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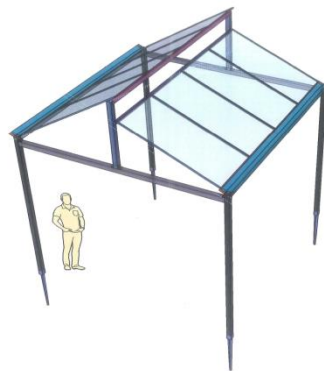
# Tropical Greenhouses: A Great Opportunity for Small Farmers

## Drivers and barriers for agricultural innovation

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# Introduction

Greenhouses: a comprehensive agricultural innovation involving a lot of related issues.

1. High-tech large-scale greenhouse technology

2. The position of smallholder farmers

3. How to bridge the gap?

4. Examples

5. Finances, technology, capacity

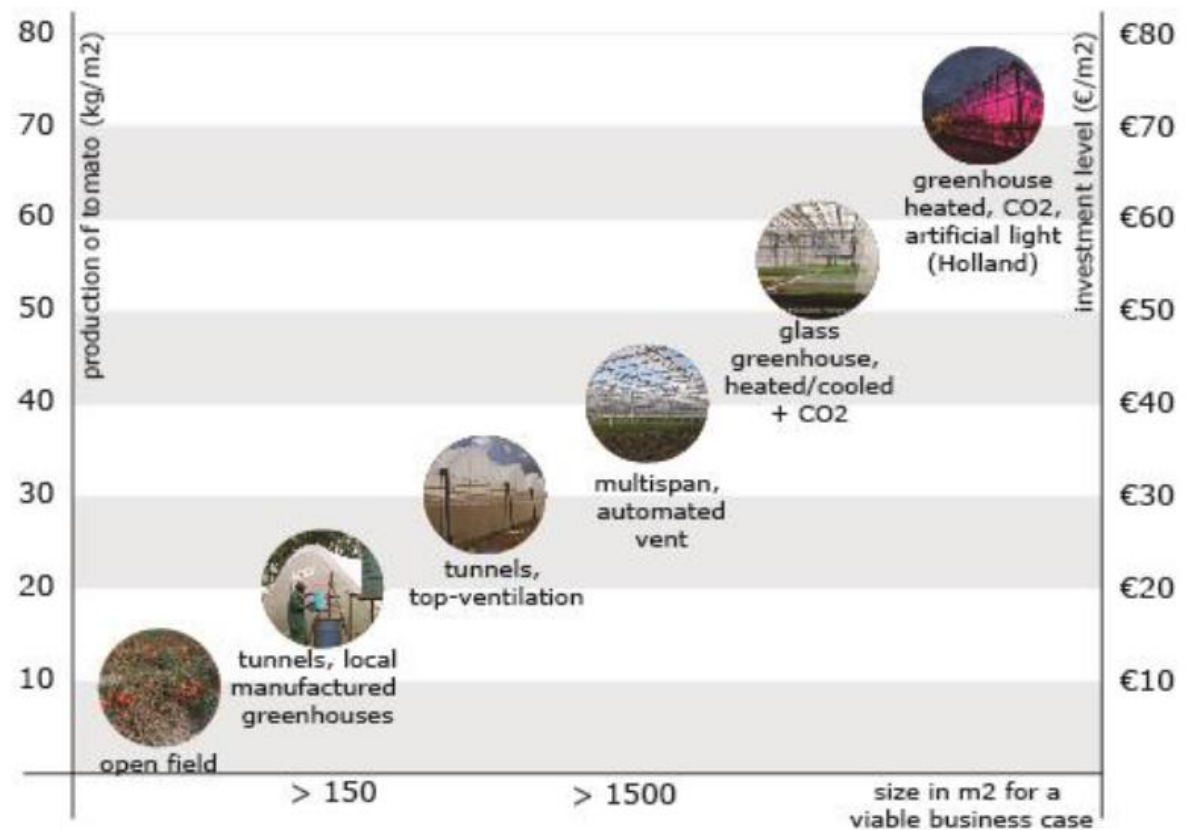
6. An enabling environment

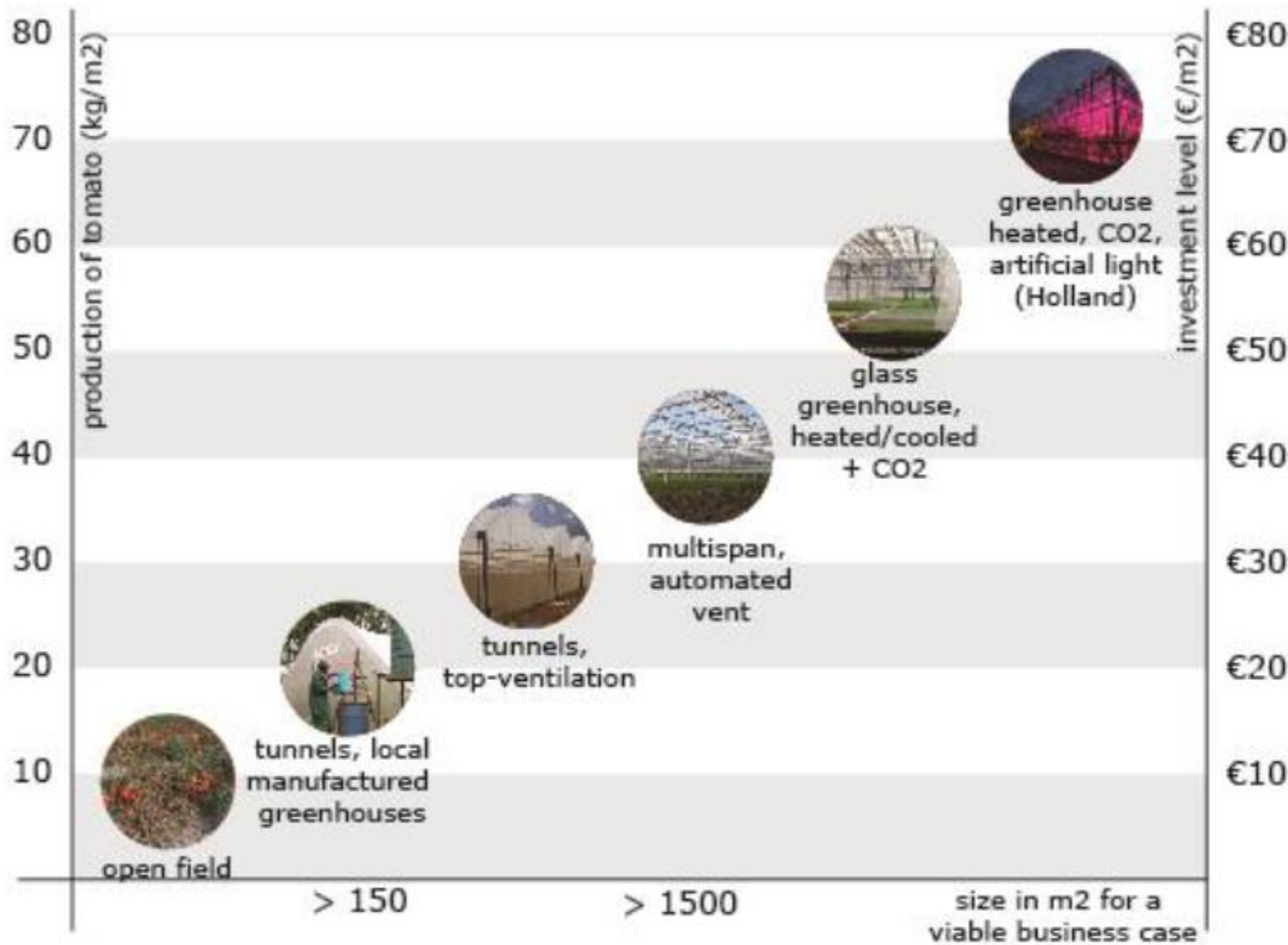
7. Out-of-the-box thinking



# 1. High-tech large-scale greenhouse technology

- Aluminum – glass, using substrate instead of soil, automatically controlled temperature, computerized drip irrigation, including fertilizer, CO<sub>2</sub> addition, led lights: the most advanced, the most sustainable, the most water efficient, €80 per square meter, 80 kg per square meter
- Knowledge about plants, proper seeds, fertilizer, judicious use of pesticides
- The more efficient, (and sustainable in use of water and energy!) the more costly.





## 2. The position of smallholder farmers



1. 500 million, producing 80% of the food in Asia and Africa, feeding one third of the population, mostly subsistence farmers, often household farmers (an extra income, women).

2. Often no land titles, due to low food prices forced into other income options (40%), not well organized, most traditional part of society, lack of capacity, extensive low risk farming, farming last option often.

Awkward paradox:

1. High-tech farming available, but no people who can run it and no capital for investment.

2. A huge mass of small farmers, but no access to either investment or technology

### 3. How to bridge the gap?

SURE: Sustainable Rural Entrepreneurship: entering the highway

Small steps in growth concerning:

1. Frugal technologies, small-scale, step-by-step increasing
2. Step-by-step growth in investment and entrepreneurial risk
3. Training in capacity (not only knowledge and skills, but also values, attitudes, mindset – precision, disciplined labor, planning, market orientation – from traditional to entrepreneurial)

Can it be done?

Can young people set the example?



## 4. Examples: greenhouses and capacity training

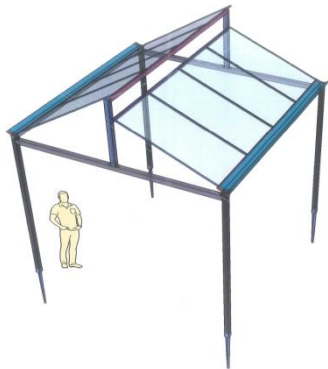
- Internships and master thesis projects (minor International Entrepreneurship and Development), SOIL, Surinam
- Pelgrimkondre: 6,5 x 10 m; €1500, first experiment, successful growing, difficulties due to land ownership and cooperation.
- Masonkondre: 5 x 15 x 4 m, including nets, €1200, distance from water (300 m), distance from Moengo (8 km), capacity of the farmer lacking (belief)





## 4. Examples: greenhouses and capacity training

- Hendrik Pinas: 8 x 15 x 4 m, €1050, no nets. Successful in use. Second one built by the farmer himself.
- Training in bookkeeping, keeping track of the produce, creation of a selling point, in the news, raising expectations in Surinam
- Next assignment: build 3 or 4 IKEA packages, train a carpenter or the vocational school Barronschool.
- Experiment with metal, Meccano system



## 4. Examples: greenhouses and capacity training

- Production in bulk would allow for strategic growth, step-by-step. Cheap, easy to install and maintain, with or without nets.
- Research among farmers: often old, not well adapted technology, rusty, abandoned, a small farmer group with access to the international market (project Wageningen), but closed, not open to cooperation or knowledge sharing



## 4. Examples: greenhouses and capacity training

- Kenya, Bondo JOOUST: 6 x 12 m, Amiran type of greenhouse, €2222, including drip irrigation.
- Manual for use, courses designed, research among the farmers showing reasonable openness to the new technology, lack of investments, drought as a problem, too much dependence on greenhouse providers, lack of separation between personal and business finance, wait-and-see mentality
- Problems with the hierarchy of the University in managing and financing the project (maintaining good relationships with the Vice Chancellor means not asking for project support)



## 4. Examples: greenhouses and capacity training

- Ghana: 14 x 7 m, including water provisions, production in pots to prevent diseases
- Meant as a demonstration model. Manual for construction and a business plan
- Problems: daily operation failed because of distance and devolving the work to non-committed people on the spot.



# 5. Finances, technology, capacity

Question to the audience:

How did these experiments perform on the issues of SURE, Sustainable Rural Entrepreneurship:

1. Small steps in innovative technologies
2. Incremental steps in entrepreneurial risks and investments
3. Growth in capacity to deal with the technology and to deal with this new entrepreneurial role

Capacity is key



# 5. Finances, technology, capacity

But technology for small scale is also an issue!

Cheap and efficient pumping systems (solar?)

Small-scale food processing machines (juice, cassava, rice, corn)

Packaging

Affordable cooling systems

E-bikes for transport to the market

Drying machines for spices, vegetables

Apps for plant treatment, marketing etc.

...



# 6. An enabling environment

1. Affordable small-scale technology
2. Well tested and robust (frugal)
3. Reasonable payback time (financial schemes)
4. Making possible a meaningful increase in income
5. Supported by capacity training (role for NGOs?)
6. Supported by conducive regulations and policies
7. Supported by cooperation of companies and donor institutions
8. Bottom of the pyramid cooperation of companies from the North and South, involving institutions of higher learning and vocational training institutions

All of this implies a business innovation system consisting of many entrepreneurial initiatives and SMEs along the whole value chain



## 7. Frugal innovation: A perspective out-of-the-box

- Everybody wants innovation, but if you really innovate, don't expect immediate approval and support.
- A perspective out-of-the-box is required, from outside, from below.
- Ethics is in the eyes of the beholder: "Ethics is optics": Are the smallholder farmers noticed at all? If yes, that leads to new technical ideas!
- Responsibility for the many smallholder farmers introduces an out-of-the-box perspective that changes both technology and entrepreneurship to respond to their needs.

