Improving access to technology for enhanced industrial development of Kenya

By

The Board and Management of the Kenya Industrial Research and Development Institute, KIRDI

Presented to Ministry of Trade and Industry and Stakeholders, October 17th, 2006
CONTENT OF PRESENTATION

1. Introduction
2. Drivers and justifications for Industrialization and Competitiveness
3. Role of R&D in industrialization
4. Role of KIRDI in industrialization
5. Grand strategy
6. Recommendations
INTRODUCTION

1. APRECIATION

2. REFOCUSSING
   - THE BOARD & MANAGEMENT IS REFOCUSSING KIRDI’S ACTIVITIES TO SUPPORT INDUSTRIALIZATION

3. PURPOSE
   - THE BOARD & MANAGEMENT HAS PREPARED A CONCEPT
   - KEEN TO RECEIVE INPUTS
DRIVERS AND JUSTIFICATIONS FOR INDUSTRIALIZATION & COMPETITIVENESS
DRIVERS FOR INDUSTRIALIZATION & COMPETITIVENESS

1. Policy Drivers for Industrialization in Kenya
   - Vision 2020
   - Vision 2030
   - MTI Strategic Plan
   - Economic Recovery Strategy (ERC 2003-2007)

2. Other Drivers
   - Millennium Development Goals
   - Agenda 21- Sustainable Development
   - NEPAD
3. The Sessional Paper No 2 of 1997 visualizes Kenya becoming a Newly Industrializing Country (NIC) in the year 2020 and joining the same league with the Asian tigers like Malaysia, Singapore and Korea.
DRAFT VISION 2030

4. Envisages a globally competitive and prosperous nation with high quality of life by 2030

- Per capita income ranking among the five highest in Africa
- Eliminating absolute poverty and building an equitable and just society
- Becoming Africa’s most competitive economy
- 10% growth in GDP for the next 25 years
5. Draft Vision 2030 Stresses

- Agricultural value addition,
- Knowledge based industry,
- Tourism and outsourcing

6. Draft Vision 2030 Envisages

- Achieving an efficient export oriented manufacturing sector by 2030

This requires that Kenya adopts manufacturing value adding practices
Strategic Plan MTI

7. The Strategic Plan of MTI Envisages

• Developing an integrated industrial policy
• Developing an industrial master plan
• Promoting acquisition of technology for the growth of SMEs
• Promoting Innovation through R&D and technology transfer
• Promotion of protection of Intellectual property rights
• Promoting ICT
• Enhancing capacity building within industries
8. Indicators of industrialization and industrial competitiveness

- Manufacturing Value adding per capita (MVA) measures the level of industrialization of a country.

- Manufactured exports per capita is a measure of the ability of a country to produce goods competitively.
## 9. Levels of Industrialization

### MVA as % GDP

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<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>KENYA</td>
<td>9.6</td>
<td>10.1</td>
<td>10.3</td>
</tr>
<tr>
<td>KOREA</td>
<td>22.8</td>
<td>28.8</td>
<td>35.1</td>
</tr>
<tr>
<td>MALAYSIA</td>
<td>19.4</td>
<td>26.5</td>
<td>36.9</td>
</tr>
</tbody>
</table>
10. Indicators of industrialization

Growth in Manufacturing Value adding in million Kshs

- 2001: 99,777
- 2002: 101,748
- 2003: 109,965
- 2004: 127,502
- 2005: 148,188

Factors of growth

- Increase in inputs and volume of outputs and NOT
- Improvement in efficiency and productivity
11. Justifications for industrialization of Kenya

- High level of Poverty
- High Level of Unemployment
- High Pressure on Resources & Space
- Over Dependency on Agro-based Economy
12. Justifications for industrialization of Kenya

High level of Poverty

- Among the 27 poorest Nations
- About 60% live below $1 a day
- GNP: $400

There is need to considerably reduce the level of poverty
13. Justifications for industrialization of Kenya

High Level of Unemployment

- 40% of the Population is Unemployed
- Graduates picking Tea and Riding “Boda boda”
- Agriculture employs over 70% of the labor force

There is need to promote manufacturing value addition to compliment the role of agriculture on economic development
ROLE OF R&D IN INDUSTRIAL DEVELOPMENT
1. For Kenya to industrialize and become competitive, it requires affordable, efficient and clean technologies

- Efforts are required to provide technologies
  - Promote SMEs and increase their productivity
  - Promote manufacturing value addition
  - Promote export oriented industries
2. KAM Statistics, 2006, indicates that

- Modern technologies are required by Kenyan industries in order to remain competitive.

- Kenyan industries currently use relatively old technologies compared to its neighbors, that is Tanzania and Uganda.
3. Sources of Technologies

Traditionally technologies can be availed through:

- Innovation and R&D
- Commercialization of Inventions
- Patent documentation
- Reverse Engineering
- Technology Acquisition through licensing
4. Sources of Technologies in Kenya

Currently Kenya obtains its plants and equipments as follows (KAM Statistics):

- 7 % locally
- 93 % imported
  - 19 % from Germany
  - 17 % from India
  - 14 % from UK
  - 8 % from Japan
  - 7 % from Italy and
  - 6 % from China
  - 3 % from USA
5. Barriers to access to technologies through innovation and R&D

Currently technology transfer from R&D institutions to industries is low because

- Low R&D funding
- Weak linkages between R&D and industries
- Lack of technology transfer culture
6. Weak infrastructure for reverse engineering

Efficient technology transfer to Kenyan industries has been hampered due to

- Lack of industrial and technology information service
- Limited use of patent Information
- Uncoordinated reverse engineering in the informal sector
7. Weak infrastructure for Prototype Development and business incubation services

Currently KIRDI is the major institution that offers prototype development facility to inventors and innovators.

Concept of Business incubation is just picking up in Kenya.
8. Weak infrastructure for commercialization of local inventions

- Intellectual Property (IP) Audit in 2004
  - Weak mechanism to link inventor with investor
  - Financing IP asset development difficult

- The IP Audit report recommended establishment of a center for commercialization of inventions by Kenyan inventors
  - Connect inventors with investors
  - Source venture capital
  - Assist inventors with business skills, marketing and licensing
  - Provide business incubations services
9. Ideal Technology Transfer Policy

Increase in local content of technology with time
## 10. Low R&D funding

<table>
<thead>
<tr>
<th>2000</th>
<th>R&amp;D Expenditure in billion dollars</th>
<th>R&amp;D expenditure % GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>KENYA</td>
<td>0.05</td>
<td>0.3</td>
</tr>
<tr>
<td>Egypt</td>
<td>0.4</td>
<td>0.2</td>
</tr>
<tr>
<td>South Africa</td>
<td>3.1</td>
<td>0.7</td>
</tr>
<tr>
<td>Asian tigers (NIC)</td>
<td>53.5</td>
<td>2.3</td>
</tr>
<tr>
<td>India</td>
<td>20.8</td>
<td>0.7</td>
</tr>
<tr>
<td>Brazil</td>
<td>13.1</td>
<td>1.0</td>
</tr>
<tr>
<td>Japan</td>
<td>106.4</td>
<td>3.1</td>
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**NOTE:** EU plans 3 % by 2015, NEPAD recommends 6 % in order for Africa to catch up
## 11. Low R&D funding of industrial research

<table>
<thead>
<tr>
<th>R&amp;D INST. Recurrent</th>
<th>2001/02</th>
<th>2002/03</th>
<th>2003/04</th>
<th>2004/05</th>
<th>2005/06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, KARI</td>
<td>801</td>
<td>821</td>
<td>862</td>
<td>865</td>
<td>1,478</td>
</tr>
<tr>
<td>Health, KEMRI</td>
<td>479</td>
<td>504</td>
<td>825</td>
<td>852</td>
<td>852</td>
</tr>
<tr>
<td>Fishery, KEMFRI</td>
<td>205</td>
<td>209</td>
<td>209</td>
<td>209</td>
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<tr>
<td>Industry, KIRDI</td>
<td>131</td>
<td>124</td>
<td>124</td>
<td>126</td>
<td>126</td>
</tr>
</tbody>
</table>
12. R&D Funding - Recurrent

- KEMRI - 32%
- KEMFRI - 8%
- KIRD - 5%
- KARI - 55%
ROLE OF RESEARCH

13. Proposed national strategic objectives on innovation and technology transfer

There is need to

- Establish national industrial and technology information center
- Develop national industrial research programs in key strategic clusters
- Establish Industrial Research Fund
- Establish Center for Commercialization of local inventions
- Promotion of technology oriented business incubation services
- Develop policy for technology management
ROLE OF KIRDI ON INDUSTRIALIZATION
1. Conceptual Linkages

Universities

- Teaching
- Extension

R&D Institutions (KIRDI)

- Capacity Building
- New knowledge through R&D
- Knowledge Transfer through dissemination
3. Identifying KIRDI’s Research Products

The direct product of research is new knowledge. It can be in the form of

- Publication
- New Technology
- New Product
- New Process
- Improvement in existing product, process or technology
4. Making R&D relevant at KIRDI through Knowledge Transfer

- Publication a traditional R&D output
- The dissemination of knowledge through publications is not enough.
- R&D is only useful if its products can lead to
  - Economic development
  - Industrialization
  - Job creation
  - Poverty Reduction

It is only through transfer of knowledge that a R&D Institution can become relevant to the society.
5. Evaluation of the Impact of R&D from KIRDI

The contribution of R&D Institutions towards a country’s development can be measured through quantity of:

- No of technologies (IP Assets) generated
- No of technologies transferred
- No of SMEs created through KIRDI’s technologies
- Companies supported through consultancies and capacity building
- Jobs created based on intervention of KIRDI
- Increase in sales of companies working with KIRDI’s technologies
6. Injecting Entrepreneurial Approaches to R&D

R&D is NOT complete until results are utilised

- KIRDI plays the role of an Enterprise
- Industry seen as the customer
- Knowledge as the product
- Researcher as a marketer
7. Entrepreneurial Approaches to Technology Transfer

Avail technology through
- Research and Development
- Prototype development
- Commercialization of inventions and innovations
- Patent and technology information
- reverse engineering
- Technology incubation and
- Common Manufacturing Facility
8. Strengthening Research and Development at KIRDI

Notable achievements:

- KIRDI has been strong in food technology
- Some processes and technologies developed for agricultural value addition, e.g.
  - KIMBO
  - Fruit processing technology
  - Honey processing technology
  - Cotton gin,
  - Rice thresher
  - Motorized oil press
  - Master mill
  - Leather processing e.g. from fish and other exotic leather
9. Strengthening Research and Development at KIRDI

Pursue demand driven research and development in the areas of

- Food Technology
- Energy
- Environment
- Leather and Textile Engineering
- Engineering
- ICT
- Mineral resources and ceramic technology
10. Strengthening Prototype Development at KIRDY

The Engineering Development and Service Center (EDSC)

Established in 1980s with support from UNDP to

- Develop prototype from local inventors and innovators
- Product parts for industries, e.g.
  - Dies, jigs, spares and tools
  - Weighing scales manufacturers
  - Mastermill is already being fabricated and marketed in EA
- Offer specialized engineering services
- Support R&D activities

Most of the above mentioned technologies were reduced to prototypes ion EDSC
11. Strengthening Prototype Development at KIRD

The Engineering Development and Service Center (EDSC)

Strengthen EDSC

- Develop prototype from local inventors
- Product parts for industries
- Reverse Engineering
12. Strengthening Commercialization of Inventions at KIRDI

- KIRDI has been commercializing inventions from local inventors and innovators
- This has been done without proper policy
- Technology Transfer Culture has been weak

Current Situation

- IP Audit undertaken
- Draft IP policy available
- IP Office created
13. Technology and industrial information services

National Industrial and Technology Information Center

- Established by UNIDO in 1980s to
  - Provide industrial and technology information to industries and SMEs
  - Was to be the only of its kind in English speaking Africa countries
  - Its activities went down over the years due to inability to attract staff

- NIIC has been revived
  - IP protection
  - Patent mining
  - Technology and industrial information
  - ICT and software development

- KIRDI is collaborating with KIPI and WIPO on this
14. Strengthening the **Common Manufacturing Facility (CMF)** at KIRDI’s Leather Development Center

Value Addition Chain in Hides and Skin

- **Raw hides**
- **Wet Blue**
- **Crust**
- **Finished Leather**
- **Leather Products**

**SMEs** | **KIRDI** | **SMEs**
15. Summary, KIRDI can support the process of industrialization through

- Research and Development
- Prototype development
- Commercialization of inventions and innovations
- Patent and technology information
- Reverse engineering
- Technology incubation and Common Manufacturing Facility
- Technology Management

ONE STOP SHOP For TECHNOLOGY TRANSFER
16. Main Constraints

- Funding
- Human Resource (Research Scientists and Engineers)
- Equipment and research facilities

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<tbody>
<tr>
<td>Number of Researchers</td>
<td>39</td>
<td>32</td>
<td>34</td>
<td>34</td>
<td>31</td>
<td>27</td>
<td>28</td>
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Qualifications of Researchers as at 2006

<table>
<thead>
<tr>
<th>Qualification</th>
<th>PhD</th>
<th>MSc</th>
<th>BSc</th>
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<tr>
<td>2006</td>
<td>5</td>
<td>8</td>
<td>15</td>
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17. HIGHLIGHTS

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**1. Mineral Resources and Ceramics**
- Principal Research Scientist: 1 (PhD) NIL
- Senior Research Scientists: 2 (PhD/MSc) NIL
- Research Scientists: 4 (MSc/BSc) 3 (BSc)

**2. Leather and Textiles Engineering**
- Principal Research Scientist: 2 (PhD) NIL
- Senior Research Scientists: 4 (PhD/MSc) 2 (BSc)
- Research Scientists: 8 (MSc/BSc) 2 (BSc)

**3. Engineering Division (Civil, Electr, Mech and Chem)**
- Principal Research Scientist: 4 (PhD) 1 (PhD)
- Senior Research Scientists: 6 (PhD/MSc) 1 (MSc)
- Research Scientists: 10 (MSc/BSc) 3 (BSc, MSc)
18. HIGHLIGHTS

4. Environment Division (Air, water and soil)

- Principal Research Scientist 2 (PhD) 1
- Senior Research Scientists 4 (PhD/MSc) NIL
- Research Scientists 6 (MSc/BSc) 1 (BSc)

5. Food Technology Division

- Principal Research Scientist 3 (PhD) NIL
- Senior Research Scientists 6 (PhD/MSc) 3 (MSc)
- Research Scientists 10 (MSc/BSc) 4 (MSc, PhD)

6. ICT (Software dev. and Comm)

- Principal Research Scientist 2 (PhD) 1 (MSc)
- Senior Research Scientists 4 (PhD/MSc) NIL (MSc)
- Research Scientists 8 (MSc/BSc) 3 (BSc)
19. HIGHLIGHTS

7. Energy (Renewable, Conventional, management and Policy)

Principal Research Scientist 2 (PhD) 1 (CEO)
Senior Research Scientists 4 (PhD/MSc) NIL
Research Scientists 8 (MSc/BSc) NIL

8. Engineering design and development

Engineers (designers, metallurgist, Fabric, tooling, manuf) 10 1

9. Leather Development

Technologists and Designers 5 1
20. CONSTRAINST – cont.

EQUIPMENTS AND FACILITIES

- State of the art equipment, facilities and pilot plants
NATIONAL STRATEGY
NATIONAL INTERESTS

Strategic planning at the national level is driven and influenced by certain identified interests which are so dear to the nation. They can be further classified into the following critical and essential categories of interests:

• SURVIVAL
• NATIONAL SECURITY
• SOVEREIGNITY
• ECONOMIC WELLBEING
• NATIONAL UNITY AND COHESION
• NATIONAL VALUES
Once the national interests have been identified, it is the duty of the planning process to examine and analyze the issues with a view to determining appropriate strategies or measures that can best protect and promote that particular area of interest. This is arrived at by weighing various options available and the requisite resources available for employment. To address this the following elements of power can be employed singly or in combination:
NATIONAL STRATEGY (VISION) AND ROAD MAP 2020

SECTOR
1. PRESIDENCY
2. EDUCATION & RESEARCH (Pri-600,000  Sec-100,000, Uni-10,000)
3. AGRICULTURE
4. PHYSICAL INFRASTRUCTURE – Roads, Rail, Ports, Housing
5. ENERGY – Power, Fuel
6. ENVIRONMENT – Natural Resources, Water Harvesting, KWS
7. FOREIGN AFFAIRS AND TRADE
8. SECURITY – Military, Police, NSIS Restructure, NYS Trunk roads
9. ECONOMIC PLANNING & FINANCE – Grand Strategy
10. MEDIA
11. CULTURE & SOCIAL SERVICES
12. PRIVATE SECTOR

RESPONSIBILITY
Vision, Political Leadership, Grand Strategy Formulation, Implementation Coordination, Monitoring & Evaluation

Raise Enrolment, ICT Focus, PhDs as targets - Capacity Building

Food Security

Trunk roads, Privatization, Second Port, Abolish slums

Renewable Sources, Nuclear

Green Policies - Trees, Ecosystem

Globalism/ Project our National Interests

Eliminate Duplicity over Insurance, Restructure and Reform

Budgetary Planning

Propagate/ Promote Consciousness & National Interests

Ethics and Ethos

Commanding Heights

MARKETS & STATE AT 80:20% ENGAGED IN SUSTAINABLE DEVELOPMENT

PLANNING PERIOD

INDUSTRIAL TAKE OFF

2005-06 2012 2015 2020

2005/06 / 07/ 08/ 09/ 10/ 11/ 12/ 13/ 14/ 15/ 16/ 17/ 18/19/ 20
CONCLUSIONS
AND
RECOMMENDATIONS
CONCLUSIONS

For Kenya to realize Vision 2020 and 2030, there is need for:

- Paradigm Shift – Focus from Agro-based to Tech & Knowledge based Economy
- Streamline and rationalize the Generation, Acquisition and Utilization of Technology
- Embrace R&D for Economic Development
- National industrial research programs and linkages
- Increase R&D funding from 0.3 to 2% of GDP
- The Ministry of Trade & Industry to drive the industrialization process, with KIRDI as a key player
RECOMMENDATIONS

There should be deliberate and concerted efforts by the GoK to strengthen KIRDI to enhance access to Technologies through:

a) Research & Development
b) National Industrial Information Services
c) Commercialization of Inventions and Innovations
d) Prototype Development and Reverse Engineering
e) Common Manufacturing Facilities
f) Business Incubation Services
REQUIREMENTS FOR KIRDI’S NEW FOCUS

1. Increased Funding for Industrial R&D programs
2. Increased funding to Attract & Retain Qualified Researchers
3. Increased Funding to Develop the following:
   a) National Industrial Information Center
   b) Center for Commercialization of Invention & Innovation
   c) Center for Prototype Development & Reverse Engineering
   d) Expand common manufacturing facilities
   e) Establish business incubation centers
KIRDI will require increased funding to the tune of KSh. 1b per year for the next ten years

“We need to embrace Research as a Nation as the Solutions to the Myriads of Problems Lie in there.

Lets Put our Money where our Mouth is!
THANK YOU