

1. Introduction

- **Mining sector important** in shaping the economic trajectories of Botswana, Zambia, and Zimbabwe.
- SA is the hub of a regional value chain for goods and services, dominant player but losing ground.
- **Room for regional cooperation** around specific programmes.
- All countries have mining linkage development strategies – some more defined and effective than others.
- Very little is known about developments in the rest of the region on mining-related NSIs; and in relation to South Africa.

2. Rationale & Qs

- Research on RSI lagging behind.
- Resource-based industrialisation requires substantial domestic knowledge intensification efforts.
- National System of Innovation (NSI) literature emphasizes the **systemic and dynamic components of domestic innovation ecosystems**

QUESTIONS

- 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?

3. Findings

ENGINEERING AND TECHNICAL SKILLS

- **Decline of mining-related skills** development in Zambia (1990s), Zimbabwe (2000s) and most recently Botswana
- Variations in support from mining companies (Bots vs. Zambia) through different funding and placement opportunities

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

- **Skills development taking place in SA.**
- **Institutional frameworks lag behind:** 2000 SADC Regional Qualification Framework
- SA qualification to circumvent limited recognition of regional qualifications
- Weak cooperation: Only University of Bots and University of Zambia cooperation with Stellenbosch/UCT – most relationships are informal: University of Zambia– University of Zimbabwe

R&D AND INNOVATION

- **Only Botswana seems positioned to build a dynamic NSI** via BITRI and Botswana Innovation Hub
- **Decline of Zimbabwe NSI:** poorly equipped IMR and SIRDC
- **SA leading capabilities in the region, but lacking regional focus**
- The findings are consistent across: Wits Centre for Mechanised Mining Systems; Center for Science and Industrial Research (CSIR), South African Minerals to Metals Research Institute (SAMMRI)
- Mintek: no mandate for regional research although commercial interest
- 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 consultancy firms (2014, 14% foreign engineers)
- Domestic firms across the region relegated to lowest value added segments.
- Except for South Africa, domestic markets are relatively open to foreign professionals.
- **Lack of enforcement** of local content provisions (understudies)
- Call for **more linkages between foreign and domestic engineering firms**

4. Conclusions

A Regional System of Innovation?

- Large-scale mining investment pulled demand for capital goods, technical skills, engineering services, mining-related technological solutions, and infrastructure = opportunities to build NSIs
- Regional System of Innovation: ‘hub and spokes’ structure = South Africa as a hub.
- **Skills development and engineering consultancy have a strong regional footprint.**
- **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.
- SA taps into the flows of regional skills to address its own skills deficit in engineering consultancy and R&D.
- Little impact on knowledge intensification outside SA.