A CRITICAL REVIEW OF THE ECONOMIC VIABILITY OF THE FERTILIZER INDUSTRY IN SOUTH AFRICA

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Introduction

The definition of viability is "the ability to live, or to exist, in a particular environment". Superficially, the fertilizer industry lives in the environment of the agricultural sector of the national economy, and this sector has enjoyed good growth and strong Government support. The industry itself has continued to invest in new plants to meet demand, draws all but two of its raw materials (sulphur and potash) from local sources, has recently embarked on huge export projects in phosphate, enjoys protection from imports, and seems to have no shortage of aspiring entrants. So why should we waste time in reviewing our position?

Superficiality, however, as we are all aware, is the enemy of policy and if the industry is to remain 'alive' and continue to serve the needs of agriculture, a more detailed medical examination from time to time is no more out of place for an industry than it is for a human being, particularly one in a key position. The last time we in the Fertilizer Society examined ourselves in public, so to speak, was in 1972, but for the above reason we make no apology for doing it again.

The examination takes the form of a brief overall inspection of the industry so that we have a general picture of what it is at present, followed by an attempt to identify the main pre-conditions for the industry's viability, and to determine how these can be met so that we live in health not sickness.

The Fertilizer Industry

From the first imports of chemical fertilizer into South Africa in 1890 and the first (unfortunately short-lived) establishment of local manufacture in 1904, the industry has grown into a giant of major economic importance today.

There are, of course, three main plant nutrients necessary for fertilization, nitrogen (N), phosphorus (P) and potassium (K), with lime a major adjunct. There are a variety of trace elements also necessary which can be included in the main products or applied separately.

The present (1976) tonnages of the main nutrients are, in round numbers

N 315 000 metric tons
P 163 000 metric tons
K 111 000 metric tons

and 1,1m mt of agricultural lime were also applied.

However, in order to apply the NPK nutrients in the right proportions for various crops, soil and climatic conditions, we presently find it necessary to have no less than 57 different registered products viz

4 straight nitrogen (excluding ammonia itself)
8 straight phosphorus (5 of which are available as powder or granular)
3 straight potassium
and 42 NP, NK or NPK compounds.

And just to complicate the issue further, 12 of these mixtures are offered with or without zinc, the main trace element.

A diagrammatic representation of how we go from the major raw materials of air, coal and water (for nitrogen) sulphur or pyrites and phosphate rock (for phosphates) and potash, to the finished products is given in Figure 1. Only sulphur and potash are imported. Most of the products sold are in solid form but latterly liquids and slurries have also come into the product range.

The total physical metric tons produced are approximately 2,7 of which 'straights' account for about one half, with the other half in compound or mixture form.

The nature of the industry changed radically in the nineteen sixties from being mainly of a mixing/compounding nature based on locally-produced superphosphates to a capital intensive 'heavy chemical' type of industry.

A tabulation of the main manufacturers, their plant capacities and the dates of commissioning is given in Table 1.

The approximate capital investments by the major companies (excluding lime producers) are

AECI	R120m	Sasol	R30m
Foskor	R 86m	Omnia	R12m
Fedmis	R156m	Iscor	R 6m
Triomf	R180m	SCI	R10m
Samancor/Sentramark		R10m.	

This totals over R600m (R490m fixed, R110m working capital) of which some R175m is earmarked for exports.

The sales value of fertilizers in 1976 was R240m approx.

TABLE 1 1977 : South African Fertilizer Producers — Plant Capacities and Commissioning dates

		AMMONIA		LAN		UREA		AMMONIUM SULPHATE		SULPHURIC ACID		PHOSPHORIC ACID		PHOSPHATES		NPK GRANULATION	
		t per annum	Year start	t per annum	Year start	t per annum	Year start	t per annum	Year start	t per annum	Year start	t per annum	Year start	t per annum	Year start	t per annum	Year start
		as NH_3		30% N		46% N		21% N		100%H_2SO_4		P_2O_5		Physical tons as SS or MAP		Physical Tons	
AECI	Modderfontein (2)	85 000	1953/59	150 000	1974	225 000	1960/76	–	–	135 000	1969	–	–	–	–	–	–
	Modderfontein (4)	310 000	1974	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Umbogintwini	180 000	1967	–	–	180 000	1967	–	–	160 000	1974	–	–	–	–	–	–
	Somerset West	–	–	–	–	–	–	–	–	92 000	1931	–	–	–	–	–	–
FEDMIS	Milnerton	88 000	1967	200 000	1967	–	–	–	–	–	–	–	–	–	–	–	–
	Sasolburg													54 000MAP	1965	•145 000	1967
	Sasolburg	–	–	200 000	1967	–	–	–	–	96 000	1959	–	–	421 000SS	1959	580 000	1959
	Kuilsrivier	–	–	–	–	–	–	–	–	–	–	–	–	–	–	120 000	1950/74
	Phalaborwa	–	–	–	–	–	–	–	–	800 000	1963	375 000	1970/76	210 000SS	1963/76	•100 000	1976
														140 000 MAP	1971/74		
SASOL	Sasolburg	67 000	1964	110 000	1964	–	–	114 000	1956	–	–	–	–	–	–	–	–
		730 000 (600 000N)		660 000 (198 000N)		405 000 (186 300N)											
ISCOR	Pretoria	–	–	–	–	–	–	8 000		–	–	–	–	–	–	–	–
	VDB Park	–	–	–	–	–	–	50 000		–	–	–	–	–	–	–	–
	Newcastle			–	–	–	–	23 000	1976	–	–	–	–	–	–	–	–
TRIOMF	Chloorkop	–	–	–	–	–	–	–	–	–	–	ϕ 40 300	1965	261 100SS	1962	275 000	1963
	Potchefstroom	–	–	–	–	–	–	–	–	272 400	1967	ϕ 42 100	1969	283 300SS	1967	583 500	1967
	Somerset West	–	–	–	–	–	–	–	–	–	–	ϕ 15 000	1970	143 000SS	1921	175 000	1953
	Umbogintwini	–	–	–	–	–	–	–	–	–	–	–	–	–	–	90 000 t B/-Blands only	
	Richards Bay	–	–	–	–	–	–	–	–	1100 000	1976	375 000	1976	–	–	–	–
	Potchefstroom	–	–	–	–	–	–	–	–					82 500MAP	1969		
OMNIA	Rustenburg	–	–	–	–	–	–	–	–	*182 000	1975/6	30 000	1975	–	–		
	Sasolburg	–	–	–	–	–	–	–	–	–	–	–	–	120 000SS	1974	240 000	1973
	Sasolburg	–	–	–	–	–	–	–	–					72 000MAP	1975		
IMPALA PLAT.	Dryden	–	–	–	–	–	–	–	–	–	–	–	–	–	–	⊕ 40 000NPK	1973
	Springs	–	–	–	–	–	–	25 000	1973	–	–	–	–	–	–	–	–
OTHER SULPHURIC ACID PRODUCERS	ADC(C of M)									557 000							
	ISCOR VDB Park									8 000	1976			348 500 MAP			
	PMC(Phalaborwa)																
	ZINGOR							220 000		105 000		877 400		1438 400 SS			
	AAC WELKOM							(46 200N)		110 000		(382 500P)		282 000P ex SS)			
	ISCOR NEWCASTLE									330 000	1977						
								TOTAL A/S		18 000	1976	TOTAL PHOS ACID (76 600 P ex MAP)					
										3 965 400 TOTAL H_2SO_4							

ϒ Phosphoric acid project reports TC 60 000 tpa TP 60 000 tpa TSW 33 000 tpa all as P_2O_5
⊕ Phosphate granulation only
• Produced by Impala Pt 72 000 (1975) and JCI (Rustenburg Pt) 110 000 t (1976) as 100% H_2SO_4
⊕ tons NPK produced as slurries

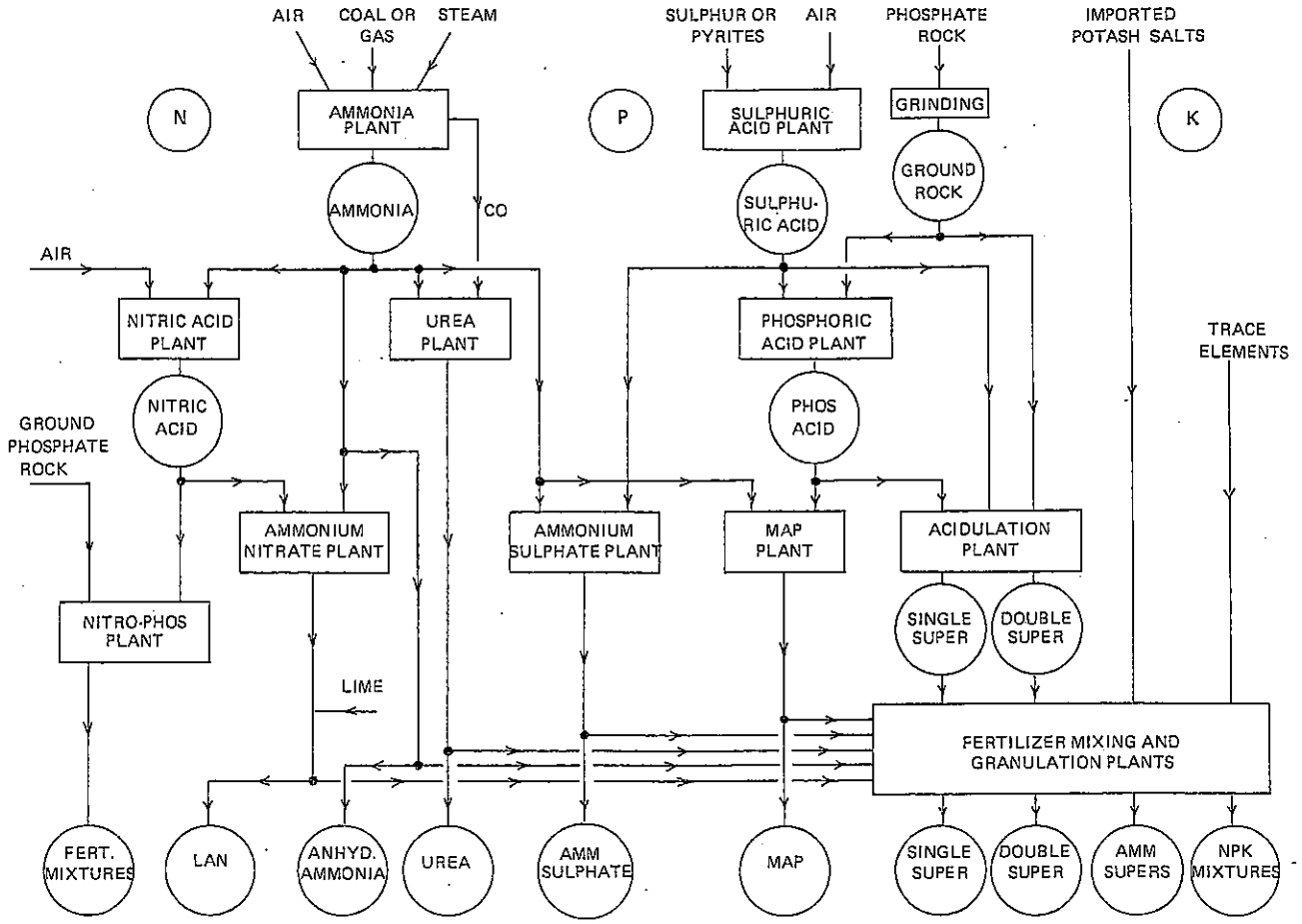

FIG 1

TABLE 2 World fertilizer prices in $ per ton

	April '73	Dec '74	June '75	Feb '76	Jan '77
Double super phosphates	85	350	180	90	80
DAP	105	410	200	120	110
Phosphoric acid	170	480	390	220	185
Urea	50	340	190	110	110
Ammonia	60	380	200	100	110
Muriate of potash	45	70	90	60	55

These are mainly f o b prices and not delivered costs.

To operate these assets and service its customers, the industry employs some 10 000 people.

Pre-conditions for continued viability

In general terms, the conditions which must be fulfilled to enable any industry to remain in existence are

i Availability of raw materials, spares, technology, people, etc.
ii A customer need for its products.
iii A price and credit structure for its products, attractive to its customers but also sufficient to generate a profitability attractive to shareholders and to enable new or replacement assets to be financed.

But firstly, of course; is local manufacture justified anyway? Apart from the obvious advantages of exploiting local raw materials, providing jobs for its population, and avoiding a massive drain on foreign exchange, two other convincing advantages exist. Firstly, the strategic importance of being largely independent of imports for our vital agricultural economy (we are only too aware of the price we pay for dependence on petroleum products) and secondly, for protection from the large swings in price resulting from im-balances in the world supply and demand ratios in individual plant nutrients.

To illustrate the point above, Table 2 shows how world trading prices for certain fertilizer products have varied in recent years.

And not only are availability and price subject to variation but predictions of these variations sufficiently far ahead to allow wise purchasing or timeous investment decisions to be made have proved consistently wrong.

Availability of raw materials, spares, technology, people, etc.

This criterion for viability can be dealt with reasonably quickly. The possibility of the withholding of raw materials by overseas sources for strategic/political reasons is limited to only two materials, namely sulphur (for sulphuric acid) and potash, assuming that refinery gas used for one third of our ammonia, would always be available from fuel imports.

In the case of sulphur, the figures are approximately as follows

We need a total sulphur availability of some 1,0m tons S p a for all purposes, of which 300 000 tons p a is for acid for the local fertilizer market and 500 000 tons p a for the export phosphoric acid market. Of the former, 250 000 tons of S need to be imported and all of the latter. However, sulphur is a freely-traded commodity available directly from a number of countries (eg Canada, Mexico, USA, France, Iran, Iraq, Poland) and even if sulphur itself was not freely available, we still have some unused pyrites, a growing likelihood of increased smelter gas availability from domestic sources and a capability of importing very cheap sulphuric acid itself (eg from Japan, Canada).

Potassium in the form mainly of muriate of potash, is used to the extent of some 315 000 tons p a (R20m p a) of which 90 per cent is used as an ingredient of mixtures and only 10 per cent is applied direct. All is imported from countries such as Canada, France, Germany, Israel, Congo and the UK is also expected to be a future supplier. Here again, potash is a freely-traded commodity which should, except in the most stringent boycott conditions, always be capable of being imported. Recovery from local potassium-containing minerals is not economically feasible under present circumstances.

All but the most sophisticated machines, technology and skilled personnel are also capable of being provided from local sources in our present stage of industrialisation.

The need for fertilizer products

The economic status of South African agriculture has already been more than adequately dealt with by Dr Spies.

Crop production and the productivity of all land in the white areas of the Republic have steadily improved over the last twenty or so years to the point where sufficient food is produced to meet the country's requirements, and agricultural produce accounts for some 40 per cent of our exports excluding gold. Despite a fall in volume from the previous year from climatic causes, the gross value of production rose 6 per cent to R2 767m in 1976.

However, our own and the world's population increases apace and it is important, politically and economically, that we remain a nett exporter of foodstuffs for as long as possible. We must continue to increase production therefore, but we can only do this by greater output from existing areas since the present cultivated area is already close to the maximum of 15 per cent of the total land area suitable for arable farming. And with limited water resources, we must inevitably concentrate on

a building up and maintaining soil fertility;
b developing/extending the use of new cultivars;
c improving farming practice by research and extension in all areas, and particularly in the Homelands.

Figure 2 indicates the relationship between the growth of the physical volume of field crops and horticultural products in the country and the growth of fertilizer consumption in the period 1950–1975.

Despite the past increases in fertilizer use, we are still applying fertilizers at below optimum levels and in the wrong

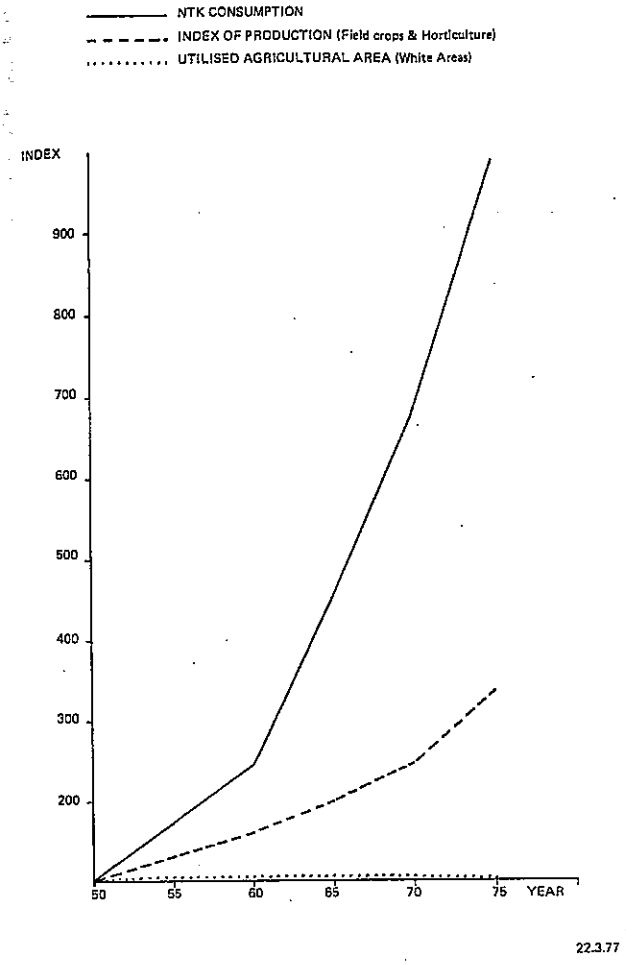

FIG 2

ratios. It has been shown by agronomists of the Fertilizer Society that application rates, even for maize, which accounts for some 60 per cent of fertilizer use, can be economically increased, and a guesstimate for all crops puts current usage rates at only some 75 per cent of the optimum.

With usage in the Bantu Homelands not even fractionally approaching optimum levels yet, and the advantages of fertilizing grassland also becoming apparent, it is fair to say that all demand factors, except price, point to a rosy future for domestic fertilizer consumption.

On the world scene, the need for fertilizers is self-evident to feed an increasing population, but the RSA can really only be considered as a supplier of phosphates, since phosphate rock is the only raw material locally available at prices competitive with other world sources. This has, of course, been the basis on which two local companies have invested a total of R140m in export plants for phosphoric acid.

Price factors

Agricultural product price/fertilizer cost ratio

While history is not always a guide to the past (shades of OPEC), it is useful at least to look at it.

Figure 3 shows that the trend in South Africa from 1958 — 1974 was for the ratio between fertilizer costs and the price obtained for crops to become more and more favourable to the farmer. This trend was reversed in 1974 but even in 1976 the ratio was still slightly better than it was in 1958.

The agricultural price/fertilizer cost ratio is, of course, affected by the demand and supply situation of both crops and fertilizers, the effect of changes in their respective input factors, and by Government intervention in the normal workings of a free market situation, with the laudable intent of freeing farmers from *excessive* variations in their nett income and consumers of agricultural products from wide swings in food prices. This intervention also has an unfortunate tendency to over-restrain price changes and profits in fertilizers.

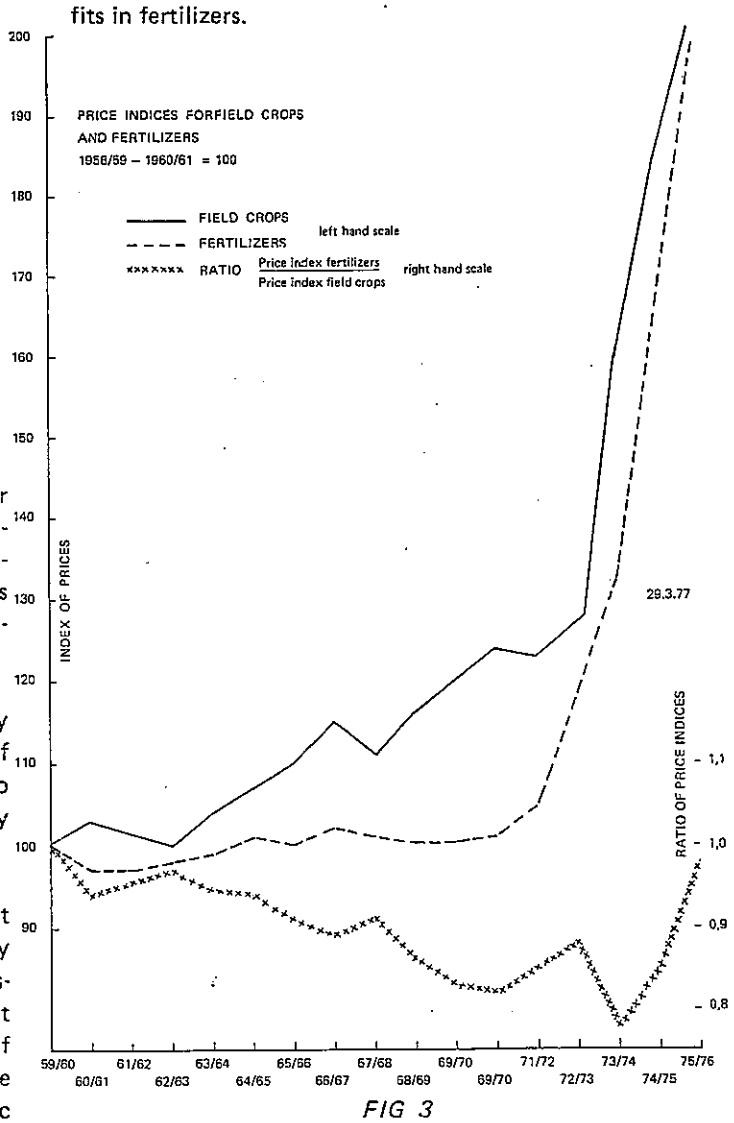

FIG 3

TABLE 3 Price increases (indexed) Inputs and Outputs Base 1958/61 = 100

	1975/76	1st July 1976
Input factors		
Tractors	268,0	292,0
Implements	241,3	253,1
Repair charges	397,8	427,3
Fuel	260,6	299,9
Feeds	192,9	217,0
Dips & sprays	206,7	216,6
Fertilizers	198,8	204,3
All farming requisites combined	228,3	249,0
Capital goods	253,0	278,6
Land prices	391,0	N/A
Outputs — Producer prices		
Summer cereals	206,9	N/A
All field crops	215,4	N/A
Horticultural crops	233,9	N/A
Livestock	263,2	N/A
Combined, all products	239,2	N/A

It is recognised that increased costs on all fronts have put farmers under severe pressure and it is not intended to pretend their position is not serious. It can be seen from Table 3 however, that fertilizers have had one of the lowest rates of increase.

As we are all aware, the industry has been, for over thirty years, subject to price control designed to protect the consumer from exploitation while at the same time permitting a reasonable return on his investment to the manufacturer. The level of this return also takes cognisance of the removal of some proportion of risk from the manufacturing venture through protection from imports.

The annual determination of maximum allowed selling prices of fertilizers is presently based on

1 Averaged cost estimates of raw materials and services delivered to fertilizer factories.

2 Averaged historical production costs for each product calculated on the higher of 80 per cent of rated capacity or actual expected production.

3 Averaged allowable administration and selling expenses.

4 A before-tax return of 15 per cent on working capital plus depreciated fixed capital, with average allowed depreciation of about 6 per cent per annum.

The only significant changes made in the above 'formula', despite frequent representations, were to increase inflation allowances on items 2 and 3 and to change the allowed return from 13½ per cent to 16 per cent in September 1974 and back to 15 per cent in February 1977.

The formula looks straight forward but in our industry's opinion it has been deficient in a number of main areas for some time and has not provided sufficiently attractive returns to encourage expenditure on productivity improvements, asset renewals or large new plants. The effects of this disincentive were first apparent in the late 1960's when the overall pre-tax return, following the large investments in fixed capital made in the '50s and '60s, fell to levels of 6–8 per cent, leading to financial difficulties for many companies and the withdrawal of overseas investor interest in the industry. The re-allignment of the residual industry in 1969/70 into essentially two large groups resulted in short-lived improvements through rationalisation. Under the 'formula' all cost benefits are lost to the industry within two years and by 1973 profits were again declining however.

The position was again ameliorated in 1973–1975 by increases in export prices which enabled the local market to be subsidised by profitable exports from surplus capacity. However, in 1976 this advantage had again disappeared and the harsh realities of an inflation-riddled world are very much with us.

In order of importance, the complaints of the industry are

1 A 15 per cent rate of return on depreciated fixed capital and on working capital, with allowed depreciation of 6 per cent p a, is a completely inadequate return under present day interest rates on borrowings, company tax rates, realistic obsolescence rates, the effect of inflation on working capital levels and capital costs of plant replacements. In the capital intensive part of the industry, the resultant widely differing calculated costs from old and new plants result in a tendency for Government to introduce profit control on individual manufacturers rather than price control.

2 The lack of recognition in the formula and in tax procedures that large chemical plants take two to three years to build and a further four years to reach full outputs and efficiencies.

3 Inadequate recognition of increases in operating, selling and administration costs; the two-year delay in applying historical costs, too small inflation factor allowance, inadequate productivity improvement incentive.

4 Great reluctance on the part of the authorities to allow adequate provision in new prices for expected escalations in such things as railage, electricity, steel,

TABLE 4 Return on shareholders' funds
Assume capital employed R100 m

	1 When formula established. Interest rate 6% Tax rate 30% 66⅔% gearing.*	2 Present position. Interest rate 12%. Tax rate 43% φ66⅔% gearing.*
Profit before interest charges and tax	13 500 000 (13,5%)	15 000 000 (15%)
Less interest charges on loans	2 400 000	4 800 000
	11 100 000	10 200 000
Less tax	3 330 000	4 386 999
Nett profit attributable to shareholders	7 770 000	5 814 000
Return after tax, on shareholders' funds	12,95%	9,69%

* Gearing is the ratio of borrowings to shareholders' funds in the business.

φ This company tax rate ignores the present extra levy.

and by refusal to allow price changes during the year virtually forcing industry to absorb these.

5 Sudden changes in the 'formula', and an autocratic approach to allowed costs have created uncertainty/insecurity in the minds of the industry regarding future profitability, further adding to an unwillingness to invest new capital.

Let me now try to illustrate the validity of these complaints by working through a number of examples.

First of all, let us see how the 'formula', under present tax and interest rates, gives a different return on shareholders' funds from that presumably intended originally. See Table 4.

Under conditions of high inflation, although it is attractive to the manufacturer to increase the level of gearing because of the tax advantage of borrowed money, it is certainly not attractive to the lender. For a capital intensive industry borrowings of 66⅔ per cent of shareholders' funds is the highest considered prudent by both parties.

In comparing the above, it should also be remembered that there are two purposes in earning profits (a) to reward shareholders for their investment in the form of dividends and (b) to retain at least sufficient profit in the business to maintain the value of one's capital. A dividend of 5 per cent in 1946, therefore allowed a great deal of scope for ploughback of profits. Today a 10 per cent dividend is barely equitable for the shareholder, leaving nothing for retention.

Secondly, let us try to see whether the 15 per cent return on depreciated fixed and working capitals and the allowed depreciation rate, permit a business to remain viable under other inflationary conditions, including the higher interest and tax rates, and if they do not, then to derive what may be considered a 'fair return'.

Inflation as measured in terms of changes in the Consumer Price index (December to December) has moved as follows in the Republic

1970	5,3%
1971	6,9%
1972	7,3%
1973	9,9%
1974	14,1%
1975	11,7%
1976	10,8%
1977 (forecast)	10 – 11%

and it is generally expected that upper single figure inflation will continue thereafter.

However, this is not the only significant factor, since in the recent past the capital costs of chemical plant and machinery have escalated well in excess of these rates, namely at about 25 per cent p a in 1972–75, and currently at about 15 per cent.

Inflation at this level must bring about a fundamental change in the attitude to returns on capital, particularly by State Authorities if industrial activity in the private sector of any economy is to continue and the value of shareholders' funds be maintained in real terms.

Several aspects of the problem have to be considered, the most important of which, in the case of the capital intensive chemical industry, is the need to make adequate provision for the replacement of plants, the cost of which increases from year to year as inflation occurs. There are two arguments as to how the necessary provision should be made.

The first is that sufficient depreciation should be charged so that if a sinking fund was created it would be adequate to provide a replacement plant when an existing plant becomes redundant. The depreciation charge required to do this in times of high inflation is prohibitive and it can be argued that the creation of sinking funds of this nature is not practical.

The second argument, which is closer to reality, is based on the assumption that the amount provided for depreciation each year is used in that year for other capital expenditure. If this approach is accepted, then the depreciation charge for a particular year should be equal to the current replacement value of the percentage of the plant being written off in that year. For example, if a plant is being depreciated at x per cent p a, it should be depreciated not at x per cent of its original cost but at x per cent of its *replacement* cost as estimated *in that particular year.* The depreciation charge will therefore grow each year to compensate for the loss in the value of money.

In regard to the actual value of x for depreciation, I, personally, strongly believe the risks of obsolescence are significantly greater than 30 years' ago and many chemical plants really should be written off over ten years and not 15 or 16 years. This would also allow consumers to obtain quicker benefits from technological improvements. However, in order not to be accused of trying excessively to distort the picture and because many existing plants will run for longer than ten years, I have used a rate of $6\frac{2}{3}$ per cent p a (15 years) in the rest of the paper.

As the tax authorities do not permit the additional charge required to replace fixed assets as an allowable deduction, this means that to provide the amount required the notional extra charge against profits must be 'grossed up' by $\frac{100}{57}$ assuming that the present rate of company tax (43 per cent excluding levy) remains.

If, however, account is taken of the investment allowance and the fact that the initial allowance and large wear and tear allowances are granted in the early years of a plant's life (under the 'reducing balance' method that is used by the tax authorities), it can be shown that the tax allowances are approximately sufficient to recognise the additional depreciation provided that replacement cost increases stay below 8 per cent p a. If, therefore, the tax authorities are not prepared to accept the philosophy of additional depreciation provisions, they could assist industrialists either by increasing the rate of investment allowances or by substituting a system of investment grants. The latter has the effect of providing the benefits at an earlier date and is particularly valuable to new companies where the benefit of the investment initial and wear and tear allowances can only be enjoyed once the company is operating at a profit.

The next important aspect of the problem is the effect of inflation on working capital. It can be shown quite simply that merely to maintain one's working capital at its current real value, it is necessary to earn on working capital the current rate of inflation 'grossed up' for tax ie 10 x $\frac{100}{57}$ = 17,5 per cent.

Therefore, any supposed benefit arising from the price control formula allowing a return on working capital higher than the current interest rate on borrowings to finance the working capital is entirely fictitious.

Since no agreed convention has yet been introduced on 'inflation accounting', it appears inevitable that for some time yet accounts will, for taxation and public reporting purposes, continue to be prepared on the basis that

1 Depreciation charges have to be applied on historic costs (and for price control purposes revaluation of assets is not recognised).

2 Stocks have to be valued on the basis of current replacement costs (although a LIFO basis does help in avoiding overstatement of profits).

The consequence of this is that higher 'apparent' returns on capital must be obtained, with the need for these recognised by all concerned, and dividend cover must be higher than considered adequate in the past.

We therefore should have a return on capital to allow for

1 An annual depreciation rate of at least $6\frac{2}{3}$ per cent p a on replacement value. (Which can be assumed for forecasting purposes to be increasing at a compound interest increase of 10 per cent p a).

2 An allowance to maintain working capital at its original value.

3 An increase in dividend, at the inflation rate compounded above that dividend level which would be considered a reasonable return for shareholders on their original investment. With no inflation a dividend rate of 5 per cent after tax (8,8 per cent before tax) would be considered adequate, but this should rise to 6 per cent to take account of high risks under conditions of high gearing.

Putting these factors together, we can construct the table contained in Table 5, assuming a 10 per cent p a inflation rate.

The position displayed is obviously a considerable oversimplification since it illustrates the return required for a single unit operating at full capacity from the first year. In actual practice such a plant takes some two years to build and a further two years to reach even 80 per cent of full capacity. In addition, strictly according to the formula, its capital and initial high costs will only be incorporated in the pricing system two years after its first full year of operation. It is also assumed that annual depreciation is re-invested

TABLE 5 Derivation of a 'fair return' before tax: Assumptions: R80m original fixed capital
R20m original working capital

Year	Depreciation. Normal allowance	Depreciation. Additional for replacement cost	Allowance for inflation in working capital	Dividend at 10,5% Pre-tax (6% after)	Extra dividend to maintain in real terms	Total income (A)	Shareholders return A x 100/167,7	Interest on loan funds @ 12% p a	Total return	Total return* as percentage of GBV/NBV		Percentage for growth risk, starter period etc on GBV	Total return required as % of GBV/NBV	
	Rm	Rm	Rm	Rm	Rm	Rm	Rm	Rm	Rm	%	%	%	%	%
1	5,3	0,5	3,5	10,5	1,1	15,1	9,1	4,3	13,4	13,4	13,4	3	16,4	16,4
2	5,3	1,1	3,9	10,0	2,1	16,0	9,6	4,1	13,7	13,4	14,2	3	16,4	17,4
3	5,3	1,7	4,2	9,4	3,1	16,7	10,0	3,9	13,9	13,3	14,9	3	16,3	18,2
4	5,3	2,5	4,7	8,9	4,1	17,7	10,6	3,8	14,4	13,5	15,9	3	16,5	19,4
5	5,3	3,2	5,1	8,3	5,1	18,5	11,1	3,7	14,8	13,5	16,8	3	16,5	20,5
6	5,3	4,1	5,6	7,7	5,9	19,2	11,5	3,7	15,2	13,5	17,8	3	16,5	21,7
7	5,3	5,0	6,3	7,2	6,8	20,3	12,2	3,7	15,9	13,8	19,1	3	16,8	23,2
8	5,3	6,0	6,8	6,6	7,6	21,0	12,6	3,7	16,3	13,7	20,0	3	16,7	24,4
9	5,3	7,2	7,5	6,0	8,2	21,7	13,0	3,8	16,8	13,7	20,9	3	16,7	25,5
10	5,3	8,4	8,3	5,5	8,8	22,6	13,6	3,8	17,4	13,7	22,0	3	16,7	26,8
11	5,3	9,8	9,1	4,9	9,1	23,1	13,9	3,7	17,6	13,3	22,4	3	16,3	27,4
12	5,3	11,3	10,0	4,4	9,4	23,8	14,3	3,6	17,9	13,1	22,8	3	16,1	28,0
13	5,3	13,0	11,1	3,8	9,3	24,2	14,5	3,6	17,9	12,5	22,7	3	15,5	28,1
14	5,3	14,8	12,1	3,2	9,0	24,3	14,6	3,5	18,1	12,1	22,7	3	15,1	28,3
15	5,3	16,8	13,2	2,7	8,6	24,5	14,7	3,4	18,1	11,6	22,2	3	14,6	28,0

* This return excludes provision for the extra depreciation to allow replacement.

annually in profitable operations. To allow for these factors, plus the provision of funds to finance growth out of retained earnings, and for dividends in excess of 6 per cent in real terms in the current uncertain capital market, a considerable extra increase is required.

These calculations (displayed in Table 5) show that a 'fair return' must be of the order of either

a 17 per cent p a on original cost (GBV) with depreciation allowances of $6\frac{2}{3}$ per cent p a on replacement value calculated each year;
or

b 25 per cent p a on written down cost (NBV) but also with depreciation allowances of $6\frac{2}{3}$ per cent p a on replacement value.

Let us now take (Table 6) the situation of a new plant built, say, $7\frac{1}{2}$ years after two smaller plants, and with the same capacity as the two earlier plants combined. This is not an unusual situation in the chemical industry in South Africa where advantage can be taken of larger market size to install plants nearer in size to world-scale capacity, with concomitant economies of scale.

We can see from Table 6 the very considerable dilemma facing the price control authorities, if they remain wedded to a formula appropriate to a large number of low-capital plants in a non-inflationary economy with obsolete criteria of profitability, and if they continue to be sensitive to the 'apparently' excessive profitabilities of manufacturers who made their investments some years ago.

The temptations before them are almost irresistible

a to disallow reasonable costs of the latest manufacturer or trim his profitability if he exceeds plant expectations in output or efficiencies;

b to introduce profit control on individual manufacturers with a levy system whereby the older/cheaper producers pay over their 'excess' profits to the higher cost/newer producers.

Both of these, of course, are the very antithesis of private enterprise, and could only lead to industry demands to have existing plants nationalised and put future investment into the hands of the public sector.

However, as already shown, if it was recognised that returns on depreciated capital, when a plant was $7\frac{1}{2}$ years old, of 25 per cent were necessary to allow assets to be replaced and working capital and dividends to be maintained in real terms, then the Government's pricing decisions are very much simplified.

TABLE 6 Financial situation old vs new plant

	Old plants	No inflation	Inflation @ 10% p a
Capacities	Old plants	New plant	New plant
Capital required	2 x 125 000 2 x R16,5m	250 000 R25m	250 000 R50m
Age	7 ½ years	New	New
Raw materials cost	R 60 / t	R 60 / t	R 60 / t
Services and admin. costs	R 60 / t	R 55 / t	R 55 / t
Capital costs			
Depreciation 6%	R 8 / t	R 6 / t	R 12 / t
Retrun on capital (15% on NBV)	R 11 / t	R 15 / t	R 30 / t
Selling price	R139 / t	R136 / t	R157 / t
Weighted average allowed by price control		R148 / t	
Profit before interest charges and tax	R5 000 000		R5 250 000
Less interest on loans (12%) (40% borrowing)	917 000		2 400 000
	R4 083 000		R2 850 000
Less tax (43%)	1 760 000		1 225 500
Nett profit attributable to shareholders	R2 323 000		R1 624 500
Return after tax on shareholders' capital	20,3%		5,4%

In the case shown in Table 6, a weighted average price of R162 per ton would be equitably indicated, looking at the question from a purely manufacturing economics viewpoint, and the returns would be at satisfactory levels on shareholders' funds, with depreciation allowances on replacement value.

Both investors are now being far more adequately remunerated as seen from the criteria developed in Table 5.

Obviously what I am saying, therefore, is that from the viewpoint of the manufacturer, the present bases for setting maximum selling prices do not yield a fair return and therefore the industry is not viable unless prices are increased. Present prices are not attractive for new investment, and reasonable profits can only be made when market growth exceeds the estimated production levels for that year. Without improvement in our industry's returns the business is a 'cash trap' needing more new investment from shareholders, while dividends necessary to attract new investment are actually being paid out of capital.

What new investment is needed? This is extremely difficult to forecast with any accuracy, but I believe that in the next five years new investment of the order of R100m may be needed, excluding anything for Foskor, and in the following five years a further R200 —R300 million at least — all in terms of 1977 money.

Unless changes to pricing policy such as I have suggested are made, I do not believe this money will be found by the private sector, particularly that portion (and it is the major one) required for the manufacture of primary and secondary ingredients ie ammonia, nitric acid, or superphosphates on new 'green field' sites. There are, of course, always willing entrants to the business who wish to put relatively little added value on to purchased or imported ingredients and can make profits out of selling finished products and/or services in a relatively small intensive area, while leaving the supply of product to distant, extensive areas to the major manufacturers (who probably have already invested capital to meet the whole demand anyway).

But what of the consumer, can he stand higher prices? Before this can be properly answered, one would have to dimension the scale of these more adequately. The example I have taken, while representative, is fictitious, but the 10 per cent or so increase in prices indicated in my example may not be too wide off the mark and I believe this to be a relatively small price to pay for a more viable industry. Demand may well fall back a little but efficiency of usage can overcome the extra cost.

I must end by urging the industry to set up a working party to examine the position in detail, and Government to recognise the urgent need for realistic pricing policies and consistency in applying them.