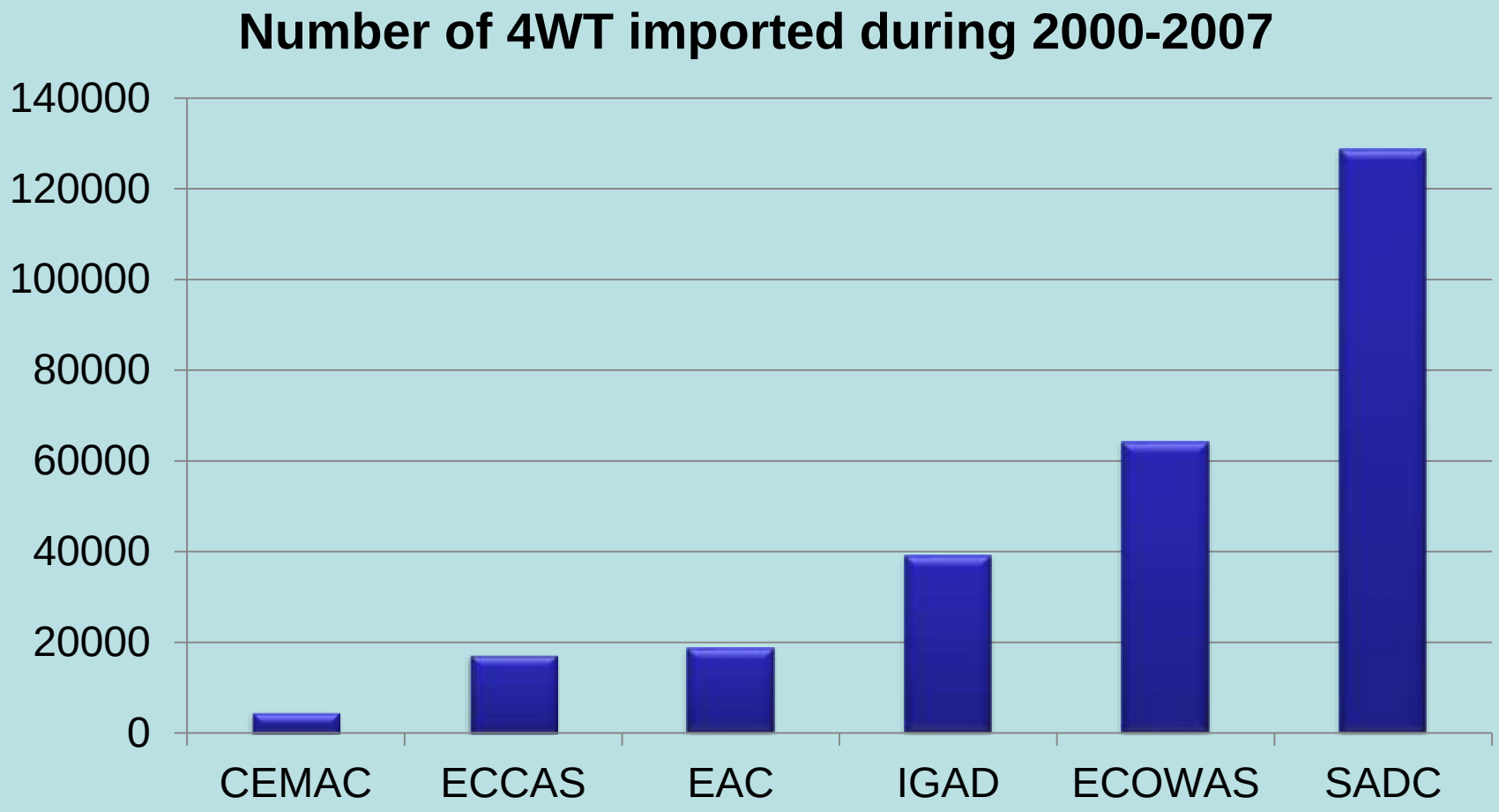


Source: World Bank 2014b



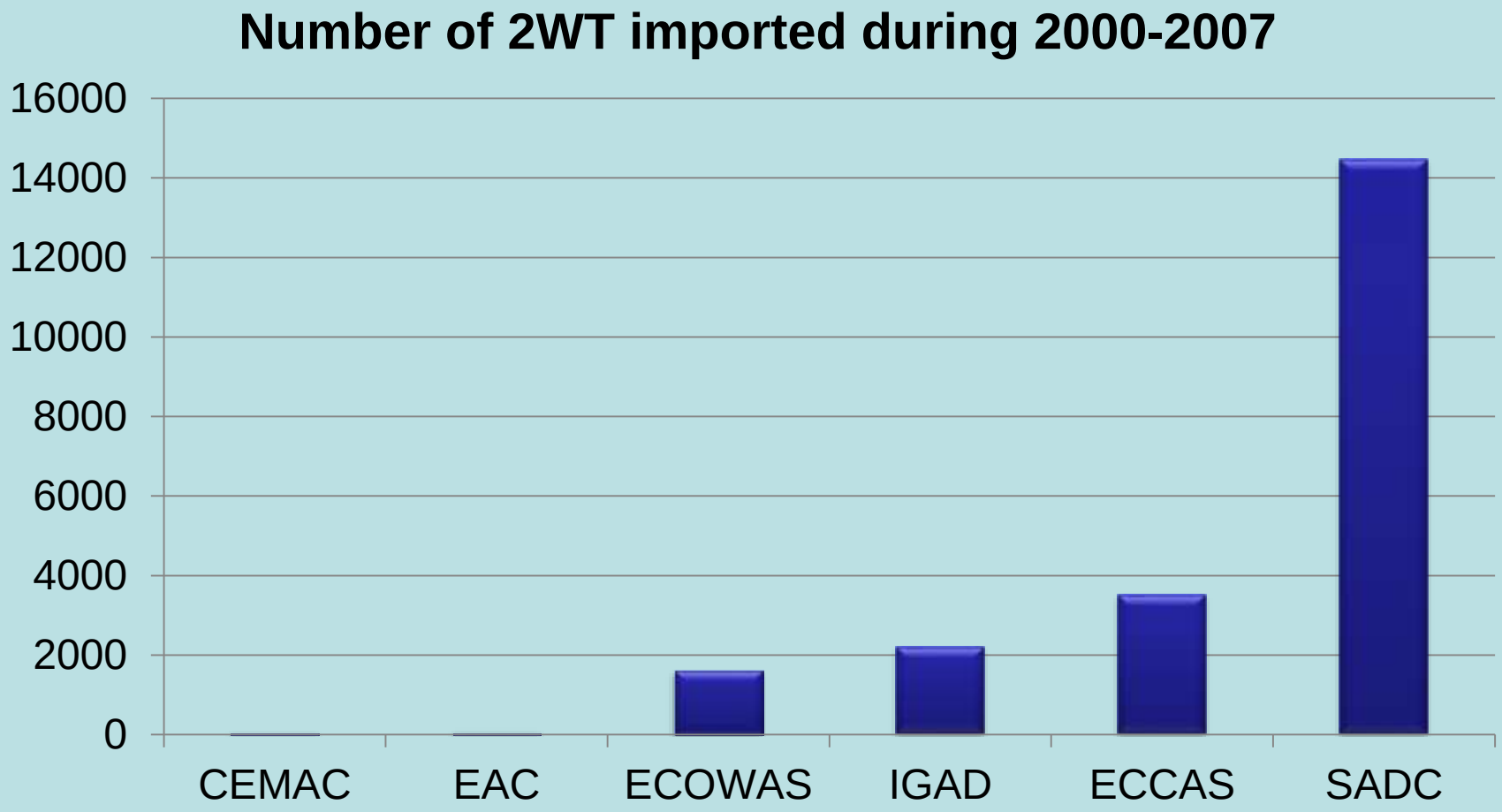
Source: FAOSTAT

Importation of 4WT during 2000 - 2007



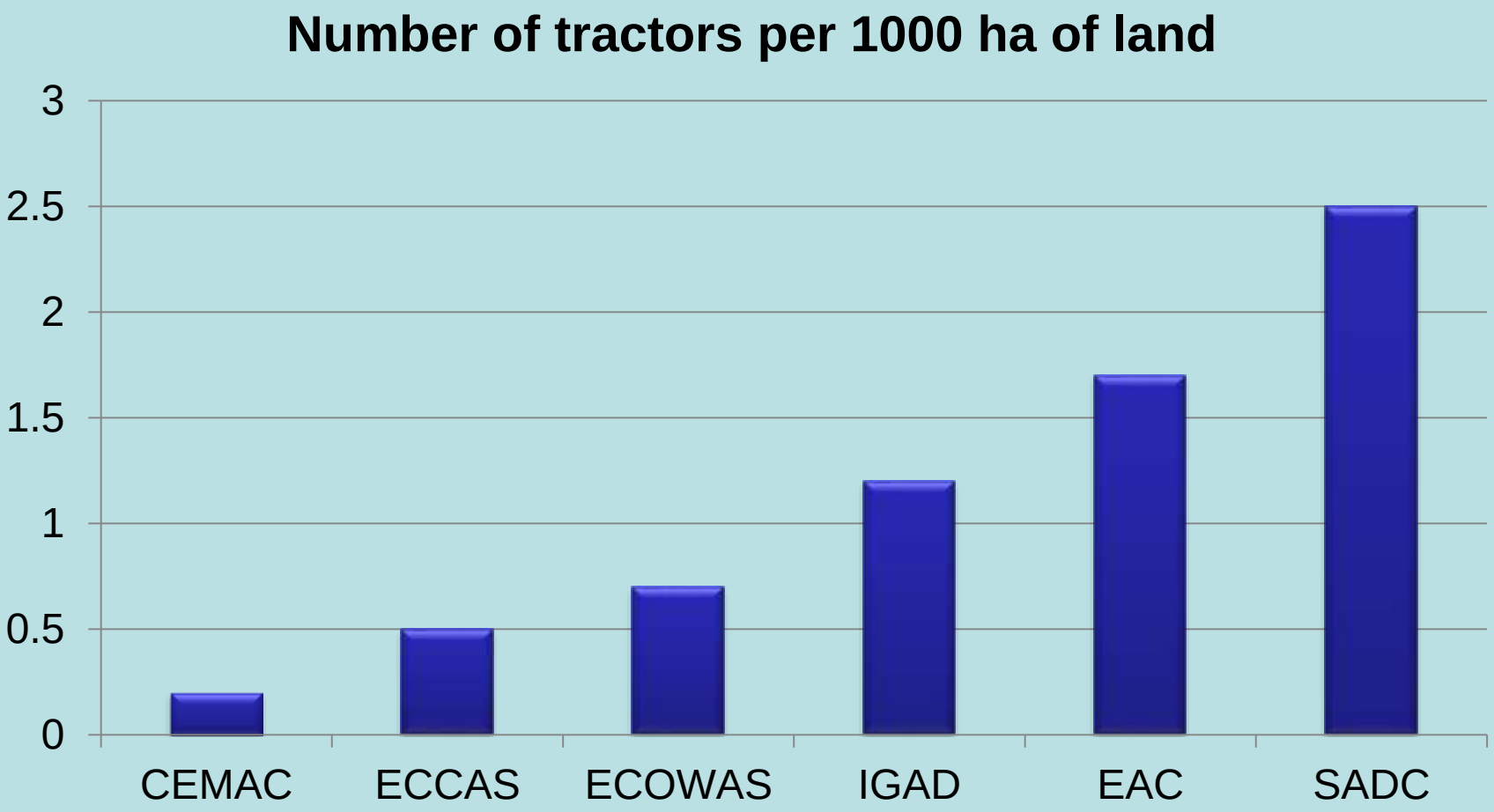
Source: FAOSTAT

Importation of 2WT



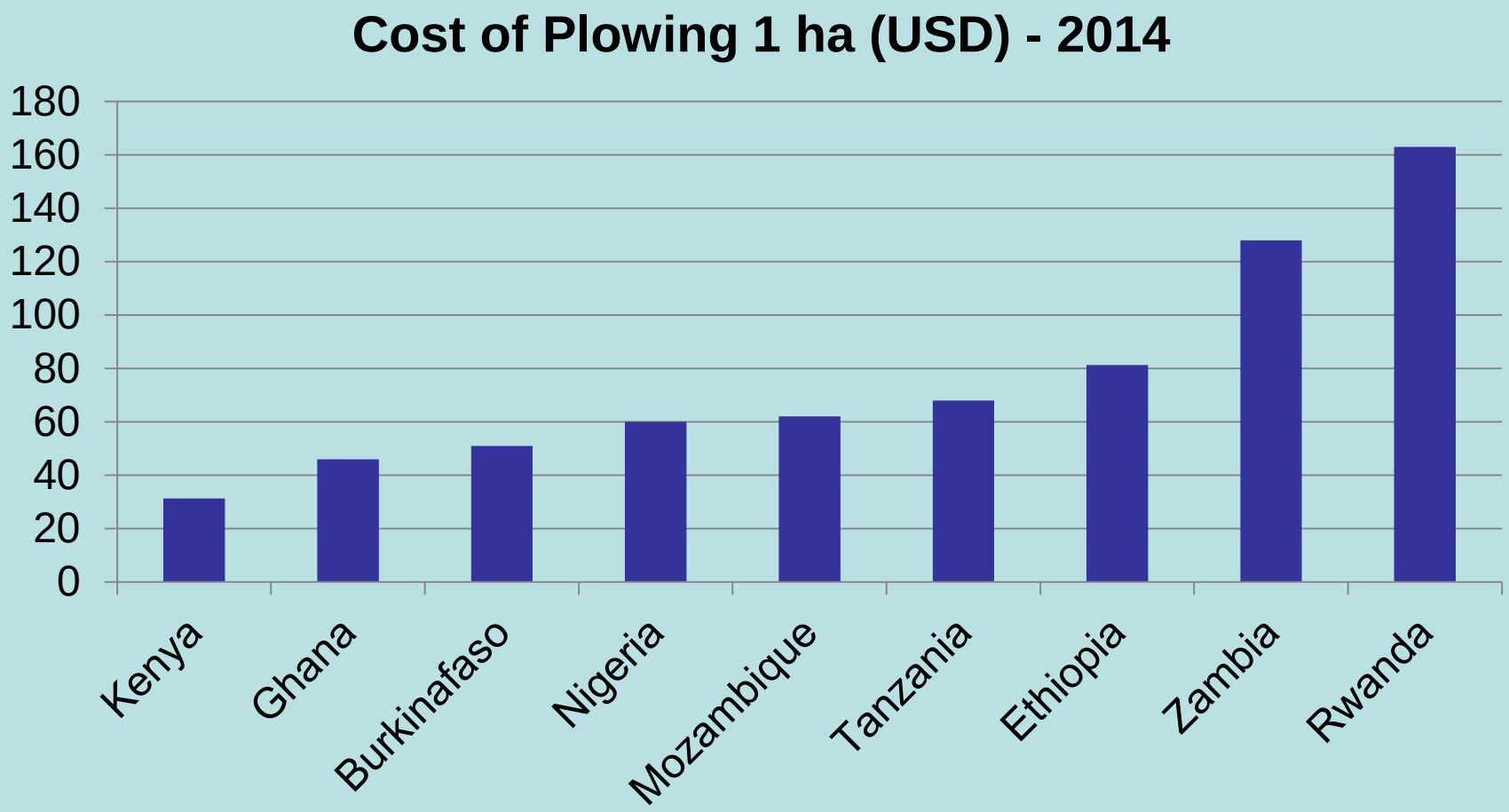
Source: FAOSTAT

Tractor Use Intensity



Source: FAOSTAT

Ploughing Costs in Selected Countries



Source: FAOSTAT/IFPRI-2014

Concluding Remarks

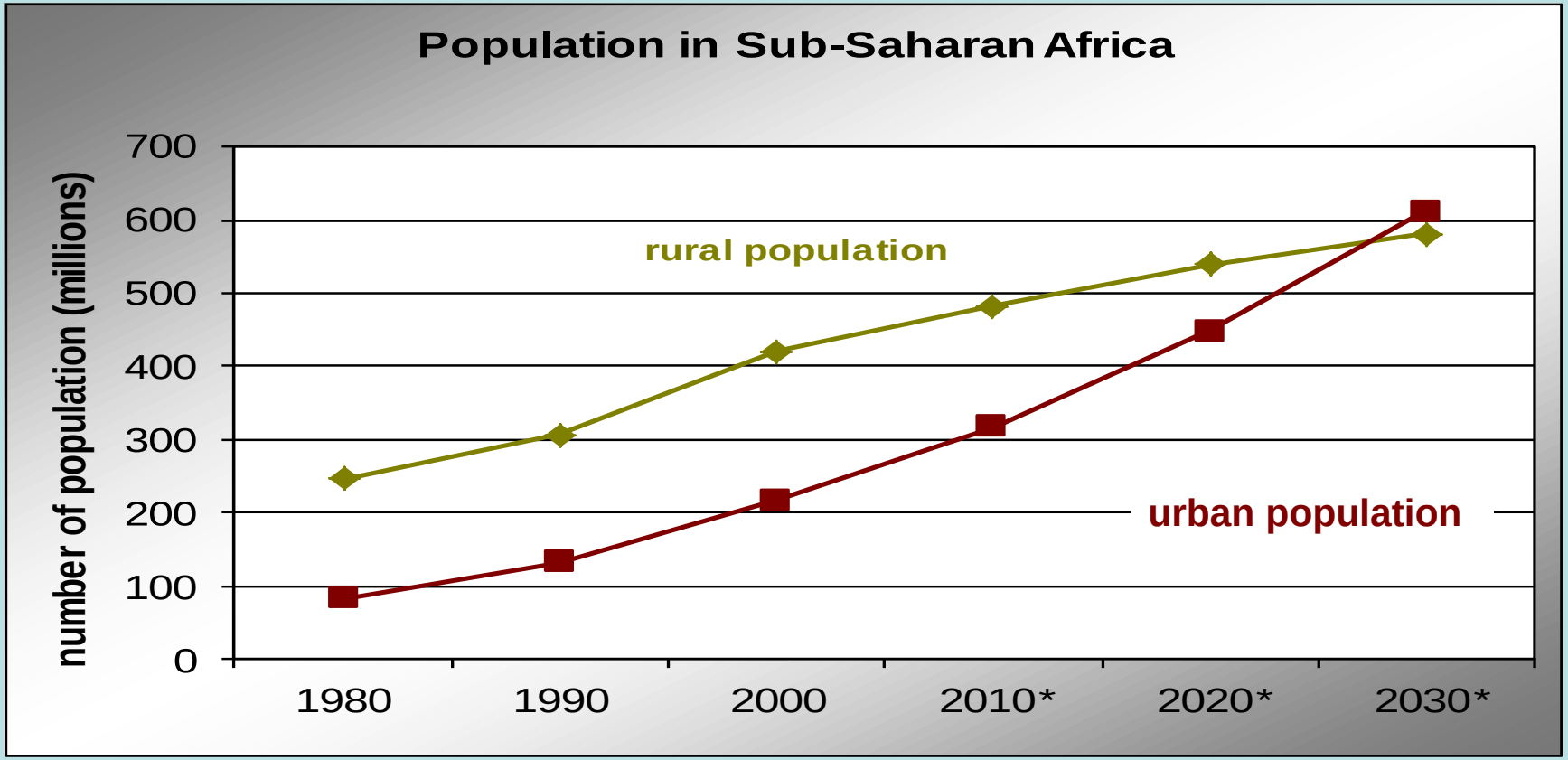
- Need to view agricultural mechanization with a long term perspective especially on Farm Power issues:
  - **Asia is largely moving out of animate power for primary land preparation;**
  - **Ethiopia has set a target of reducing DAP by 50% by 2035**
  - **Tanzania is setting out a process of getting rid of the hand hoe by 2035**
- Need to learn from our past experience both successful and failed projects – too much repetition of past mistakes
- Need to learn from others especially where mechanization has occurred in recent past and from other countries in SSA
- Agricultural mechanization is critical to the future of agricultural development and food security in SSA
- **Two concluding slides : from Fan & Pardey and UNFPA**

Accounting for Growth in Agricultural Output in China 1965 - 89

Factor	***% Contribution to growth***
Land	-0.9
Irrigation	3.3
Labour	3.4
Power	11.8
Institutional change	13.8
Research	19.8
Fertilizer	21.3
Other factors	27.6
Total	**100%**

Source: Fan & Pardey (1992)

Concluding Remarks



Source: FAOSTAT

THANK YOU!