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

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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

<table>
<thead>
<tr>
<th>Sub-sector</th>
<th>Sector Size Eu(billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telecoms</td>
<td>12</td>
</tr>
<tr>
<td>Information Technology</td>
<td>6</td>
</tr>
<tr>
<td>Aerospace</td>
<td>1</td>
</tr>
<tr>
<td>Defence</td>
<td>1</td>
</tr>
<tr>
<td>Instrumentation &amp; Process Control</td>
<td>1</td>
</tr>
<tr>
<td>Security</td>
<td>0.13</td>
</tr>
<tr>
<td>Automotive</td>
<td>0.13</td>
</tr>
<tr>
<td>Power</td>
<td>0.5</td>
</tr>
<tr>
<td>Other</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Eu 22.26 billion</strong></td>
</tr>
</tbody>
</table>
Success stories: Integration

- Netstar, and others: Vehicle Tracking Systems
- Conlog: Vehicle Security Systems
- Eloptro: Airborne Systems Camera
- Spescom, Conlog: Prepayment solutions
- Psitek: Community Telecoms
- Omnilpes, Poynting: Antennadesign, manufacture
- CBI: Magnetic earth leakage systems
- Tellumat: Point to point μ-wave subsystems
- SACO Systems: RFID, Asset & product Tracking Systems
- SAME: 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): Rollout of Telecoms infrastructure in Malaysia

Ref: A DESCRIPTION OF THE SOUTH AFRICAN ELECTROTECHNICAL INDUSTRY
www.savant.co.za 06/04
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

FDI

MNE

NGOs

SABS & NML

Higher Education Institutions

Science Councils

Suppliers/IP

DTI/DST/GEDA
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 extend 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

- Gauteng province
  - Cosmopolitan 8 million people
  - 18 810 square kilometres
  - 70% of SA workforce
  - Total revenue: 2003/4 R27.2 b, 2004/5 R29.7b
  - 33.9% to GDP of SA & 10% Africa’s GDP
## Preliminary Results

### Ownership

- 73%: 100% foreign owned
- 19%: <50% foreign owned
- 8%: 50<X%<100

### Number of suppliers

- 58%: None
- 31%: More than 1
- 3%: Single
- 8%: N/R

### Table

<table>
<thead>
<tr>
<th></th>
<th>Growing Mkt</th>
<th>Low Prod_Costs</th>
<th>Exist_Know_Base</th>
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</thead>
<tbody>
<tr>
<td>Important</td>
<td>81%</td>
<td>53%</td>
<td>58%</td>
</tr>
<tr>
<td>Not Important</td>
<td>8%</td>
<td>28%</td>
<td>22%</td>
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</table>
## Preliminary Results

<table>
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<tr>
<th>Category</th>
<th>Activity</th>
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<tr>
<td><strong>Co-op with Local firms</strong></td>
<td>R&amp;D</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Formulation of standards</td>
<td>4</td>
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<tr>
<td></td>
<td>Components procurement</td>
<td>21</td>
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<tr>
<td><strong>Parent Co-assistance</strong></td>
<td>Joint R&amp;D</td>
<td>14</td>
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<td></td>
<td>Training</td>
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<td>Plant &amp; Equip maintenance</td>
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<td><strong>Local supplier relationship</strong></td>
<td>Supplier visits &amp; audits</td>
<td>17</td>
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<td></td>
<td>Provision of equipment</td>
<td>8</td>
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<tr>
<td><strong>Contents of production document inflow from Parent</strong></td>
<td>patents</td>
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<td>Product knowledge</td>
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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
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