

Mining-related National Systems of Innovation in Southern Africa: a Regional Perspective

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TIPS Conference
University of Johannesburg
14 June 2016



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Outline

Part of larger research project on Regional Industrialisation supported by UNU-WIDER

- Rationale and research questions
- Key findings
- Implications for regional cooperation

Rationale and Research questions

- Resource-based industrialisation requires substantial domestic knowledge intensification efforts (de Ferranti et al. 2002; Blomström and Kokko 2007; Wright and Czelusta 2004, 2007)
- National System of Innovation (NSI) literature emphasizes the systemic and dynamic components of domestic innovation ecosystems (Freeman 1995; Viotti 2002; Lundvall 2010)
- **What is the role of mining-related NSIs in Botswana, Zambia and Zimbabwe?**
- Assessing NSIs in isolation risks missing important dynamics related to skills development and competence building across borders.
- **What is the role of South Africa in relation to these three NSI?**
- Policy implications

Previous Research

- Most research focuses on the competitiveness of SA mining inputs cluster (Walker and Minnitt 2006; policy report by Jourdan)
- SA is the hub of a regional value chain for goods and services (Fessehaie, 2015):
 - Dominant player but losing ground.
 - Policy inconsistency across the region.
 - Room for regional cooperation around specific programmes.
- All countries have mining linkage development strategies – some more defined and effective than others (previous work on Zambia and Botswana in Morris et al., 2012; Fessehaie, 2012; Mbayi, forthcoming).
- Very little is known about developments in the rest of the region on mining-related NSIs; and in relation to South Africa.

Findings

What aspects of the NSI have been covered?

1. Engineering skills development
2. (Technical Vocational Education and Training)
3. R&D and Innovation
4. Competitiveness of the domestic engineering consultancy services

Engineering Skills Development

- Decline of mining-related skills devt in Zambia (1990s), Zimbabwe (2000s) and most recently Botswana
 - Lack of infrastructure
 - Poor institutional capability (staff vacancy rates and qualifications)
 - Poor human capital planning (private universities, international agreements, shifting demand for eng skills)
- Variations in support from mining companies (Bots vs. Zambia)

Regional dimension

Country	Students studying abroad		Top five destinations for outbound mobile students	Number of incoming foreign students
	Total	Outbound mobility rate %		
Botswana	9 471	71.6	South Africa (7,012), Australia (792), UK (700), USA (488), Malaysia (152)	n/a
South Africa	5 619	0.8	USA (1,971), UK (1408), Australia (643), Cuba (340), Germany (196)	49 979
Zambia	3 610	14.7	South Africa (1,363), USA (859), UK (541), Australia (317), Namibia (228)	n/a
Zimbabwe	16 669	29.9	South Africa (10,586), UK(2,741), USA (1,999), Australia (892), Namibia (71)	n/a

Institutional frameworks lag behind: 2000 SADC Regional Qualification Framework

SA qualification to circumvent limited recognition of regional qualifications

Not disaggregated but SU and UCT data shows different patterns (numbers and UG/PG)

Weak cooperation: Only UB and UNZA cooperation with SU/UCT – most relationships are informal

UNZA – UZ



R&D and Innovation

Only Botswana seems positioned to build a dynamic NSI

Botswana Institute of Technology, Research and Innovation (BITRI)

Botswana Innovation Hub (BIH)

vs.

Decline of Zimbabwe NSI

Institute of Mining Research (IMR)

Scientific and Industrial Research and Development Centre (SIRDC)

Regional dynamics

SA leading capabilities in the region

CSIR: lack of regional leadership (SIRDC/BITRI)

Mintek: no mandate although commercial interest

South African Minerals to Metals Research Institute (SAMMRI)

Wits Centre for Mechanised Mining Systems

Significant % regional researchers but no institutional linkages

Slow progress at SADC level but Botswana trying to have a regional reach



Engineering Consultancy Services

Regional value chain dominated by SA-based engineering firms, with significant regional skills – 2014, 14% foreign workers in the mining sector (South Africa Chamber of Mines)

Domestic firms relegated to lowest value added segments

No MRA

Regional dynamics

Except for South Africa, domestic markets are relatively open to foreign professionals

Lack of enforcement of local content provisions

Returning engineering skills struggle to enter the market

Call for more linkages between foreign and domestic engineering firms



A Regional System of Innovation?

Large-scale investment in the mining sector pulled demand for capital goods, technical skills, engineering services, mining-related technological solutions, and infrastructure = opportunities to build NSIs

Embryonic Regional System of Innovation, including:

- institutional relationships
- cross-border investment flows
- flows of mining-related goods and services
- intra- SADC flows of students, lecturers, technicians, and engineers

- 'hub and spokes' structure = South Africa as a hub

Contd.

Yet:

- SADC institutional frameworks lag behind
- But bilateral cooperation also ineffective (SA leadership?)
- SA NSI not geared to the region yet market for innovation would be large
- Significant engineering skills development for the region is taking place in SA, but these skills tend to remain in SA: Zambia biggest loser
- South Africa taps into the flows of regional skills to address its own skills deficit in engineering consultancy and R&D but very different dynamics
- Little impact on knowledge intensification outside SA

Policy Implications

- SA leadership
- Cooperation with key countries
 - Zambian high-level government official: 'regional cooperation can be driven by shared interests or by shared problems. In terms of cooperation driven by shared interests, there is a great potential for South Africa and Zambia to cooperate because of the long, shared history of the mining sector' (Field interview)*
- Cooperation across institutions (universities, TVET, associations, govt, firms) and areas
- Revising the mandate of key SA R&D institutions to target the region
- Supporting entry of regional engineers into their domestic markets
- Supporting linkages with domestic engineering firms in the region