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Research Report

Downstream processing in developing countries: Opportunity or mirage?

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Downstream processing in developing countries:

Opportunity or mirage?

by

James Bond*

Oil, gas and mineral production are capital-intensive activities that attract foreign direct investment (FDI) and generate taxes and royalties for host governments.¹ But they do not create as much employment or skills enhancement as manufacturing or service industries. In many lower income countries, raw or intermediate materials are often exported for processing in other parts of the globe. For example, although Africa possesses 26% of world bauxite reserves and produces 9% of world bauxite, it only produces 4% of primary aluminum.

Leaders of resource-rich developing countries see lack of local processing as foregone opportunities for job creation, skills development and linkages to the rest of the economy. For decades they have tried to encourage reluctant foreign investors to invest in local processing capacity. But from an economic point of view, this may be a misguided strategy because processing of crude or ore into finished products does not directly add much value.

Oil, gas and mineral processing are not very profitable businesses and their contribution to GDP is small. They can at best hope to cover long run marginal costs, with significant over- and under-shooting around its trend line. For processing to be able to overcome low profitability and consistently generate a profit, it needs to be located where there is a geographic or other advantage.

In the case of oil refining, the advantage is being located close to a major petroleum product market (e.g., Rotterdam, Singapore, US Gulf Coast) which sets prices for traded products. Refineries close to markets minimize overall transport costs, because the cost of transporting crude to these refineries is significantly lower than the cost of transporting refined products from a distant refinery. Most refineries in developing countries lose money in economic terms and need to be subsidized, either directly from treasury or by manipulating refined product prices. Thus, Africa has only 1% of world refinery throughput but 3.9% of world petroleum product consumption and 10.4% of oil production.

For aluminum smelting, the advantage is not proximity to major markets but access to cheap energy, because of the high energy cost of the transformation process. Aluminum smelters generate a positive margin over long period only by accessing electricity at prices far below average world cost, generally because of extremely cheap hydroelectricity (e.g., smelters in Ghana or Cameroon) or a contract to buy energy at very low marginal cost (e.g., Mozal in Mozambique, supplied by a joint venture of the Mozambique and South African utilities at fractions of a US cent/kWh). If a smelter cannot access cheap electricity it cannot hope to break even.

Copper will depend on both transport and energy costs. Chile, located on the Pacific with high energy costs, exports copper concentrate for processing in East Asia while landlocked Zambia processes its ore locally and exports refined copper.²

Although downstream processing has led to disappointing outcomes in the past, it does not mean that it should always be foregone. Important success stories in countries like Botswana, Indonesia, Morocco, and South Africa show there can be a case for downstream processing if conditions are right. Three criteria must be met:

- a) A significant advantage, geographic or otherwise, other than the natural resource itself.
- b) Private sector investment and ownership to ensure effective management.
- c) Processing must be carried out competitively and subsidies must be eschewed.

Under these conditions, downstream processing makes economic sense.

Although downstream processing may not have been a successful development strategy, extractive industries create other positive spinoffs. Ecosystems of firms providing support to oil, gas and mining have emerged organically around the extractive sectors. For example, oil producers like Indonesia and Nigeria have seen the creation of internationally competitive support firms in oil logistics, maintenance and services. Chile and South Africa are providers of mining services, from geologists and mining engineers to specialized banks, now operating internationally. These clusters provide employment, create world-class skills and possess strong links into the rest of the economy. They are not capital-intensive and are models for development in resource-rich countries.

For governments, the best manner to exploit the potential of extractive industries therefore seems to be to nurture related-industry clusters. Support should include creating a business-friendly investment environment, promoting small and medium-sized enterprises, and providing targeted infrastructure (information/communications technology, ports, airports). Education can assist by providing targeted vocational training in partnership with the private sector.

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¹ This note was inspired by the *Perspective*: “Infrastructure for ore: Benefits and costs of a not-so-original idea” by Louis T. Wells, Harvard Business School.

² Ores of precious metals (gold, silver, platinum) are processed close to the mine because of the high value of the metal.

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