



# Diffusion of Innovation in Tanzania Rural Food Processing Ventures A Case of Sunflower and Palm Oil

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# Introduction

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# 1. Background

- ▶ Food processing sub-sector is an important economic activity
- ▶ Position within manufacturing sector: One third (29.9%) of all registered enterprises (URT, 2010b)
- ▶ Employment within manufacturing sector: 54% (URT, 2010a pp13,31)
- ▶ Performance within the sector: 78.4% of sales exported in 2008 (URT, 2010b p46)
- ▶ Increased performance indicates changes in products and production processes. These are innovation activities which potentially play an important role for the growth of enterprises.

## Background (cont...)

- ▶ Concentration: 73% in few regions (Dar es Salaam, Singida, Kagera, Arusha, Mwanza, Tanga, and Kilimanjaro (URT, 2010b p21)
- ▶ Apparent opportunities for the growth of food industry in rural Tanzania: (1) Rural area is agrarian by nature with abundant raw materials, (2) Human resource: about 80% of economically active population.
- ▶ Adequate diffusion of innovation in rural areas will stimulate utilisation of local raw materials and reduce its transport cost to process in urban areas, hence the increase in production.
- ▶ Market for processed foods is growing and stimulates increase of edible oil production.

## Background (cont...)

- ▶ E.g., sunflower oil production in 2004/2005: 21,325 tonnes. The production increased to 88,753 tonnes in 2006/2007 (RLDC, 2008).
- ▶ However, this increase is little as compared to the nation demand of oil, a fact which in turn has forced the country to import vegetable oil to meet consumption demand.
- ▶ Tanzania consumes about 240,000 tonnes of edible oil per annum: 25% of local production while 75% is imported - from Malaysia and Indonesia (URT-MIT, 2009).
- ▶ Sunflower and palm oil processing ventures may raise the capacity of the domestic market, save foreign currency spent in the importation of edible oil, stimulate non-farming activities, increase employment and reduce rural-urban migration, and ultimately resulting into socio-economic development of the country.

## 2. Research Problem

- ▶ Imported oil had so far flooded the local markets and adversely then stimulating the need for adequate diffusion of innovation in Tanzania rural processing ventures
- ▶ This is based on the nature of the problem indicating insufficient oil supply of rural oil ventures despite all the natural endowment of resources in rural Tanzania, and thus showing a gap in information about the types and the extent to which innovations are diffused to rural edible oil processors.
- ▶ Lack of information hinders any attempt to adequately bring changes in edible oil production and the development of edible oil processing subsector.

# 3. Research Objectives

The study intended to assess the extent of diffusion of innovations to rural areas in Tanzania; specifically by

- (1) identifying the types of innovations diffused to rural oil processing ventures
- (2) assessing factors facilitating and constraining diffusion of innovations to rural oil processing ventures
- (3) assessing the role of market in the diffusion of innovation.

# 4. Conceptual Framework

Diffusion of innovation is the way in which innovation spreads to different consumers. It is understood as a process towards enhancing technological capabilities of enterprises through various factors or elements.

Rogers (1962) provides significant keys to diffusion of innovation. According to him, four elements are considered for an innovation to diffuse: innovation, communication channels, time and social system (context).

1. Rogers (1983) defines Innovation as an idea, practice or object that is perceived as new by an individual or other unit of adoption



## Conceptual Framework (cont...)

- ▶ There are 5 characteristics for innovation to spread: (a) **relative advantage** (b) **compatibility** (respond to values, norms, habits and needs of potential adopters), (c) **complexity** (simple to understand), (d) **trialability** (experimentation of innovation), (e) **observability** (of innovation results)
- ▶ 2. Communication channel:
  - (1) Mass media - create knowledge of innovations,
  - (2) Interpersonal channels - influence the decision to adopt or reject innovations. Most individuals evaluate an innovation, not based on scientific research by experts, but through the subjective evaluations of peers who have adopted the innovation.

# 5. Research Design & Methodology

- i) Research Approach: both quantitative & qualitative
- ii) Area of the Study:  
Singida & Dodoma – Sunflower: most substantial oil & suitable for large market (RLDC, 2008:4)  
Kigoma & Mbeya – Palm oil: highest oil content but most imported (77%) (URT, 2009)
- iii) Population: owners of Sunflower and Palm oil processing ventures; oilseeds farmers, and machine makers from Arusha & Morogoro
- iv) Sampling Procedure: simple random sampling
- v) Data collection Methods: Primary (questionnaires, observation and interviews) & Secondary data

## Research Design & Methodology (cont...)

- ▶ vi) Data Analysis
- ▶ 1 - reviewed literature was summarized to make a scheme of findings.
- ▶ 2 - Analysis of quantitative findings through descriptive statistics (frequencies and percentages).
- ▶ 3 - Correlation of findings focusing on (1) identification and evaluation of the rate of innovation adopted by rural oil processing ventures, (2) assessment of the extent to which such innovations have replaced traditional technologies.
- ▶ Innovation and level of innovativeness were measured in terms of frequency of new and improved equipment, quality of oil and ways of production.

## Research Design & Methodology (cont...)

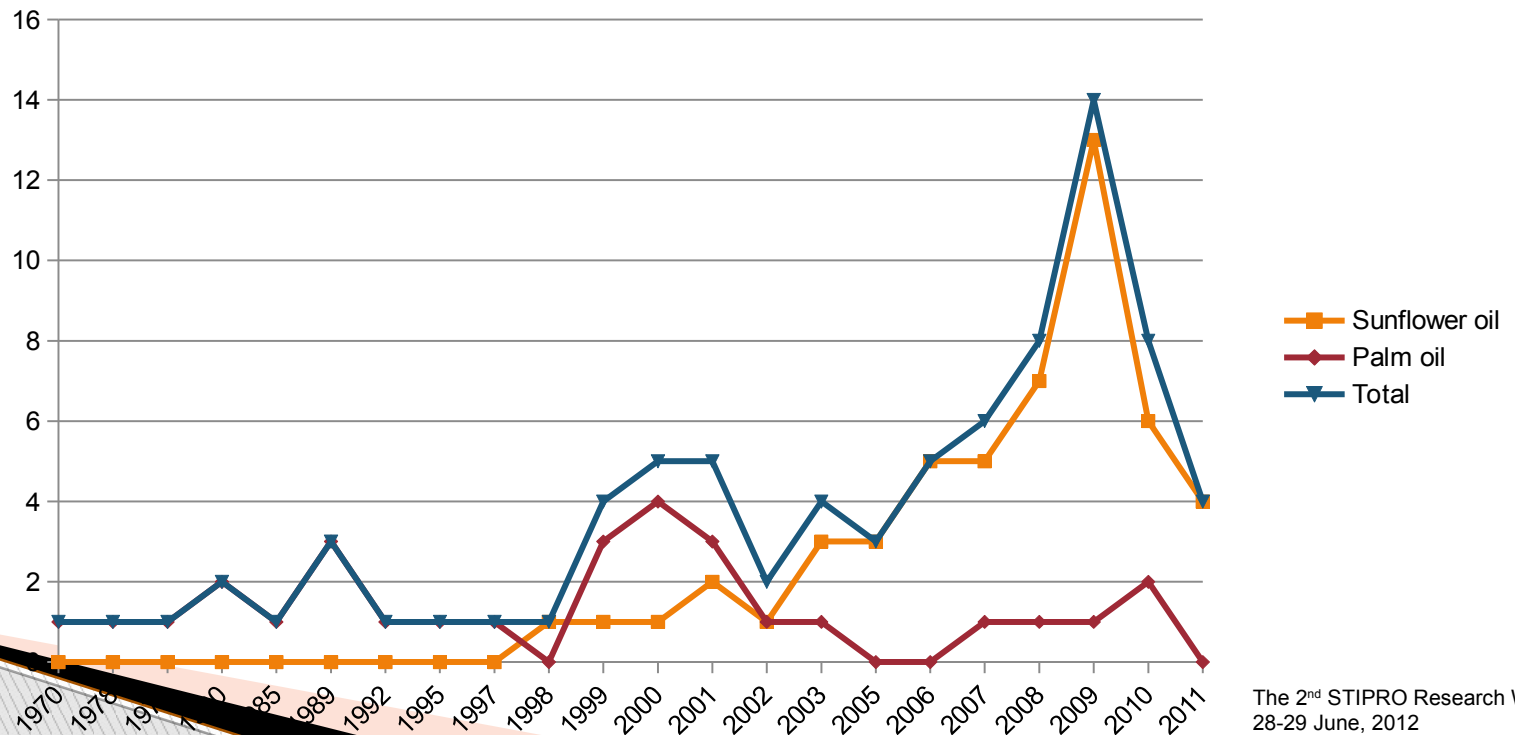
- ▶ 4 - Studying the absorptive capacity of rural oil processing ventures over innovation diffused as well as the ratio between need and innovation adopted.
- ▶ 5 – looking at the frequencies of linkages between oil ventures and their suppliers and buyers to determine the role the market plays in the diffusion of innovation
- ▶ Qualitative data was provided from open-ended questions, interviews and observation.

# 6. Research Findings

- ▶ a) Basic information about surveyed firms
- ▶ **Ownership types:** 77% of sunflower firms operated under sole proprietorship and 72% of palm oil firms were under family-based type.
- ▶ **Firm size:** 82.7% - Micro, and 17.3% - small sized firms. There was no medium enterprise found among the rural oil processing firms.
- ▶ **Owners' level of education:** 80% of firms are owned by primary school leavers, 19% of secondary school leavers, and 1% attended tertiary education.

## Basic information (cont...)

- ▶ **Year of establishment:** most (14%) firms were established in 2009 whereby the increasing rate of sunflower firms' establishment was faster than palm oil.



## b) Types & level of Innovation

- ▶ **Modern technologies:** 100% of sunflower firms used modern equipment while a tinny minority (3.7%) of palm oil firms used modern equipment.
- ▶ **Level of equipment change:**
- ▶ 47.5% were still using equipment as it was bought (60% from sunflower & 40% palm oil) ;
- ▶ 33.8% improved their equipment (48.1% from sunflower & 51.9% palm oil);
- ▶ 18.8% introduced different types of equipment (86.7% from sunflower & 13.3% palm oil)

## b) Types and level of Innovation (cont...)

- ▶ **Relative advantages:**
- ▶ In sunflower: 47.4% have increased oil quantity as due to new presses, and 19.2% increased oil appearance as due to new filters and packaging materials.
- ▶ Palm oil quantity and quality were challenged by failure to adopting new equipment, and oil safety has been increased due to introduction of sealed gallons.
- ▶ Adopting quality technologies could be a potentially important step for improving overall production and meeting local demand.



## b) Types and level of Innovation (cont...)

- ▶ **Innovation in work organisation**
- ▶ 9.9% changed their working settlement and 3.8% changed their team structures and focused on task delegation as an aspect of division of labour. Some employees started to specialize in pressing oilseeds, some others were filtering, while others were cleaning oilseeds.
- ▶ There is **low level of diffusion and adoption of innovation** in rural oil processing ventures with much prominence in palm than sunflower oil.

## c) Factors Facilitating Diffusion & Adoption of Innovation

- ▶ (1) Electricity in some villages & increased quantity and quality of oilseeds.  
These factors stimulated entrepreneurs to acquire different types of machines - small or big sized machines
- ▶ (2) Flow of information of new equipment whereby 2.7% (through media), 64.9% (competitors), 21.6% (suppliers), 5.4% (SIDO), 2.7% (technological centres)
- ▶ Sunflower benefited much from these factors than palm oil. Sunflower firms were established in villages along the electricity line and had facilities to link with oilseeds business persons

## d) Factors Constraining Diffusion & adoption of Innovation

- ▶ (1) Low linkages between oil firms and machine makers (21.6%) as well as technological centres (2.7%)
- ▶ In addition, Palm oil firms had (2) Inadequate supply of electricity (100%), (3) Little awareness on new equipment (11.5%), and (4) were less entrepreneurial.
- ▶ The government should stimulate, strengthen and coordinate linkages among stakeholders
- ▶ Factors affecting sunflower included (1) High cost of purchasing machines (67.2%), and (2) Shortage of oilseeds (29%) as getting oilseeds had become more and more competitive, a fact that constrained them to wish new equipment.

# e) Role of market in the process of diffusion and adoption

- ▶ (1) **local factories are making machines** of different types (electric and manual/diesel)
- ▶ Marketing strategies: 20% used media, 60% fliers, 60% catalogues, 40% internet, 80% demonstrations, 40% discount, and 80% exhibitions and trade shows; 100% used outdoor advertising and offers (repair services & trainings). These were however inappropriate for rural areas (far from machine factories)
- ▶ Constraints to disseminate technologies to rural firms: (a) shortage of finance to support R&D for dissemination, (b) attitude of rural people: (i) are less risk takers since they want to assure the machine operation before buying while there is limited opportunity for demonstrations, and (ii) failure in machine loan repayment

## Role of market in the process of diffusion & adoption (cont...)

- ▶ The Government should fund R&D and provide entrepreneurship training among rural oil processors.
- ▶ (2) Coming to **oilseeds farmers**
- ▶ Sunflower farmers showed an interest to increasingly deal with sunflower, But there was low consideration from palm trees farmers.
- ▶ Most of palm trees were old and semi-wild, condensed in small sized farms, and some others were planted at the borders just to keep farms secure.
- ▶ Extension services on the advantages of modern varieties of oilseeds would be of paramount importance.

## Role of market in the process of diffusion & adoption (cont...)

- ▶ (3) In terms of **oil market** - local markets and along the roads and rail way stations
- ▶ Constraints to attract potential customers: (1) little information about large markets, (2) lack of means to reach potential markets, (3) lack of refining and storage facilities that could prevent oil to become harmful; (4) oils were not labelled (and no date of processing)
- ▶ Linkages with market research agencies would assist to improve marketing skills and acquire adequate markets.

## Role of market in the process of diffusion & adoption (cont...)

- ▶ (4) **Customers influence innovation**,
  - low linkage between rural oil firms and customers: 16% of firms received feedback
  - Impact of feedback: upgrade of oil quantity and quality as a result of improving and introducing new oil equipment
- ▶ (5) **support institutions** - 6.2% were trained on entrepreneurship, business development, hygiene and product standard skills.
- ▶ Low linkages with stakeholders indicates isolation of rural oil firms that affects diffusion of appropriate and updated innovations.

# 7. Conclusion & Recommendations

- ▶ Rural oil processing firms are in need of appropriate technological diffusion for increasing production
- ▶ In order to respond effectively to the constraints to diffusion of innovation and make rural oil ventures more productive
- ▶ (1) Government should facilitate rural oil processing firms with more simplified machines, improved roads and power supply
- ▶ (2) Entrepreneurship training is needed to both oilseeds farmers and oil processing ventures so that growth can be entrepreneurially materialized among rural food processing ventures



## Conclusion & Recommendations (cont...)

- ▶ (3) Government should strengthen linkages between rural oil processing firms, machine manufacturers and support institutions.
- ▶ (4) Local oil producers should establish and strengthen associations to deal appropriately with challenges facing rural oil producers
- ▶ (5) TBS and TFDA should frequently visit rural oil producers to create awareness and facilitate the improvement of oil standards

# 8. Area for further Research

- ▶ 1. Identifying effective motivation mechanisms to increase oilseeds production
- ▶ 2. Identifying the effectiveness of linking rural oil processors and oil refining plants
- ▶ 3. Analysing trend of establishment of rural oil processing ventures



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