

## 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.