

SPOTLIGHT

on mining and metallurgical engineering manpower in South Africa

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The Federation of Societies of Professional Engineers (FSPE) recently conducted a survey of professional engineering manpower in South Africa. This article presents the data relevant to mining and metallurgical engineering.

FSPE in their survey attempted to determine the supply of engineers in South Africa both from local universities and by immigration. The immigrants gave some problems in that it is difficult to know whether a man who claims to be professionally qualified really is. However, it was estimated that the ratio of immigrants who claimed to be qualified to those who really are the equivalent of our local graduates was between 1,0 and 1,9 for mining engineers, and between 2,0 and 4,1 for metallurgical engineers. The difference in these ratios is not really surprising, since mining engineering is a well-defined profession whereas a fair number of metallurgical scientists can be expected to claim to have become metallurgical engineers, even though their

qualifications may not be accepted by the South African Council for Professional Engineers.

FSPE then used data from the Department of Labour on vacancies to estimate the total demand, on the thesis that, if vacancies are the difference between demand and supply, then demand is the sum of supply and vacancies. Their 'model' is shown in Fig. 1.

They ignored those who went overseas on graduating, for two reasons. Firstly, a study showed that a good proportion of those who went overseas did so for further study or to gain international experience, and returned in due course, thereby becoming immigrants. Secondly, the method of estimating immigrants relied to some extent on the university at which the first degree had been obtained, and this estimate would therefore have missed South African graduates who were immigrating back to South Africa. The two effects would thus largely cancel each other.

It is also of note that the method of calculating the demand allowed emigration or other reasons for leaving the profession to be ignored. Leaving the professional

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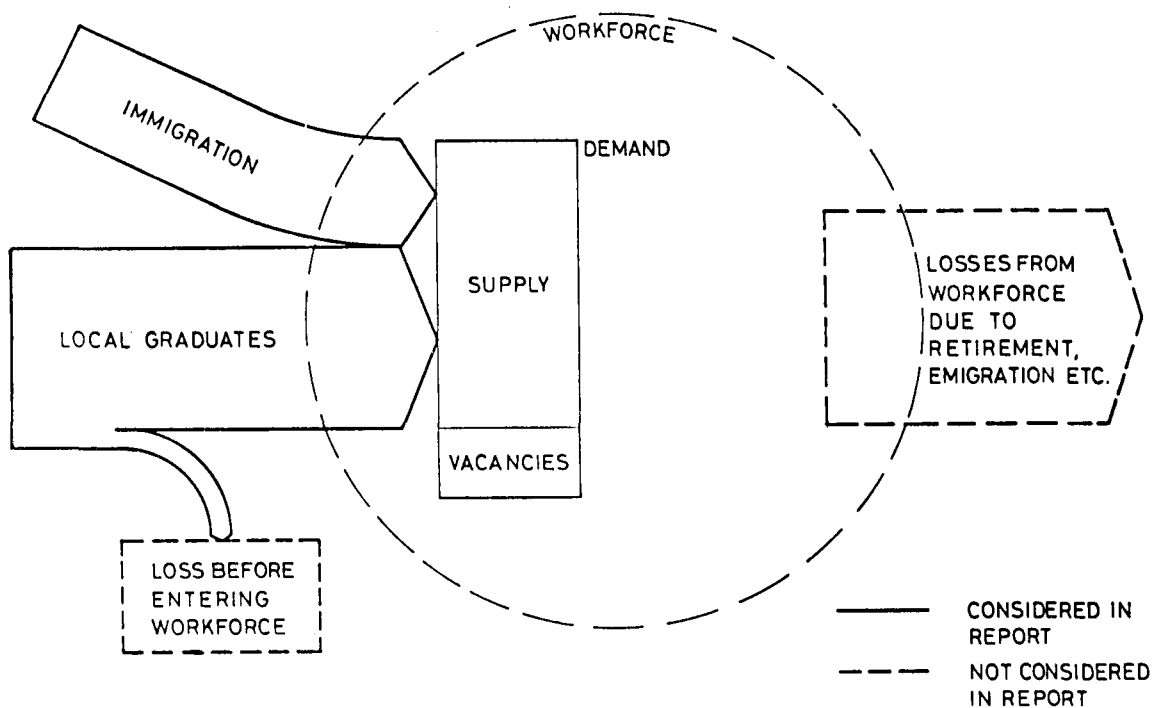


Fig. 1—The model for the total demand for professional engineers

workforce must create a vacancy; so, by measuring the vacancies, FSPE determined the losses indirectly.

In the calculation of the demand, a time lag was allowed between the creation of the supply and the measurement of the vacancies to allow the new supply of engineers time to find jobs. The Department of Labour surveys the vacancies in April every other year; so, for instance, in the calculation of the 1973 demand, the class graduating during 1972 and the immigrants arriving during the same year were added to the vacancies found in April 1973.

This method of calculating the demand seemed to smooth out fluctuations in supply and vacancies, and so permit a reasonably firm basis for short-term extrapolation. In addition, the number of local graduates in the near future could be calculated quite easily from the numbers registered at the universities, because about half of those who register finally graduate. The future immigrant supply was very difficult to estimate, particularly since there appeared to have been a marked drop in immigration after 1976. However, two estimates were made of possible future immigration, which seemed to lead to a reasonable picture of the future levels.

In this article, therefore, the historical situation is first reviewed, then some extrapolations are made into the early 1980s, and finally the results are discussed.

Historical Supply and Demand

The data on the supply during 1972, 1974, and 1976, and the vacancies during 1973, 1975, and 1977, are given in Tables I and II. Average values for the FSPE estimates of the immigration are given.

It will be noted that, even though the rates of local graduation and immigration, and, in the case of mining engineers even the vacancy rate, varied by factors of nearly 2, the calculated demand varied very little from year to year. Also given in Tables I and II is a 'linear estimate', that is, the best straight line through the data for the demand, which indicates that, during the

TABLE I
HISTORICAL SUPPLY, VACANCIES, AND DEMAND FOR MINING ENGINEERS

	1972-3	1974-5	1976-7
Local graduates	16	17	8
Immigrants	33	28	51
Supply	49	45	59
Vacancies	63	63	37
Demand	112	108	96
Linear estimate	113	105	97

TABLE II
HISTORICAL SUPPLY, VACANCIES, AND DEMAND FOR METALLURGICAL ENGINEERS

	1972-3	1974-5	1976-7
Local graduates	14	9	12
Immigrants	15	20	27
Supply	29	29	39
Vacancies	56	63	52
Demand	85	92	91
Linear estimate	86	89	92

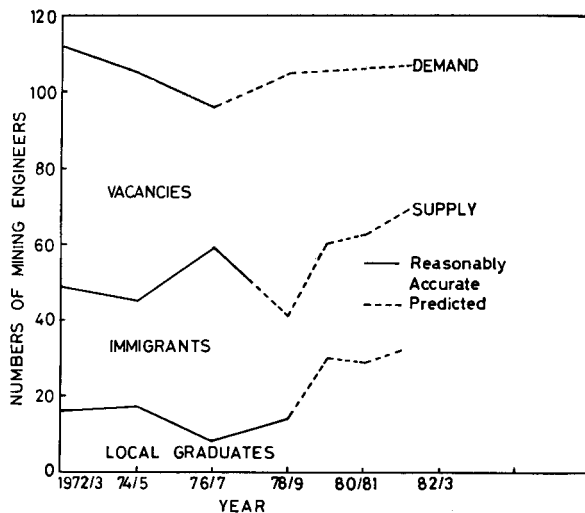


Fig. 2—Mining-engineering manpower, 1972-1982

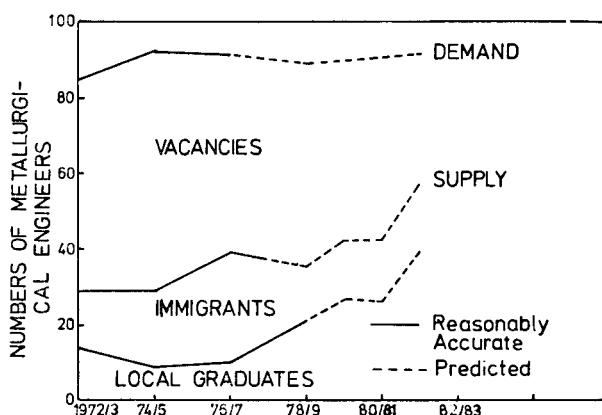


Fig. 3—Metallurgical engineering manpower, 1972-1982

period concerned, the demand for mining engineers may have fallen by about 3,5 per cent per annum, and that for metallurgical engineers may have increased at about 1,7 per cent per annum. However, the data are felt to be too few to definitely indicate any such trends. Moreover, the South African Institute of Mining and Metallurgy (SAIMM) in reviewing the data, expressed an opinion that the continual shortage of engineers in mining and metallurgy may have resulted in some posts being abolished rather than being reported as vacancies. It will be observed from Tables I and II that less than half the demand was filled in nearly every case, so that the loss of some potential vacancies may be expected.

FSPE noted that the low variation in the demand for engineers was common in all the disciplines studied, and there were large variations in the supply and vacancy rates. For instance, in the largest discipline, civil engineering, the demand increased by only 6 per cent over the period, even though graduations increased by over 30 per cent and immigrations by over 60 per cent, and vacancies decreased by 33 per cent. The rate of increase in demand, averaged over all the disciplines, was about 0,6 per cent per annum. In the estimation of the future manpower situation, this rate was therefore applied to

TABLE III

ESTIMATED FUTURE SUPPLY, DEMAND, AND VACANCIES FOR MINING ENGINEERS

	1978-9	1979-80	1980-81	1981-82
Local graduates	14	30	29	32
Immigrants	27	30	33	36
Supply	41	60	62	68
Demand	105	106	106	107
Vacancies	64	46	44	39

TABLE IV

ESTIMATED FUTURE SUPPLY, DEMAND, AND VACANCIES FOR METALLURGICAL ENGINEERS

	1978-9	1979-80	1980-81	1981-82
Local graduates	21	27	26	39
Immigrants	14	15	16	18
Supply	35	42	42	57
Demand	89	90	90	91
Vacancies	54	48	48	34

the average demand of 105 mining engineers and 89 metallurgical engineers for the years 1972-77.

Future Supply and Demand

The future supply of local graduates was estimated from the number of students registered at our universities. Historically it has been found that about one out of every two who register for a course in engineering will eventually graduate, so that a reasonably good estimate of the future supply is possible.

The future supply of immigrants was clouded by the fact that immigration dropped significantly after 1976. However, FSPE believed that immigration would be restored to pre-1976 levels by the mid-1980s, and therefore extrapolated linearly from the estimate of the 1977-8 rate of immigration.

The data on the estimated supply and the linearly extrapolated demand are given in Tables III and IV, and the future rate of vacancies is estimated by difference. The data are also shown, with the data from Tables I and II for comparison, in Figs. 2 and 3.

Discussion

For mining engineers, the data show that, historically, the supply has been less than half the demand, and that over 60 per cent of the total supply was provided by

immigration. The SAIME has, of course, been aware of this sad state of affairs, and has been exerting pressure wherever possible to boost the intake of students. The initiation of the Phoenix courses is of particular note. The success of the SAIME's efforts is clear from the rising enrolments at our universities. In 1981, there may be four times as many graduates as there were in 1976.

However, if immigration can be slowly increased, by 1981-2 the supply may exceed half the total demand, and to achieve this the supply from immigration must exceed the supply of local graduates during the period. Clearly, there is continual cause for concern. In particular, it is by no means certain that the rate of immigration can be increased. FSPE in its report notes a number of possible reasons for the decrease, such as the downturn in the economy, the devaluation of the rand relative to many European currencies and a resultant apparent drop in local salaries, and the call to young immigrants to make themselves available for National Service. In spite of these factors, they were confident that immigrants could continue to be attracted in increasing numbers.

A significant uncertainty is the future demand. In view of the present state of the mining industry, it seems most unlikely that the downward trend during 1973-76 will persist. The Department of Labour carried out a further survey in April 1979, and the results will be released shortly, when it will be possible to check the FSPE prediction of about 65 vacancies. In addition, a more reliable estimate of the immigration during 1978 should become available in the near future.

Very similar remarks can be made about metallurgical engineering manpower. If anything, the historical supply has been an even lower proportion of the demand than it has been in mining, largely because fewer metallurgists have immigrated to South Africa. Again, the numbers of local graduates are expected to increase significantly in the near future, and the supply may exceed half the demand in the early 1980s. However, the situation may not be as acute as revealed by the FSPE survey, partly because there is an inflow of people trained as scientists, which is a source that is lacking in mining engineering, and partly because a number of chemical engineers enter metallurgical engineering during the course of their careers.

However, one thing is clear: there are no grounds for complacency. Efforts to increase the numbers of mining and metallurgical engineering students who enter our universities must continue.