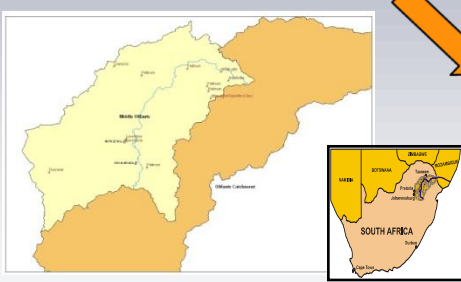


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Background and Problem Definition

Water is one of the most essential resources for human beings, economic development and the environment. In the Middle Olifants sub-basin of South Africa the mining sector represents a fast growing industry competing with other water users, like households and the agricultural sector. Although water is an essential input to industrial production only little studies have been done on industrial water use. One reason for that is little data availability and difficult data collection in the industrial sector especially in developing countries where data records are missing. However, addressing the issue of water demand, efficiency of its use and its allocation between different users is of paramount importance in water scarce countries like South Africa and future research is necessary.



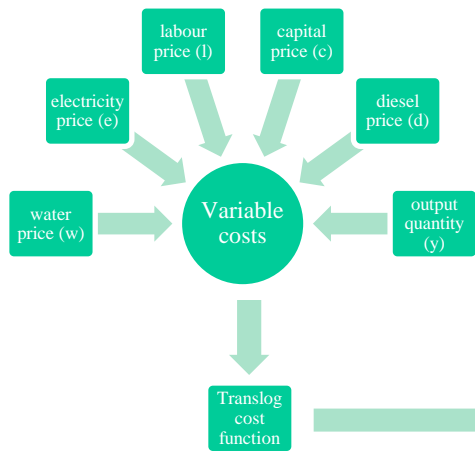
Research Question
 What is the structure of industrial water demand in the Middle Olifants sub-basin of South Africa ?

- cost shares of production factors
- own and cross price elasticities of production factors
- marginal value of water



Source: DWAF, own data collection

Methodology

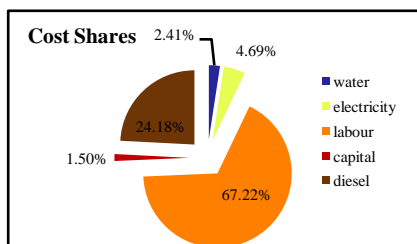


- Literature review
- Expert interviews with representatives of
 - National and local Department of Minerals and Energy (DME)
 - National and local Department of Water Affairs and Mineral (DWAF)
- Interviews with head officers of 8 mines in the Middle Olifants Area to identify cost functions for each mine. Monthly time series data from January 2004-September 2007 was collected where possible.
- Data cleaning, descriptives of cost shares of production factors and further regression analysis

• Cost share equations are estimated and the first derivative of the translog cost function with respect to water quantity is used to determine the marginal value of water.

Any cost function that exhibits a monotonic, homogenous and concave function of prices represents some well-behaved technology. In this study the translog function was chosen to approximate a second order twice differentiable restricted cost function:

Descriptive Analysis and Proceedings



Source: own calculation and presentation

The cost shares for this sample mine show that expenditures for water are relatively low compared to other production factors. Only capital costs are lower, which is due to the declining characteristics of capital expenditures. Labour represents the biggest share of variable costs. Although water is an essential input to the extraction process, its costs are very low attributable to its low prices.

After having identified the cost function for each mine a comparison of the marginal values will be done. One aggregated marginal value for the whole mining sector will be computed, which will lead to an aggregated demand function for water.

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