

Framework for Innovation Scorecard for South Africa

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Innovation Scorecard: Towards the Development of Composite Innovation Indicators for South Africa

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Objective



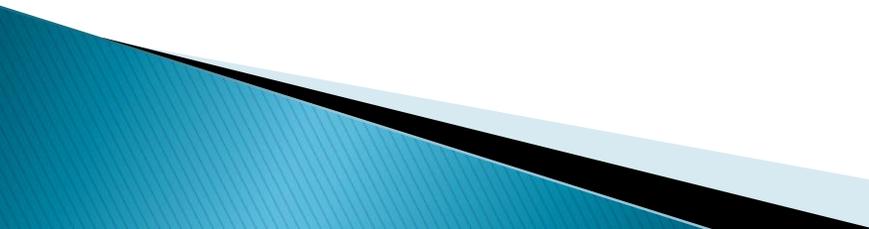
- ▶ To enhance the monitoring of the innovation system by developing Composite Innovation Indicators for South Africa

Methodology



- ▶ Review literature related to International Composite Innovation Indicators
- ▶ Identify coverage of South Africa
- ▶ Develop appropriate composite indicators for the South African national system of innovation

Overview

- ▶ Composite indicators are synthetic indices of individual variables. They combine (aggregate) a number of variables into a single valued metric.
 - ▶ Composite indicators are useful as they are able to integrate large amounts of information into easily understood formats and are valued as a communication and political tools.
 - ▶ Are used to rank countries in various performance and policy domains.
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Composite Indicators various fields



Economy

Composite of Leading Indicators (OECD)
OECD International Regulation Database (OECD)
Economic Freedom of the World Index (Economic Freedom Network)
Economic Sentiment Indicator (EC)
Internal Market Index (EC)
Business Climate Indicator (EC)

Environment

Environmental Sustainability Index (World Economic Forum)
Wellbeing Index (Prescott-Allen)
Sustainable Development Index (UN)
Synthetic Environmental Indices (Isla M.)
Eco-Indicator 99 (Pre Consultants)
Concern about Environmental Problems (Parker)
Index of Environmental Friendliness (Puolamaa)
Environmental Policy Performance Index (Adriaanse)

Composite Indicators various fields



Globalisation

- Global Competitiveness Report (World Economic Forum)
 - Transnationality Index (UNCTAD)
 - Globalisation Index (A.T. Kearny)
 - Globalisation Index (World Markets Research Centre)
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Society

- Human Development Index (UN)
 - Corruption Perceptions Index (Transparency International)
 - Overall Health Attainment (WHO)
 - National Health Care Systems Performance (King's Fund)
 - Relative Intensity of Regional Problems (EC)
 - Employment Index (Storrie and Bjurek)
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Composite Indicators various fields

Innovation/ Technology

Summary Innovation Index (EC)

Networked Readiness Index (CID)

National Innovation Capacity Index (Porter and Stern)

Investment in Knowledge-Based Economy (EC)

Performance in Knowledge-Based Economy (EC)

Technology Achievement Index (UN)

General Indicator of Science and Technology (NISTEP)

Information and Communications Technologies Index (Fagerberg)

Success of Software Process Improvement (Emam)



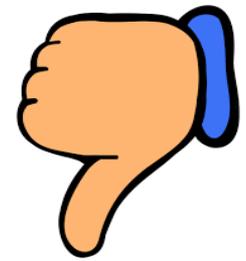
Pros and Cons



Pros:

- ▶ • Can summarise complex, multi-dimensional realities with a view to supporting decision makers.
- ▶ • Are easier to interpret than a battery of many separate indicators.
- ▶ • Can assess progress of countries over time.
- ▶ • Reduce the visible size of a set of indicators without dropping the underlying information base.
- ▶ • Thus make it possible to include more information within the existing size limit.
- ▶ • Place issues of country performance and progress at the centre of the policy arena.
- ▶ • Facilitate communication with general public (i.e. citizens, media, etc.) and promote accountability.
- ▶ • Help to construct/underpin narratives for lay and literate audiences.
- ▶ • Enable users to compare complex dimensions effectively.

Pros and Cons



Cons:

- ▶ • May send misleading policy messages if poorly constructed or misinterpreted.
- ▶ • May invite simplistic policy conclusions.
- ▶ • May be misused, e.g. to support a desired policy, if the construction process is not transparent and/or lacks sound statistical or conceptual principles.
- ▶ • The selection of indicators and weights could be the subject of political dispute.
- ▶ • May disguise serious failings in some dimensions and increase the difficulty of identifying proper remedial action, if the construction process is not transparent.
- ▶ • May lead to inappropriate policies if dimensions of performance that are difficult to measure are ignored.

DST (2002) Suggestion

“South Africa’s National Research and Development Strategy”

Quality of life

- Technology Achievement Index

Wealth Creation

- Technology-based growth

Science, engineering and technology human capital

- Researchers per thousand of workforce
- SET demography

Technical progress (improvement and innovation)

- Patents
- High-tech start-ups
- Business innovation investment
- Key technology missions

Business performance and key industrial sectors

- Technology / trade mix
- Proportion of high-tech firms
- Sectoral performance

Future R&D capacity

- University enrolments (SET proportion)
- S&T post-graduate degrees
- Matriculants with Maths and Science

Current R&D capacity

- Publications
- Global share of publications
- R&D intensity (investment)

Imported know-how

- Technology balance of payments
- Imported high-tech equipment
- Imported ICT

Requirements

- ▶ Quality of Framework
 - ▶ Normalization Process: bring the various indicators to the same unit,
 - ▶ Weights to be used
 - ▶ Aggregation Process: the way the sub-indicators are combined

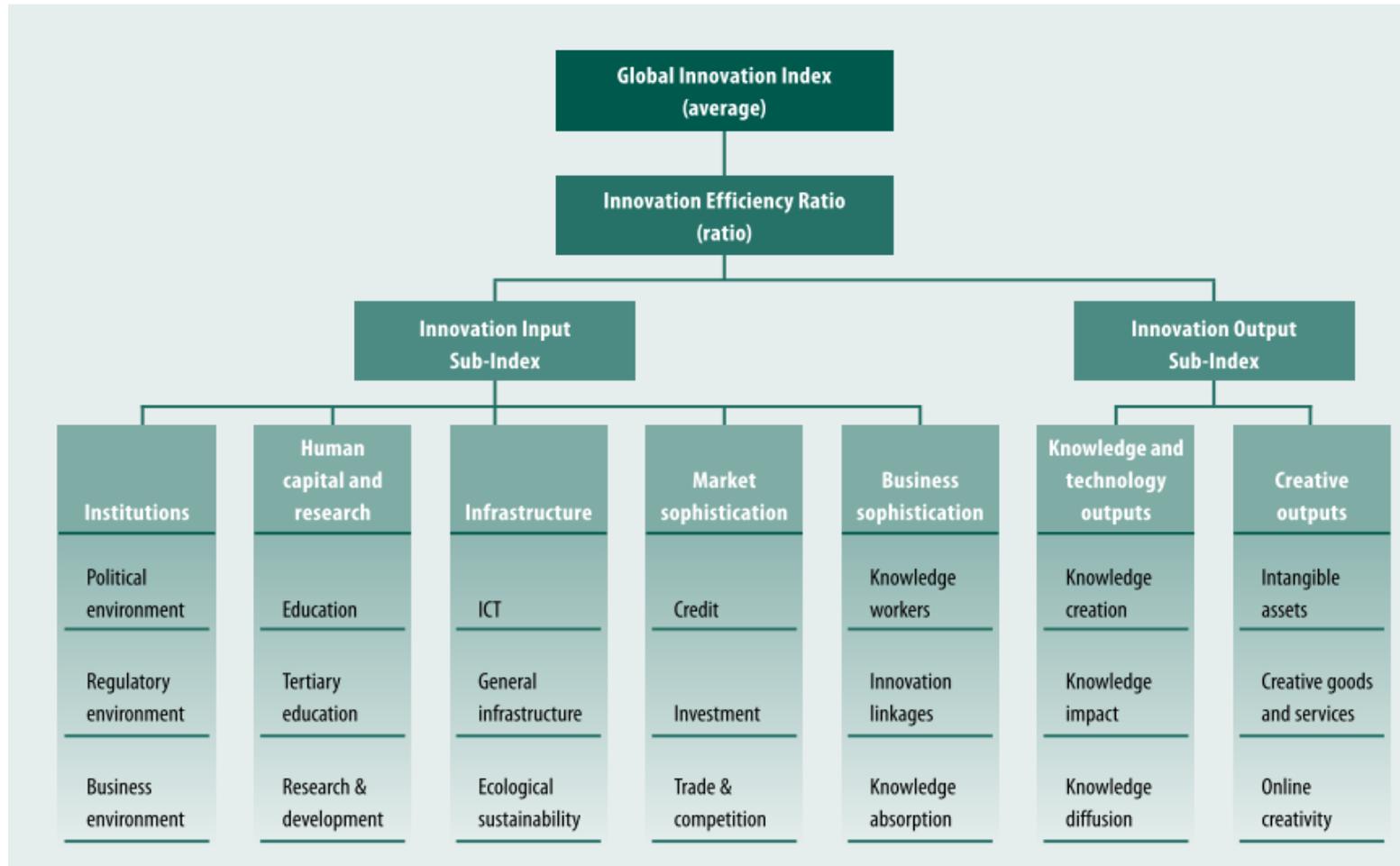
 - ▶ The normalisation across the various indicators and across countries has the result that the numerical values of the composite indicators are not comparable from one year to the next
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Indicators covering South Africa

- ▶ The Global Innovation Index ★
- ▶ Innovation Union Scoreboard
- ▶ The Abu Dhabi Innovation Index
- ▶ Bloomberg Innovation Index

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- ▶ Partial Composite Indicators
 - ▶ Global Talent Index
 - ▶ Knowledge Transfer
 - ▶ Knowledge Intensive Economy ★

Global Innovation Index-GII



GII Pillars – SA Rankings

Indicators	Score (0-100)	Rank (out of 143)
Global Innovation Index 2014	38.2	53
Innovation Input sub index	30.9	63
Innovation Output sub Index	45.6	47
Innovation Efficiency Ratio	0.70	93
Global Innovation Index 2013	37.6	58
Institutions	69.9	44
Human capital & research	28.7	70
Infrastructure	32.9	84
Market Sophistication	63.8	18
Business Sophistication	32.7	68
Knowledge & technology outputs	29.1	62
Creative Outputs	32.7	70

GII SA Rankings

Year	South Africa Ranking
2015	54
2014	53
2013	58
2012	54
2011	59
2010	51
2009	43



Knowledge Based Economy



Definition

- ▶ A knowledge-based economy describes an economy that uses information resources (technologies, skills, and processes) to achieve and accelerate economic growth potential

Importance

- ▶ Sustainable economic growth can be achieved only through knowledge/technology

Countries/regions with relevant monitoring and policies

- ▶ Australia; Massachusetts; USA; UK ;EC; ADB; Iran etc

Measuring the Knowledge Economy

- ▶ By industry (output-based measure);
- ▶ By occupation (input-based measure)
- ▶ Composite indicators



Size of South African Knowledge Economy

Year	VA KTI/GDP
1997	0.16
1999	0.17
2000	0.17
2001	0.18
2002	0.18
2003	0.19
2004	0.19
2005	0.19
2006	0.19
2007	0.20
2008	0.19
2009	0.19
2010	0.19
2011	0.19
2012	0.19

Knowledge Intensive services include education, health, business, financial, and communications services. High technology manufacturing industries include aerospace, communications and semiconductors, computers and office machinery, pharmaceuticals, and scientific instruments and measuring equipment.

Size of South African Knowledge Economy and Selected Countries

Countries	VA KTI/GDP
United States	0.40
United Kingdom	0.35
South Korea	0.29
Turkey	0.23
China	0.20
South Africa	0.19

South African Composite Knowledge Index – Structure

Innovation and Technological Adoption

- ▶ Royalty and License Fees Payments and Receipts
- ▶ Scientific and Technical Journal Articles
- ▶ Patent Applications Granted by the USPTO

Education and Training

- ▶ Secondary Enrolment ratio
- ▶ Tertiary Enrolment ratio
- ▶ Adult literacy rate

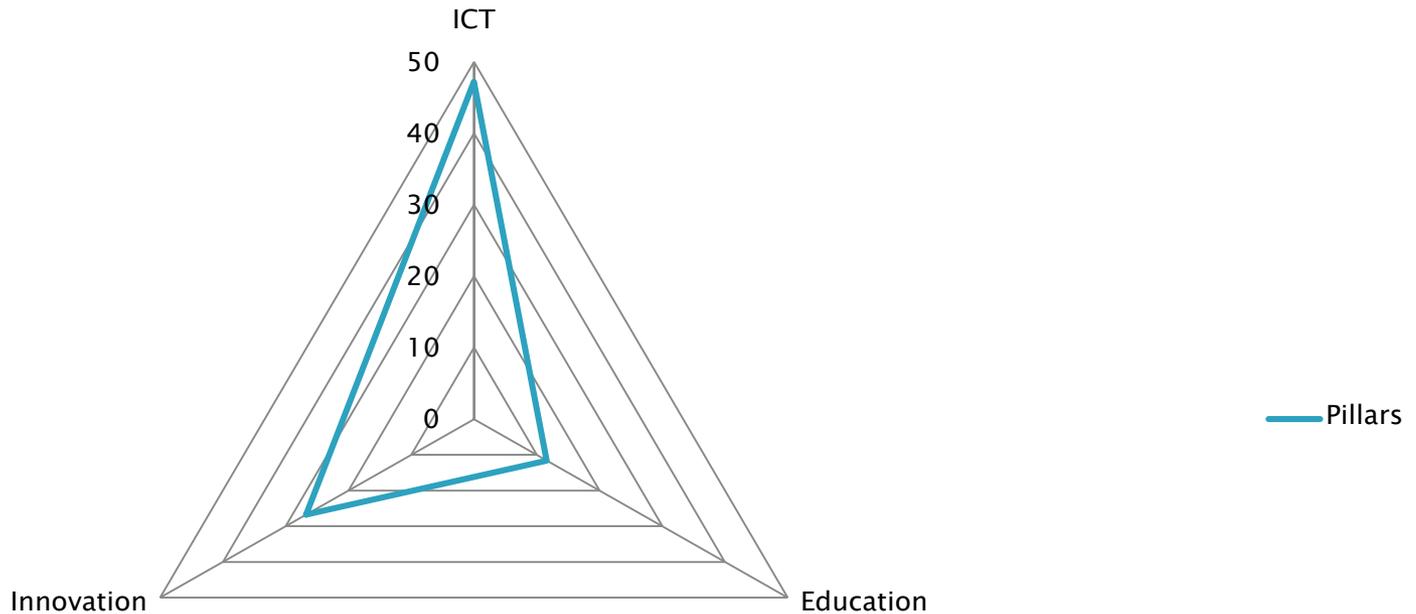
Information and Communications Technologies Infrastructure

- ▶ Telephones Per 100 People (telephone mainlines + mobile phones)
 - ▶ Percent households with computers
 - ▶ Percent households with internet
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South African Composite Knowledge Index – Pillars

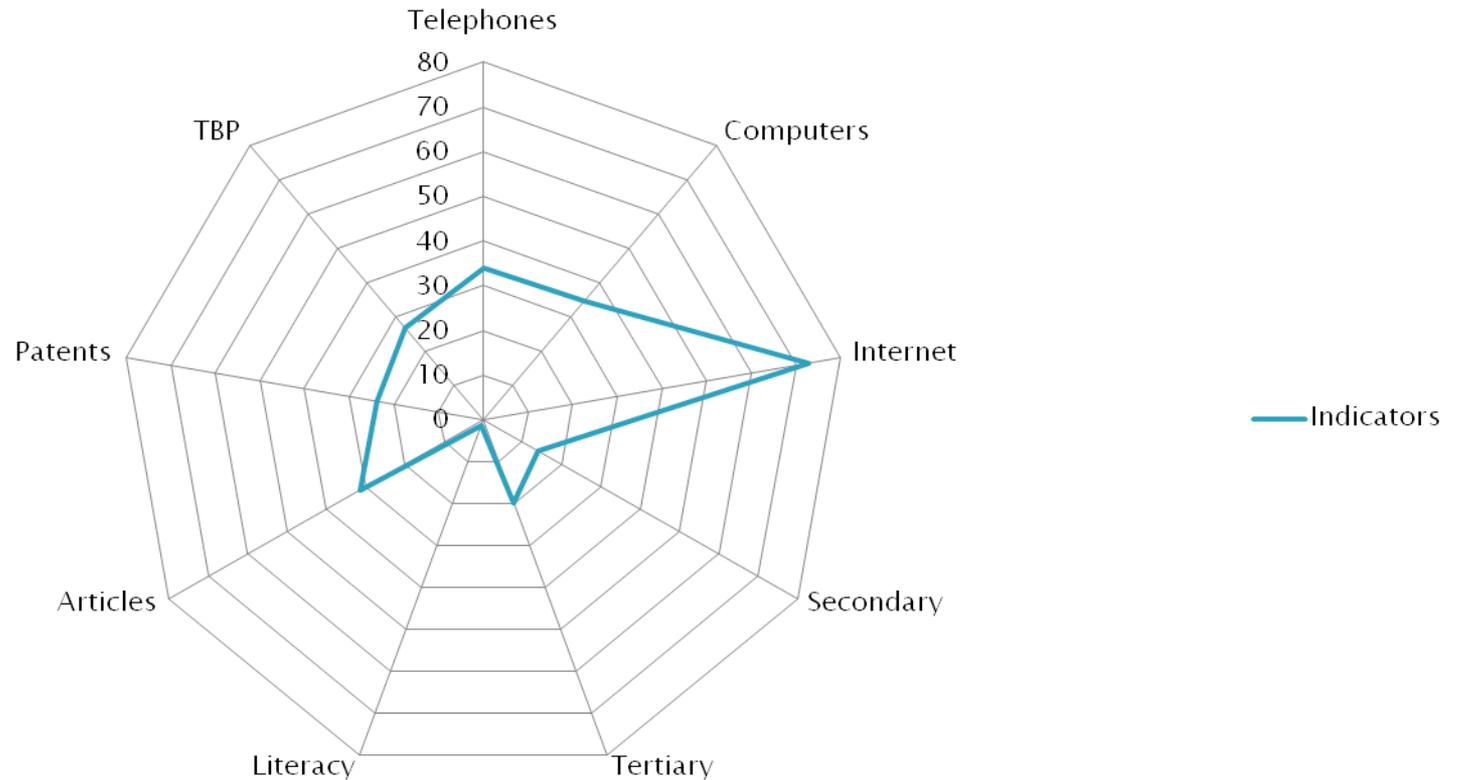
(base 2010) SACKI (2014) = 28.5

SACKI Pillars 2014



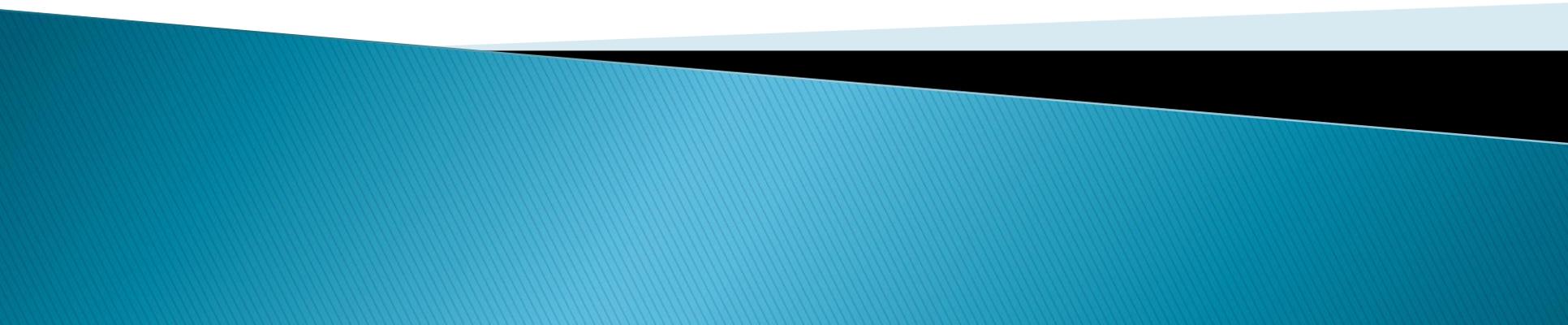
South African Composite Knowledge Index – Indicators

SACKI Indicators 2014

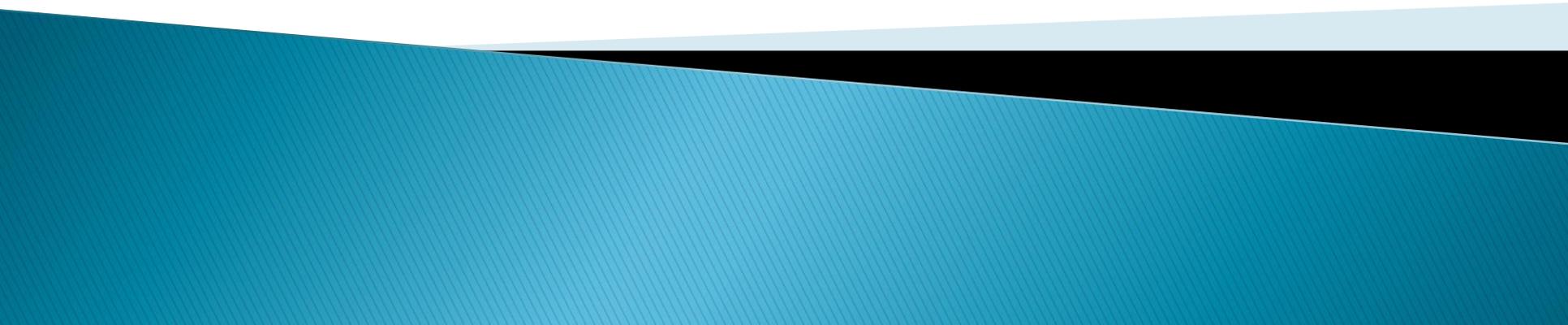


SA Innovation Index

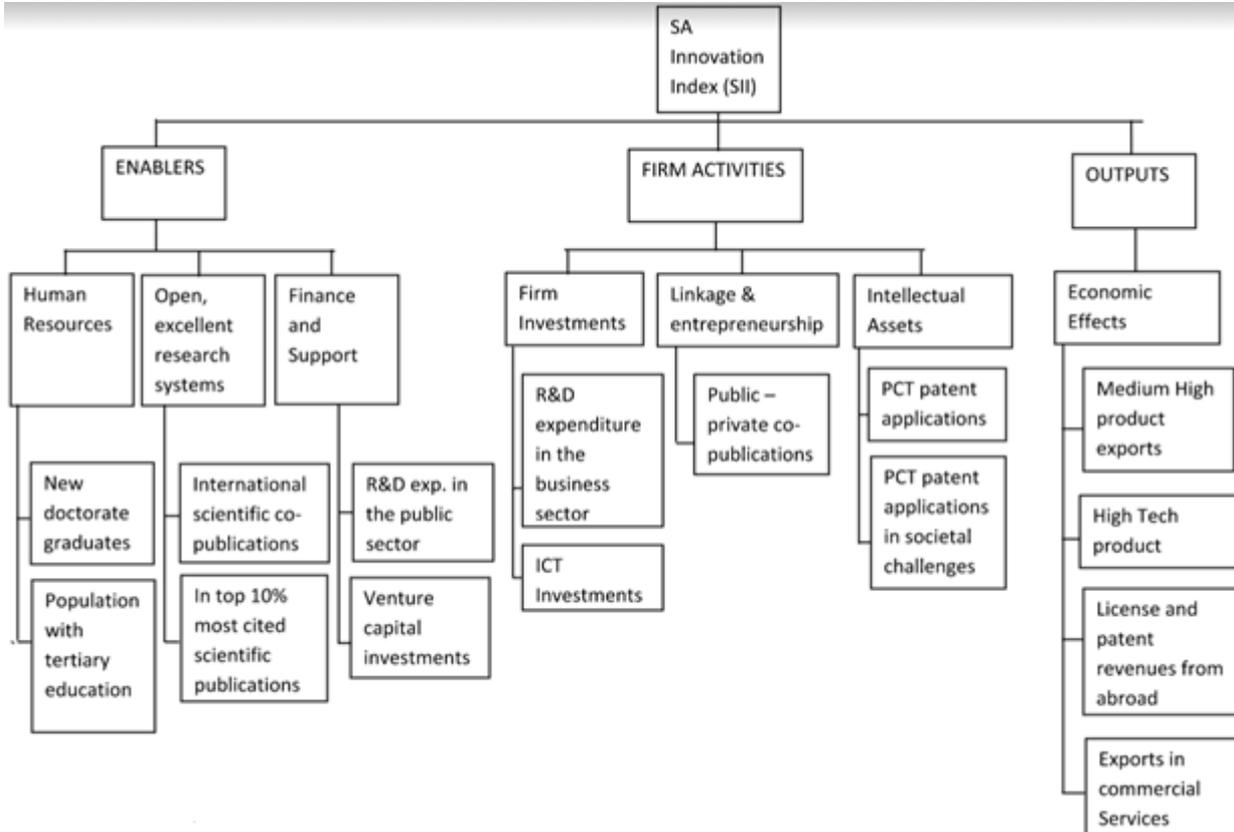
Innovation Scorecard



SA Innovation Index

- Structure as per Innovation Union Scoreboard
 - Monitoring instrument of European Commission
 - Assessment of the innovation performance of the EU27 Member States
 - Three pillars – enablers; firm activities; outputs
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SA Innovation Index



SA Innovation Index 2010–14

Enablers

Type/Indicators	Growth/Decline
ENABLERS	
New Doctorates per 1000 population aged 25–34	0.43
% population aged 20–64 having completed tertiary education	0.15
International scientific co publications per million population	0.52
Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications in the country	0.16
R&D expenditure in the public sector (% of GDP)	0.027
Venture capital (% of GDP)	-0.49

SA Innovation Index 2010-14

Firm Activities

FIRM ACTIVITIES	
R&D expenditure in the business sector (% of GDP)	-0.108
Public Private co-publications per million population	0.27
PCT Patent applications per billion GDP	-0.16
PCT Patent applications IN SOCIETAL CHALLENGES per billion GDP	-0.06
ICT Investments as % of GDP	-0.09

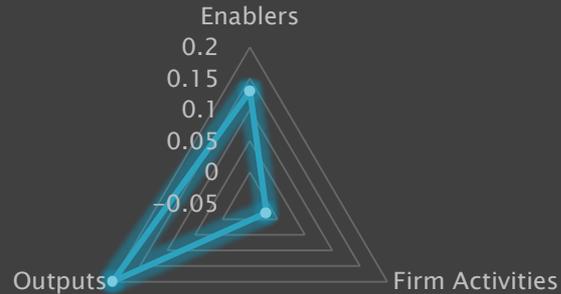
SA Innovation Index 2010-14

Outputs

OUTPUTS	
Licence and patent revenues from abroad as % of GDP	0.51
Contribution of High Tech product exports to total exports	0.32
MH Tech product exports to total Exports	0.009
Contribution of exports in commercial services to total exports	-0.038

SA Innovation Index 2010-14

South African Innovation Performance
Growth 2010-2014



SAIPG = 0.11
Outputs > enablers
Firm negative

Recommendations 1

- ▶ There are a number of international composite innovation indicators covering South Africa. These indicators can be utilised in order to inform NACI about the country's relevant innovation position internationally. The Global Innovation Index and the Innovation Union Scoreboard are important in the above context.
- ▶ NACI should prepare detailed analyses of South Africa for each new issue of the ab indicators



Recommendations 2

- ▶ Partial innovation indicators are particularly useful for addressing issues of priority in the policy community. Indicators recommended are those related to:
- ▶ Knowledge Intensive (based) Economy/investment
- ▶ Technology Transfer from the universities and research organisations to industry
(commercialization; collaboration, trained people)
- ▶ Human Talent (talent environment; quality of labour force; higher education; compulsory education etc)
- ▶ Government priorities in innovation



Recommendations 3

- ▶ The “South African Composite Indicator” should be monitored regularly.
- ▶ The Innovation Scorecard should be expanded to include a social impact/social innovation.
- ▶ The indicator should be developed to include historical values (2000).



Recommendations 4

- ▶ A number of international composite indicators include South Africa. However, often the developers do not have access to all South African data. NACI should monitor these efforts and offer to provide the missing indicators.



Any Questions???

