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Resources Policy

journal homepage: www.elsevier.com/locate/resourpol

The significance of mining backward and forward linkages in reskilling redundant mine workers in South Africa

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ARTICLE INFO

Keywords:

Reskilling workers
Artisanship
Mining
Backward linkages
Forward linkages

ABSTRACT

The South African mining industry employs close to half a million people. Some of the sub-sectors of the mining industry such as gold and platinum mines are regarded as labour intensive and require modernisation. To improve this situation and ensure the long term survival of the industry, the Chamber of Mines of South Africa has drawn up a strategy to modernise mining by embracing automated and autonomous technologies among others. The unintended consequences of these technologies is the reduction in labour, particularly in low skills categories. It is then prudent to reskill the affected mine workers to lessen the dire effects of redundancy. To this effect, this paper analysed mining forward and backward linkages with the aim of identifying the best path with the most absorptive capacity for redundant mine workers. Based on the economic analysis of mining linkages, it was realised that artisanship training is the relevant skill set for redundant workers.

1. Introduction

The mining industry in South Africa is generally regarded as labour intensive, particularly the narrow and steep reef mines in the Witwatersrand basin and the western parts of the Bushveld Igneous Complex (BIC). The strategy to modernise the mining industry through the use of automation or autonomous technologies (Baloyi, 2014; Moolman, 2015) will inadvertently put thousands of low level mine jobs at risk.

Modernisation is a concept developed by Chamber of Mines of South Africa (2017: p2) that “will help to improve safety and health, facilitating the quest for zero harm. It will also contribute to increased skills development, employment, exports and revenue; not to mention the knock-on effect on local communities”. As part employment creation or preservation, efforts to reskill redundant mine workers in appropriate vocations has to be undertaken.

Many of the current reskilling programmes focus on agriculture and community based activities, particularly in rural labour sending areas and most of them are not effective (Stacey et al., 2010; Solomons, 2016). Notwithstanding, there is scope to reskill miners with the aim of creating potential employees and entrepreneurs for mining supplier industries by virtue of affected workers’ knowledge of the mining industry.

It is in this context that this research sought to understand the nature and corresponding monetary value of inputs into the local mining industry. In the quest to create understanding, mining inputs

were divided into goods and services with the aim of finding out where future growth lies. The thinking was if miners are to be skilled for future employment or entrepreneurship, the area of future growth should be targeted.

To achieve this goal, resource linkages were analysed because there was a clear understanding that mining is a natural resource that creates linkages in the economy. Typically there are five resource linkage types, namely production, consumption, fiscal, spatial, and lateral linkages (Leeuw and Mtegha, 2016). The focus in this research is on production linkages, in particular forward and backward linkages. The monetary value of these linkages is generally captured by countries in their input/output tables. The importance of these linkages, particularly in developing countries, is the potential to kick-start economic activities, subject to capacitated factors of production.

South Africa, a country endowed with mineral resources and with over 150 years of mining history, has realised the value of these linkages by developing a beneficiation strategy of its minerals (Department of Mineral Resources, 2011). The value and depth of mineral resources linkages depends on a number of things such as the size and structure of the domestic economy, the importance of the mineral endowment in the global trade, the country’s factors of production in particular human resource development (HRD), the level of research and development (R&D), and political will. The capacity to accurately account for value created from the domestic mineral endowment and the capturing of appropriate rents for reinvestment in the resources sector, as well as financing well-meaning public goods can invariably

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<https://doi.org/10.1016/j.resourpol.2018.02.004>

Received 30 June 2017; Received in revised form 24 January 2018; Accepted 5 February 2018
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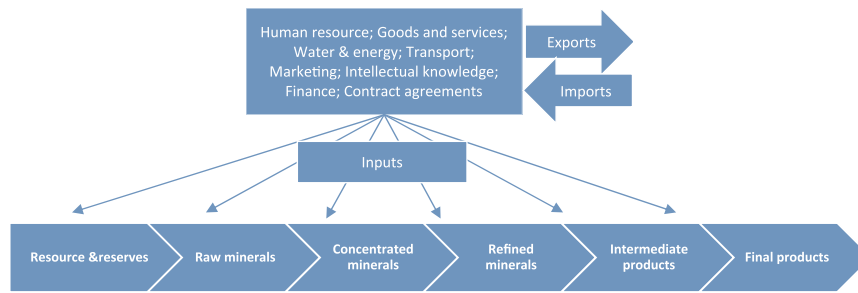


Fig. 1. Inputs along mineral sector value chain.

lead to sustainable economic activities beyond mining.

A well-executed mineral beneficiation strategy has the potential to create value nodes along the mineral value chain and each value node is capable of creating its own backward linkage envelope or area of influence consisting of a number of supplier firms. There could however be an overlap of these suppliers across different nodes as densification occurs over time. The densification in an economy or region is enhanced by clustering (Porter, 2007).

Fig. 1 shows a typical forward linkage effect in the mineral sector with each node along the value chain potentially linking back into the domestic economy. Exports and imports undermine the real impact of forward and backward linkages. Exports prematurely terminate the length of the value chain, resulting in the leakage of value with subsequent nodes being created in importing countries. It is not unusual for the value chain of developing countries to terminate after node 2 in Fig. 1.

On the other hand, imports finished goods undermine the domestic capacity to produce goods and provide services. This leads to base or primary industries in the resources sector to link to foreign firms through local agencies, with the bulk of the procurement value being accrued abroad. Under these circumstances there is very little benefit to the domestic economy.

Historically mining in South Africa has had strong linkages with the rest of economy to the extent that it led to the formation of other industries. According to Hirschman (1958), an industry (primary industry) is considered strong if it induces the formation of other local industries. The economic effects of a primary industry are even more pronounced if the inducement of other industries occurs within clusters. This feat was historically achieved by the South African mining industry in the twentieth century. Examples in this case would include the development of manufacturing capacity of hand-held rock drill machines and hydropower technology and associated equipment, and manufacturing of explosives (Pogue, 2006; Leeuw, 2012; African Explosives Limited, 2017).

The strength of mining in South Africa has gone beyond the formation of industries to the creation and support of towns. For example, the gold mining sector has created towns like Johannesburg, Welkom, Carletonville, and Evander. Today Johannesburg is the metropolitan city and the financial services hub of South Africa. Other commodities like diamonds have created towns like Kimberley in the Northern Cape Province, coal created Witbank and Secunda in the Mpumalanga Province, and PGMs are underpinning the rapid growth of towns like Rustenburg in the North West Province and Burgersfort in the Limpopo Province.

2. General overview of the South African economy

2.1. Economic overview at national level

South Africa is a constitutional democracy and has one of the most diverse economies in Africa. It was ranked the third biggest economy in Africa in 2016 after Nigeria and Egypt based on the size of their gross domestic products (GDP) in current prices. Its GDP per capita in current

prices was US\$5800 in 2016, higher than those of Nigeria and Egypt (International Monetary Fund, 2017).

The economy of South Africa was largely agrarian before the advent of large-scale mining in the latter half of the 1800s. After the discovery of large deposits of diamonds, coal, and gold, demand from mining gave rise to other industries (Fedderke and Wollnik, 2007). While mining has always been largely privatised in South Africa, the government from the 1920s established State owned enterprises in the manufacturing, utility, communication, and transport industries. These enterprises, particularly those in the manufacturing industry, underpinned the government's import substitution policy in the 1960s and 1970s. They were also an avenue to create jobs for white people under the Apartheid regime (Leeuw, 2012).

Mining and manufacturing continue to occupy a special place in the economy of South Africa, but their contribution to the GDP has been declining at the expense of the services sector which is made up of industries such as wholesale, transport, finance, and personal services. For example, in 1993 the contribution of mining and manufacturing to the GDP in 2010 constant prices were 15% and 14% respectively. Their contribution dropped to 8% and 12% respectively in 2015 (Statistics South Africa, 2016). Fig. 2 shows the relative contribution of different economic sectors to the South African GDP in 2015.

If sectors in Fig. 2 are constituted to reflect services, industry and agriculture as broad economic sectors, while government sector and taxes are excluded, it can be observed in Fig. 3 that the biggest contributor to GDP from 1993 to 2015 was services sector (finance, real estate, business services, and retail trade). In the same period, the industry sector (mining, manufacturing, construction, and utilities) was the second biggest contributor while the agriculture sector (farming, fishing, and forestry) was the least contributor. The relative proportion of services, industry, and agriculture sectors in the South African economy is typically that of developed countries and yet it is a developing country. It can also be observed in Fig. 3 that the services sector

RSA Sector GDP Contribution in 2015 Based on 2010 Current Prices

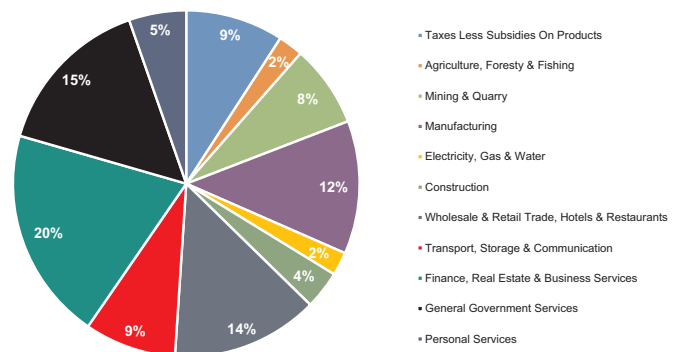


Fig. 2. Percentage contribution of industries to the South African GDP in constant 2010 prices in 2015.

Source: Statistics South Africa (2016)

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