

# **Technology Transfer by electronics sector foreign direct investors to actors within the SI: a South African analysis**

**Venantio Mzenda**

**University of Pretoria (MoT) South  
Africa**

# Outline

- Review of the sector
- Description of concepts
- Theoretical study
- Theoretical framework
- Research framework
- Methodology
- Research questions
- Preliminary findings

# History of the sector

- Components sector established during apartheid
- Restructuring since '94:
  - Commercialization of strategy
  - Lowered defense spending
  - Vertically integrated firms
- In professional sector: 6 of 1660 firms contributes 80% of sector's o/p
- Local demand 85% came from 3 firms

# The Local Electronics Sector

<b>Sub-sector</b>	<b>Sector Size Eu(billion)</b>
Telecoms	12
Information Technology	6
Aerospace	1
Defence	1
Instrumentation & Process Control	1
Security	0.13
Automotive	0.13
Power	0.5
Other	0.5
<b>Total</b>	<b>Eu 22.26 billion</b>

## Success stories: **Integration**

- Netstar, and others: Vehicle Tracking Systems
- Conlog: Vehicle Security Systems
- Eloptra: Airborne Systems Camera
- Spescom, Conlog: Prepayment solutions
- Psitek: Community Telecoms
- Omniples, Poynting: Antennadesign, manufacture
- CBI: Magnetic earth leakage systems
- Tellumat: Point to point  $\mu$ -wave subsystems
- SACO Systems: RFID, Asset & product Tracking Systems
- SAMES: Custom ASIC's
- AMS: Aerospace Monitoring Systems (HUMS)
- Lodox: X-Ray Imaging techniques

## Success stories: **Niche/entrepreneurial**

- ATE: Avionics and Vehicle Electrotronics, Prime Contractor
- Sunspace: Microsatellites, University project, followed by International success
- ATE: Integration of 2ndGen subsystems
- UEC: Decoder Integration
- Grintek, Avitronics: Electronic Warfare integration and application
- RRS: Malaysian Airport Traffic Control
- MTN: Rollout of infrastructure in Africa
- Didata (Plessey/Tellumat): Roll-out of Telecoms infrastructure in Malaysia

*Ref: A DESCRIPTION OF THE SOUTH AFRICAN ELECTROTECHNICAL INDUSTRY*

# Concepts

- Technology..... application of **scientific knowledge** and **skills** to the **setting up, operating, improving** and **expanding** of productive facilities.
- Technology Transfer: Broad set of processes, covering flow of knowledge, expertise, know-how, equipment amongst stakeholders .  
Includes learning to understand, choose, utilise, adapt and replicate technology

# Technology recipients

- Domestic suppliers
- Local labor force
- Local competitor firms
- Local R&D institutions and universities
- Externalities: other domestic non-competing firms
- New off-shoot firms a result of FDI externalities

# Theoretical Framework

- FDI can play a positive role towards technological upgrading of lagging nations (sectors) [Stehn '91; Sanani 2000; Bloemstrom '83; Lall '80]
- It is widely claimed Asian Tigers' current competences in the electronics sector could be traced back to FDI
- FDI theory [Dunning H '94; Caves'70]
- Technology transfer theory
- Systems of innovation theory
- Evolutionary economics models (Triple Helix)
- Technology diffusion and spillover



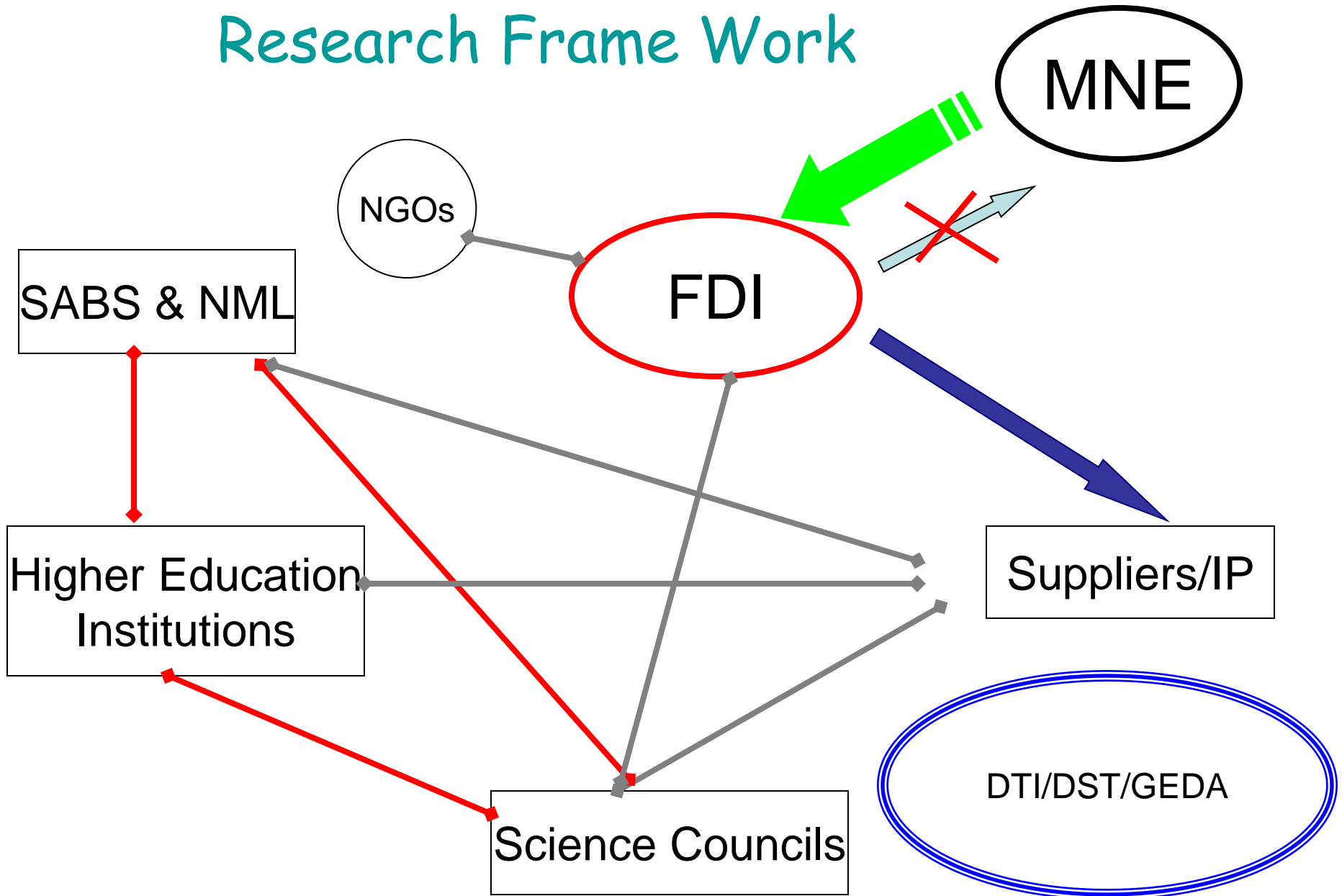
# Theoretical Framework

- FDI theory:
  - Eclectic paradigm
  - Market imperfection theory
  - Push factors
  - Pull factors
  - Transportation costs theory
- Systems of innovation framework
- Technology transfer theories
- Social network theories

# Motivation

- The past; the present and the future of the sector
- The role of electronics on firm competitiveness
- Importance of a sector level study
- Inconclusive findings whether or not FDI can be used for competence upgrading

# Research Frame Work



# Methodology

FDI in the electronics sector

Questionnaire submitted electronically (stage 1)

Questionnaire submitted electronically (stage 2)

Depth interview with network actors

Data analysis

**Primary Research Question:** To what extent does technology transfer from FDI, to actors within the NSI?

### **Research sub Questions**

- What is the nature of the linkages between the FDI and actors within the NSI.
- How can the actors within the NSI play an additional role in facilitating technology transfer
- What is the effect of ownership structure on TT?
- Which instruments can be employed for the effective monitoring of technology transfer within the electronics sector
- what is the relationship between the nature of the technology and the effectiveness of its transfer

# Preliminary Results

Total revenue  
2003/4 R27.2 b/  
2004/5 R29,7b

70% of SA workforce

70% of SA workforce



Gauteng province

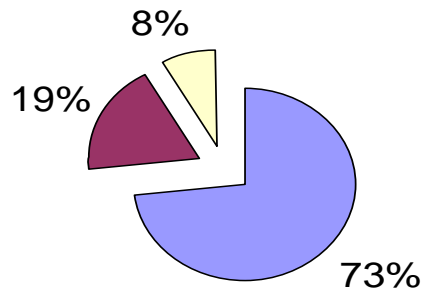
Cosmopolitan 8  
million people

18 810 square  
kilometres

33.9% to GDP of SA  
& 10% Africa's GDP

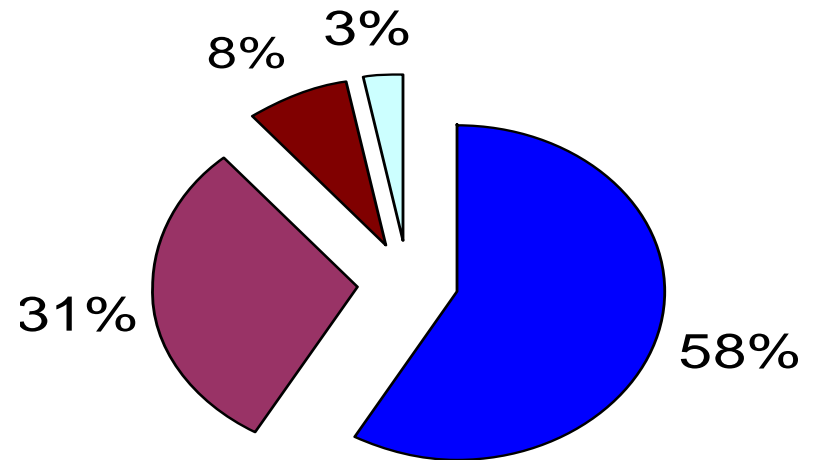
# Preliminary Results

## Ownership



■ 100% foreign owned 
 ■ <50% foreign owned 
 ■ 50<X%<100

## Number of suppliers



■ None 
 ■ More than 1 
 ■ Single 
 ■ N/R

	Growing Mkt	Low Prod_Costs	Exist_Know_Base
Important	81%	53%	58%
Not Important	8%	28%	22%

# Preliminary Results

Co-op with Local firms	R&D	6
	Formulation of standards	4
	Components procurement	21
Parent Co assistance	Joint R&D	14
	Training	19
	Plant&Equip maintenance	11
Local supplier relationship	Supplier visits & audits	17
	Promotion of learning	13
	Provision of equipment	8
Contents of production document inflow from Parent	patents	14
	Product knowledge	21
	Announcement on Cost & Qty	11
	Introduction to new pract.	13
	Production standards	12



# Expected contributions

- Holistic definition of the process and conditions most ideal for effective transfer of technology from FDI to the local economy: Generation of theories and models
- Policy suggestions for state institutions with an influence and interest on FDI and the development of a knowledge based economy

The end

Co-op with Local firms	R&D	0.17
	Formulation of standards	0.11
	Components procurement	0.58
Parent Co assistance	Joint R&D	0.39
	Training	0.53
	Plant&Equip maintenance	0.28
Local supplier relationship	Supplier visits & audits	0.47
	Promotion of learning	0.36
	Provision of equipment	0.25
Contents of production document inflow from Parent	patents	0.39
	Product knowledge	0.58
	Announcement on Cost & Qty	0.28
	Introduction to new pract.	0.36
	Production standards	0.33