Learning from the Economics of networks

...to enhance poverty alleviation in African cotton zones

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## Context

- Cotton is economically important to Africa
  - But its fate is under threat
- Cotton sectors are under reform
  - But outcomes are far from being satisfactory
- Scientists can help
  - Through better understanding on how cotton sectors have evolved
Something original

- An attempt to mobilize a theory seldom used in agriculture
  - Economics of network: theory from the industry world
- Of interest?
  - Analysis only specific to African cotton development?
  - Or valid also to preserve the effectiveness of agricultural activities in other contexts?
Clarification

- Network of services: what's
- Observable characteristics of network of services
  - Public monopoles for a long time and in most countries
  - But submitted to reform or "deregulation"
  - …with questionable outcomes (air transport, train, telephone)
- African cotton sectors have got the same characteristics!
Economic and organizational features of service networks

- 3-layer Morphology
- 5 functional criteria
  - Club effects
  - Production synergies
  - Crossed subsidies
  - Border conflict between monopole and competition in service supply
  - Strong State regulation
3-layer morphology of networks of services

High layer for supply of final and diversified services to clients

Intermediate layer = make connection (physical or information)

Low layer = infrastructures for production (with great economies of scale)
Major characteristics of cotton promotion in Africa

- Production before colonization…by cotton trees!
- Promotion since mid-19th century
- "success" since 1921-1952 according to countries
Major facts about cotton production in Africa

- Production by smallholding farmers
  - 2-3 ha/farm, today
- Farms grouped in villages
  - Various sizes, ten to hundreds of "families"
- Villages scattered
- Insufficient and bad tracks to reach villages
View of the basic organisation, around 1950s

inputs  seedcotton

Cotton company
Evolution and diversification of the services offered to farmers

- Service externalisation
  - Seedcotton marketing by farmers’ groups
  - …along with the management of input credit

- Diversification of services
  - Adult literacy program for practical purpose
  - Training and equipment of village blacksmiths
  - Assistance to food crop production
  - Wells and drillings for water supply in villages
  - Assistance to village women in production
  - …assistance to pest control according to threshold program
Organisation shift with service externalisation

Cotton company

seedcotton

Farmers' groups
3-layer morphology of cotton organisation from the 1960s

High layer = seedcotton marketing and input supply on credit, then many other services

Intermediate layer = extension staff to provide technical information to and from farmers

Low layer = gins, park of trucks, energy central
Club effects

- General case
  - More and better services at lower prices as the Club grows

- Cotton case
  - Decrease of transaction costs in marketing up to negative cost
  - Lower price for inputs
  - Indirect effects
    - Extension of rural tracks
    - ...

Production Synergies

- General case
  - Synergies deriving from using the same infrastructures to achieve more types of products/services

- Cotton case
  - The truck park has enabled to market more agricultural commodities from farmers
  - Advantage deriving mainly from the infostructure
    - The same extension staff has been mobilized to provide more types of technical assistance to villagers
Crossed Subsidies

- General case
  - Subsidies between clients
  - Subsidies between types of services
    - The launch of a new product is subsidized by the financial resources generated by older ones

- Cotton case
  - Subsidies between farmers
    - Same price everywhere in the country
  - Between services
    - Seedcotton marketing and input supply
    - Same prices for differentiated inputs…
Dynamics of networks

- Through rather simple models
  - Based on the network functioning cost at a given size
  - and on the analysis of the utility resulting from being member to the "club", with nevertheless two possible options
    - Maximisation of the individual utility of each member
    - Or maximisation of the collective utility of the whole membership
    - Leading to distinct optimal size of the club
Dynamics with 4 stages

- Initial phase to overpass a critical size $n_1$;
- Phase of auto-sustained growth, members can afford alone the club's growth;
- Phase of monitored growth so as to reach the collective optima beyond the "private" optima,
- A phase of growth to ensure universal service to prevent the exclusion of a few clients

- Intervention is needed from the State
- Intervention of the State not necessary, but it can help to grow faster
- Public intervention is compulsory
- Public intervention is needed
state's role in network construction

- Compulsory role because of the requirement to overpass quickly the critical size
- Role generally through regulation
  - By allocation of monopoly
- The Role often has lasted and enabled the set up of powerful networks
Lessons on the state's role on deregulation

- "deregulation" of networks in developed countries always has called upon regulation
- Ineffectiveness of deregulation experiences has resulted from naive modalities
- Regulation needed to preserve the club effects
  - By maintaining the inter-dependence of the 3-layer morphology
- Regulation needed
  - to mitigate the exclusion phenomenon or its effects
  - to prevent the wastage of the infrastructures investment
Conclusion

- A first attempt to apply industrial economics to agriculture
- The reform of cotton sectors in Africa must take their sizes into account
  - Hence must be reasoned...but not the case so far
- Deregulation still needs regulation
  - Important role to the State...
  - ...finally acknowledged?
  - To preserves advantages resulting from the network functioning (club effects, production synergies)