



**Tshwane University
of Technology**

We empower people

Development Models of Science Parks – Finance & Economic Impacts

Rasigan Maharajh
Science Park Seminar
DST, COFISA & Innovation Hub
7th June 2007, Tshwane





Outline

- Introduction
- Innovation Indicators
- OECD Measures of Innovation
- Developing Country Measures:
 - Unique?
- Concluding Challenges





Introduction

- Local Economic Development is important for
 - Growth in Productivity & Competitiveness
 - Social Cohesion
 - Good governance a.k.a. Accountability
- Science Parks contribute to
 - Capacity mobilisation
 - Capability formation
 - Competency creation
- National Systems of Innovation provide the conceptual framework to
 - Coordinate knowledge resources
 - Build linkages between public & private enterprises
 - Analyse systemically and forge policy solutions





Policy Definitions

- Narrow STI:
 - Innovations in products, services, processes, & institutional strategies
- Systems of Innovation:
 - Totality of know-how in a firm, industry, sector, cluster, region or nation
 - Functional & dysfunctional arrangements
 - Coordination challenge





Innovation Studies

- Innovation research seeks
 - to understand the sources, mechanisms, and effects of innovation and technological change and
 - to measure its
 - Inputs (people and the training they receive, physical and financial resources, and how they change over time).
 - Outputs (e.g., scientific papers that directly result from projects or programs)
 - Outcomes (broader social impacts, such as improved productivity, income, and well-being)
 - It is also important to understand the intermediate products of the process of technological innovation, such as knowledge spillovers and research tools
- In the absence of systematic research findings, public policy tends to rest on "common wisdom"
- However, as pointed out more than once at the workshop, research on innovation often shows common wisdom to be wrong.
 - *the relationship between relevant research findings and recent policy proposals in the areas of research joint ventures and science parks was unclear*

- NSF (2007)





Explicit STI

- ANC Discussion Document on Science & Technology for a Democratic South Africa
- Eminent Persons Review (IDRC, Commonwealth & OECD)
- Science & Technology Initiative
 - National Science & Technology Forum
 - Mass Democratic Movement + Statutory Forces
- Green Paper on Science & Technology
 - Audit of Science, Engineering & Technology in the Public Sector
 - Foresight: Preparing for the 21st Century
 - Review of Science Budget Vote
- White Paper on Science and Technology
 - Review of Science, Engineering & Technology Institutions
 - National Advisory Council on Innovation
 - National Research Foundation
- National Research and Development Strategy





Implicit STI

- Fiscal
 - Growth, Employment & Redistribution
- Monetary
 - Inflation Targeting
- Competition
 - Commission & Tribunal
- Industrial
 - National Industrial Policy Framework
- Geo-spatial Planning
 - Priority Nodes & Spatial Development Corridors
- Sustainability & Environment
 - Biodiversity Protection (including IKS)
 - Strategic Environmental Impact Assessments
 - National Sustainable Development Strategy





OECD

- originated in 1948
 - Organisation for European Economic Co-operation (OEEC)
 - to help administer the Marshall Plan for the reconstruction of Europe after World War II
- in 1961 it was reformed into the Organisation for Economic Co-operation and Development
- provides a setting where governments
 - can compare policy experiences,
 - seek answers to common problems,
 - identify good practice and
 - co-ordinate domestic and international policies
 - Wikipedia (2007)





Problem Statement

- At the heart of the knowledge-based economy, knowledge itself is particularly hard to quantify and also to price.
- We have today only very indirect and partial indicators of growth in the knowledge base itself.
- An unknown proportion of knowledge is implicit, uncodified and stored only in the minds of individuals.
- Terrain such as knowledge stocks and flows, knowledge distribution and the relation between knowledge creation and economic performance is still virtually unmapped.
 - OECD (1996)
- “know-what (facts), know-why (principles), know how (skills) and know-who”
 - Lundvall and Johnson (1994)





OECD Conceptualisation

- our understanding of what is happening in the knowledge-based economy is constrained by the extent and quality of the available knowledge-related indicators.
- Traditional national accounts frameworks are not offering convincing explanations of trends in economic growth, productivity and employment.
- Development of indicators of the knowledge-based economy must start with improvements to more traditional input indicators of R&D expenditures and research personnel.
- Better indicators are also needed of knowledge stocks and flows, particularly
 - relating to the diffusion of information technologies, in both manufacturing and service sectors;
 - social and private rates of return to knowledge investments to better gauge the impact of technology on productivity and growth;
 - the functioning of knowledge networks and national innovation systems; and
 - the development and skilling of human capital.

• OECD (1996)



OECD Instruments/ Manuals

1. R&D

2. R&D

3. Technology Balance of Payments

4. Innovation

5. Patents

6. Human Resources

1. Proposed Standard Practice for Surveys of Research and Experimental Development (Frascati Manual 1993)
2. Main Definitions and Conventions for the Measurement of Research and Experimental Development (R&D) (A Summary of the Frascati Manual 1993)
3. Proposed Standard Method of Compiling and Interpreting Technology Balance of Payments Data (TBP Manual 1990)
4. OECD Proposed Guidelines for Collecting and Interpreting Technological Innovation Data (Oslo Manual 1992)
5. Using Patent Data as Science and Technology Indicators (Patent Manual 1994)
6. The Measurement of Human Resources Devoted to S&T (Canberra Manual 1995)

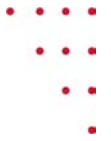




Acknowledging limitations

- there are no stable formulae or “recipes” for translating inputs into knowledge creation into outputs of knowledge;
- inputs into knowledge creation are hard to map because there are no knowledge accounts analogous to the traditional national accounts;
- knowledge lacks a systematic price system that would serve as a basis for aggregating pieces of knowledge that are essentially unique;
- new knowledge creation is not necessarily a net addition to the stock of knowledge, and obsolescence of units of the knowledge stock is not documented
 - OECD (1996)





Other countries are searching?

- The Department of Commerce is seeking public comment on issues related to the measurement of innovation.
- *“The design, invention, development and/or implementation of new or altered products, services, processes, systems, organizational structures, or business models for the purpose of creating new value for customers and financial returns for the firm.”*
- 1. Improvement of the underlying architecture of the U.S. System of National Accounts to facilitate development of improved and more granular measures of innovation and productivity.
- 2. Identification of appropriate economy-wide and sector-specific indicators that could be used to quantify innovation and/or its impacts.
- 3. Identification of firm-specific data items that could enable comparisons and aggregation.
- 4. Identification of specific “holes” in the current data collection system that limit our ability to measure innovation.
- www.innovationmetrics.gov.

- From Federal Register / Vol. 72, No. 71 / Friday, April 13, 2007 / Notices





Concluding Challenges

- More Research for better evidence-based policy-making
 - What do we know about the process of innovation and its effects?
 - What impact have our policy interventions created?
 - Local issues matter
 - Regional systems?
 - National systems?
 - Continental challenges?
 - Global Integration





References

- Lundvall, B. & Bjorn Johnson (1994), "The Learning Economy", Journal of Industry Studies, Vol. 1, No. 2.
- OECD (1996), The Knowledge Economy, Paris.
- Blankley, W. , Scerri, M. , Molotja, N. & Imraan Saloojee (2006), Measuring Innovation in OECD and non-OECD Countries, HSRC Press.
- Centre for Science, Technology and Innovation Indicators (CeSTII) <http://www.hsrc.ac.za/CCUP-58.phtml>
- National Science Foundation (2007) "Advancing Measures of Innovation: Knowledge Flows, Business Metrics, and Measurement Strategies", Workshop Report, NSF 07-306, January.
- NePAD Science, Technology & Development





Thank You

i e r i
Institute for **E**conomic **R**esearch on **I**nnovation



Institute for Economic Research on Innovation