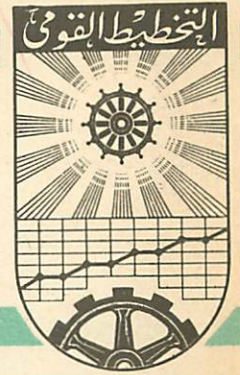


# ARAB REPUBLIC OF EGYPT

## THE INSTITUTE OF NATIONAL PLANNING



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Memo (1317)

A Program of Action to  
Rationalize the performance  
of the Egyptian Steel Industry  
(1975 - 1985)

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A Program of Action to Rationalize the  
Performance of the Egyptian Steel Industry:  
1975-1985

Introduction:

This Study is motivated by an expertize report on the metallurgical industry in Egypt: Atkins Planning,<sup>(1)</sup> The expertize work was meant as a strategy for the development of the industry till 1985 . This work will be referred to as the Report. The technological problems of the industry constitute a central part of the Report. The economics of the industry in terms of costs and benefits add valuable information on the performance of the industry in the base year (1975) . There are projections of demand/ supply across various steel products for the target year (1985), but a comprehensive framework is not articulated as regards the probable developments of costs and benefits of implementing the production plan . For the target year, apart from the production level, nothing is said about employment size, wage level, prices of raw materials, charges on capital, tariffs, international prices-to give iust examples of information needed to gauge the performance of the industry in comparison with the base year. Such vacancies deprive the Report of any policy content and restrict its use to a background survey .

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(1) Athins Panning : "A Strategic Study of the Egyptian Metallurgical Industry", London 1977.

Our study is meant as complementary to Atkins Report . Specifically, it is a program of action to rationalize the performance of the industry during the period 1975-1985. The details of the program are spelled out for the target year only but the methodology can easily be worked out to yield a Year-to-year management program . This dynamic dimension of our program will help monitoring developments of the performance of the industry in future. This is a leap in the direction of gauging the efficiency of the industry, not in a given point of time, but over time. It is a leap from static and comparative static analysis to dynamic analysis. This method of attacking the efficiency issue is showing the limits of other methods such as Domestic Resource Cost method (DRC) which deals with the efficiency (competitiveness) issue Ex post . So much has been said about the competitive position of the Egyptian industry Ex Post<sup>(1)</sup>. The results of such studies should be considered irrelevant for future if not supplemented by efficiency studies such as ours which design a program of action to rationalize resource allocation. Ex Ante methods of efficiency analysis are needed and our study is a trial in this respect .

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(1) Bent Hansen & K. Nashashibi: "Foreign Trade Regimes and Economic Development", National Bureau of Economic Research, New York, 1975.

A full account of our methodology will be given in detail within the context of this study. It is sufficient here to summarize our working steps .The study starts by presentig the global picture of the industry in terms of its ability to satisfy demand for steel in 1985. Aggregation is necessary here across different steel products with different technical specifications so that the demand/supply balance is in terms of tons of steel . Secondly, the production level in the target year is translated in terms of costs per ton in 1985. The cost structure between 1975 and 1985 is a central piece of information to gauge the performance of the industry. Here, the reasonableness of assumptions about probable developments of each cost component is discussed. Thirdly, price policy guidelines are exposed and the cost/price structure is provided to evaluate the financial position of the industry. Lastly, we propose a package of policy instruments to implement the rationalization program . The above four steps constitute the subject matter of four sections , They are as follows :

Section (I) : deals with the development of demand for (and supply of) steel in 1985,

Section(II): provides calculations on the cost structure in the target year,

Section(III): discusses the price policy, and

Section (IV): presents the policy instruments needed to implement the rationalization program .

The statistical Appendix presents detailed data on company finance in 1975.

Section (I): The Production Plan :

I.I. Development of Demand for Steel in 1985

Three methods are used to project demand:

1. time series projections .
2. macro-economic correlations between steel demand, population, and Gross Domestic Products (GDP) .
3. international comparisons of steel demand according to the level of development.

Of course, the projections of the above methods differ and an average is calculated as an estimate of demand for steel in 1980 and 1985. The projections are provided in table(1) together with the level of consumption in the base year and the rate of change in demand in the sub-period 1975-1980 and for the whole period 1975-1985.

Table(1): Projection of Demand

(1000 ton)

Product	Demand	Projected Demand		Absolute Change		Rate of Change	
	(Consumption)	1980	1985	1975-1980	1975-1985	1975-1980	1975-1985
Flat Products	307	420	760	113	453	37.8	147
Non-flat products	198	302	480	104	282	52.5	142
R.C. Bars	439	578	860	139	421	31.7	96
<b>Total</b>	<b>944</b>	<b>1300</b>	<b>2100</b>	<b>356</b>	<b>1156</b>	<b>37.7</b>	<b>122</b>

(Average)

Source: Atkins Report, table (2.23) .

The level of consumption (demand) comes close to one million ton of steel in 1975. The projected level is 1.3 and 2.1 million ton in 1980 and 1985 respectively. This means that over ten years, the consumption of steel will be more than double its level in 1975. The estimated annual average rate of increase across different kinds of steel products is 12.2% over the ten year period . It is worthwhile to mention that the above projections are not ours but are those of Atkins and will be accepted by us as a

starting point. This means that any limitations of demand projections are not challenged from our side. Such limitations can be exemplified by observing that Atkins figure for the component of demand-sales from local production-is provided at two different levels as shown in table (2).

Table(2):Local Production level(1975)

(tons)

Estimate	Sales from local Production (a)	Sales/local Production (b)	Production level
(1)	496 700	91.1	545 225
(2)	588 110	91.1	645 565

Sources :

- (a) Sales figure (1) is that used by Atkins to project demand, while sales figure (2) is given on page (2) of the Report .
- (b) Yousef El Awaamy: "Determinants of Wages in the Egyptian Industry (The Case of Steel)" , Unpublished Paper .



From table (2), it is observed that there are two different figures for the local production level in the base year. The reason is that the level of production is a compiled figure : sales figure multiplied by the rate of sales from local production provided by other sources (1). In this way, sales figures are used as a base in calculating the level of production. This means that we doubted the original data on local production figures. Atkins used estimate(1), in table (2), of sales from local production in addition to imports to project demand. The preference of estimate (1) is not clear from Atkins Report and this indicates limitations on his projections of demand.

#### I.2. Potentials of Increases in Production:

Increase of Production comes from two sources :

- 1- gradual utilization of excess capacity .
- 2- Probable increase in labor productivity that comes with utilization of excess capacity .

Data on capacity utilization are scattered throughout the Report so that an estimate is required. The available data are on the firm level and an average over firms can be used. But if we know that Hadid & Solb (H-S) firm is the largest and probably accounts for 40% of the production of the industry, it becomes clear that the figures for capacity utilization have to be corrected as regards the weights of different firms in production. This has been done in such a way that 0.4 is used as a weight for (H-S) and the residual of 0.6

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(1) Yousef El Awaamy : Op. Cit

is used as a weight for the average rate of capacity utilization in other firms for which data are available. The results are as follows for year 1975 and are based on data provided in tables (3/a) and (3/b) :

- 1- The rate of capacity utilization in steel-making and rolling is 0.57.
- 2- The rate of capacity utilization in foundries is 0.57.

Table (3/a): Rate of Capacity Utilization ( Steel-making and Rolling) (1975)

Plant	Current Capacity (1000 ton)	Production	Rate of Capacity Utilization	weights
Hadid & solb	3262	1161	36	0.40
copper works	225	167	74	0.60
Delta Metals	180	130	72	
National Metals	305	204	67	
Average *			( 57)	

Soure: Atkins, Table (4.2).

\* weighted Average= (36) (0.4) +(72) (0.6) = 57 %

Table (3/b) : Rate of Capacity Utilization (Foundaries ),1975

Plant	Steel	Iron	Weights
Hadid & Solb	15	20	0.40
Copper works	70	-	[ 0.60
Delta Metals	56	75	
Average *	(47.2)		

Source: Atkins Report , Table (4,7)

\*Weighted Average = (17.5) (0.4) + (67) (0.6) = 47.2 %

This means that almost half of the installed capacity is idle (48 %). Other sources Provides nearly the same rate of idle capacity as our calculated figure for 1975. <sup>(1)</sup> If full utilization of excess capacity is to be reached in 1985, upgrading of capacity will be 4.8% per year. In other words, production can be increased by 4.8% per year if excess capacity is phased out over ten years . A constant rate is assumed to facilitate the computations .

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(1) Yousef El Awaamy : OP.Cit.

Table (4): Rate of Un- utilized Capacity

Year	Atkins*	Other Sources <sup>(1)</sup>
1974		63.5
1975	48	47.2
1976		45.1
1977		52.2

Source :

(1) Yousef El Awaamy : op.Cit.

\* Recalculated

On the other hand , the second source of increase in production is labor productivity. The situation in 1975 is that the productivity per worker is 16 ton per year in (H-S) company - the largest of all firms. This is no surprise since the rate of utilized capacity is only 36% . It is striking to know that in European countries, the production per worker ranges between 100 and 250 ton as compared with 50- 100 ton in some other developing countries . Atkins stated that even if (H-S) was producing 1.5 million ton per year , the productivity would be only 62 ton annually per worker. Apart from other speculations, the Report gave a probable annual figure of 26 ton per man in 1985 if bottlenecks in production are eliminated, especially the excess capacity bottlenecks . This means that productivity per man can be increased by 6.4% annually if the rate of unutilized capacity of 64% is phased over ten years. Note that we translate capacity utilization into increases in production . Even if we accepted the estimated figure of 26 ton per man as a target of production in 1985, the rate of increase between 1975 and 1985 will be 62.5%  $(26/16)$  . We preferred to work with an annual increase in labor productivity per se of 6.4% in line with upgrading capacity in (H-S) . Here (H-S) is used as representative of production for the whole industry. A constant rate of increase in labor productivity is chosen to facilitate computations .

The projected level of production (supply) is a forward step. Over the ten years, local production will increase by 112% to reach 212% of its level in 1975. Table (5) provides two different estimates of supply .

Table(5) : Projected Production Level(1985)

Estimate	Production level 1975	Production level 1985	Rate of change 1975/85 <sup>(1)</sup>
Estimate (1)	545225	1155877	112
Estimate (2)	645565	1368598	112

- (1 ) The annual rate of change in production is assumed equal to the sum of two components :
- a. upgrading capacity utilization by 4.8 % .
  - b. increase in labor productivity by 6.4 % .

Excess demand is the difference between projected demand and projected supply. This excess demand is a measure of the level of imports required to close the gap between supply and demand . It is estimated that imports will range between 35 and 45% of the demand level . For the sake of comparison , table (6) provides Atkins balance of demand and supply . According to the Report, imports will amount to 19 % of demand and the local production will satisfy 81% of demand in 1985. It is important to note that Atkins figure for production in 1985 is based on the assumption of full utilization of maximum capacity. Maximum capacity is that optimally attained in optimal operating conditions. it is obvious that this assumption is a luxury given the operating conditions of the industry. This ambitious target of production is discarded if we know that current capacity (that could actually be operated) is not fully utilized. Our estimate of supply is based on the assumption of full utilization of current capacity.

Table(6); Balance of Supply & Demand(1985)

( 1000 ton)

Item	Atkins	Ours
Supply	1705	1156 (1369)
Demand	2100	2100
Excess Demand (or Imports)	395	944 (731)
Imports/Demand	19%	34.8-44.9%

Another feature of table (6) is that the share of the industry in the local market will be 60 % in 1985. Table(7) presents data on this respect during the period 1966/67 to 1975. it could be seen that the share of the industry in the 'local market is 50% in 1975. In some years(68/69), the industry has reached a share of 74% in the local market . A general trend cannot be inferred since the share is flactuating. Nevertheless, it could be stated that an attainment of 60% share is a tremendous performance of the industry .

The last issue on the supply side is to show that the target of increasing output by 11.2% Per year is not an impossible target. Two criteria are suggested :

- 1- the last performance of the industry with respect to sales from local Production.
- 2- Changes in average productivity of labor and capital .



Table (7) : Share of the Industry in the Local Market  
(1966/67 - 1975)

Item	1966/67	67/68	68/69	69 /70	70/71	71/72	27/73	74	75
Sales from local production	278845	305620	373133	415374	380470	385362	400441	393304	469700
Imports	152200	126200	131300	224900	163840	244240	173230	312860	474640
Consumption	431045	431820	505533	640214	544310	629602	573671	706164	944340
Share in the Market	65	71	74	65	70	67	70	55.7	49.7

source : Atkins Report, Table (2.11).

As regards the first criterion, table (8) presents the Performance of the industry: it attained a rate of increase in sales from local production of 12.2% during the period 1966/67- 1969/70, a rate of 4.7% during the period 1970/71-1975, and a rate of 7.6% over the period 1966/67-1975. The evidence is inconclusive . But the very reason behind the rationalization program is to improve the performance of the industry, hence a higher rate of increase in production is suggested .

Table (8): Rate of Change of Sales from Local Production (1966/67-1975)

Sub-period:1966/67-69/70		Sub-period:1970/71-75		Whole period:1966/67-1975	
Absolute Change	Annual Rate of Change	Absolute Change	Annual Rate of Change	Absolute Change	Annual Rate of Change
136529	12.2	89230	4.7	190855	7.6

Source : table (7) above .

As regards the second criterion, table (9) presents the development of capital and labor productivity over the period 1971-1978. Average productivity is defined as the ratio of gross value added to capital (labor) . Percentage changes in average productivity are provided in the last two columns of the table . It could be seen that a range of 8.8-12.6 % increase in productivity across labor and capital is observed. Our suggested target of increase in production of 11.2 % lies within the above range and this indicates that our option of production is reasonable .

Table (9): Average Productivity of labor and Capital (1971-1978)

Year	In 1000 Capital (K)	* Labor (L)	Value Added (V)	V/L	V/K	(K/L)	$\Delta$ (V/L)	$\Delta$ (V/K)	Changes in Average Productivity	
									L	K
1971	62006	24.2	19600	810	0.315	2562	-	-	-	-
1972	66367	26.0	27600	1061	0.416	2553	251	0.100	31	32
1973	69767	28.9	32200	1142	0.461	2414	81	0.045	8	11
1974	70043	31.1	23600	759	0.337	2252	(-) 383	(-) 0.124	(-) 33	(-) 27
1975	134689	40.1	27700	541	0.161	3359	(-) 218	(-) 0.176	(-) 29	(-) 52
1976	141542	44.7	30800	689	0.218	3166	148	0.057	27	34
1977	150480	44.5	48300	1082	0.321	3382	396	0.103	57	47
1978	163162	44.6	61300	1374	0.376	3658	289	0.055	27	17
Average									12.6	8.8

Source: Yousef El Awaamy: Op.Cit., Calculations are ours .

\* Capital is restricted to Machinery and Equipment .

It remains to show the economics of realizing this production plan in terms of costs and benefits. This is the subject matter of the following section .

Section(II) : Cost Structure in 1985 :

II.I. Cost per Ton in the Base Year(1975)

There are two estimates of total costs of production in 1975 according to data in table (10) :

1. Atkins estimates derived from detailed cost data on the firm level . The components of costs are : wages, materials and services, depreciation, interest, and other costs . Total costs are estimated as LE 197 279 million .

2. Other sources put the figure of production at factor costs as LE 138 419 million .<sup>(1)</sup>

The component of raw materials is the most important item of total costs. Costs of raw materials are LE 151.119 million according to Atkins firm-by-firm cost data. the share of raw materials in total costs is 84.3% . This conforms well with other sources .<sup>(2)</sup>

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(1) & (2) : Yousef El Awaamy: Op. Cit.

Since there are two different estimates of production level in 1975, we will find two different corresponding estimates of total costs per ton as well as two different estimates of costs of raw materials per ton . Total costs of producing a ton of steel ranges between LE 233 and 303 and a ton of steel costs from LE 196 to 255 as raw materials . The central values of the range of costs are :

1. A ton of steel costs LE 268.
2. A ton of steel costs LE 226 as raw materials.

Table (10): Production Costs (1975)

Item	Total production Costs  LE 1000	Raw Materials	Product- ion  (ton)	Total cost per ton LE	Raw Materials per ton LE
Atkins	179279	151119	(1) 545225	328	277
		(84.3%)	(2) 645565	278	234
Ours	138419	116272	(1) 545225	253	213
		(84.3%)	(2) 645565	214	180
<u>Average</u>					
Estimate(1)				303.0	255.5
Estimate(2)				233.5	196.5
Range				(233-303)	(196-255)
Central Cost				268	226

Source: Our Calculation .

Development of costs in 1985 will depend upon the assumptions made about the probable change in every component of costs. This task is the subject matter of the following subsection.

## 2.2. Cost per Ton in the Target Year(1985)

The procedure followed for estimating costs per ton in 1985 will be to work out every component of costs seperately and then to come up with an aggregate. We begin with raw materials .

### A. Raw Materials :

Raw materials are the most important component of costs. The costs of raw materials as a percentage of total costs of production range between 61.9% and 84.3% during the period 1971-1978. There is no problem in estimating costs of raw materials for the production target if we know two pieces of information :

1. required raw materials to produce one ton of steel .
2. the price level of raw materials in 1985.

Both types of information are difficult to gather . Workable assumptions have to be made .We will assume that technical coefficients are constant between 1975 and 1985 which means that the technique of production does not change

during the period of projection . This assumption cares for the first required information and seems reasonable given the fact that techniques seldom do change rapidly .

The second information necessitates a detailed study of the probable development of costs in the supplying industries (iron Ore and foundaries). This is a tremendous task beyond the scope of this study. A second alternative is to calculate the rate of change in prices of raw materials from the past experience and then apply the same rate to the future. Even with its limits , this alternative cannot be used because the available data in this respect are scanty. The only information available is the relative increase in prices of raw materials and final products during the period 1974-1978 as presented in table (11) .

It could be seen that the prices of raw materials have increased heavily compared with increases in prices of final products during the period 1974-1978. The penalty rate-the difference between increases in prices of raw materials and final products-averaged 103.8% which means that the industry has to bear an annual increase in costs of raw materials of 20.8 % between 1974 and 1978 without being able to shift this burden on the consumer . In addition to this, it is worthwhile to mention that the cost of raw materials per ton of steel in the



base year is overvalued due to the exchange rate policy which entailed a shift from official rate (subsidized) to parallel exchange rate (market) exchange rate. So far, it could be inferred from what have been said that a cost of raw materials of LE 226 for producing a ton of steel is high enough to justify its application when calculating the costs of raw materials needed to produce the target level of output. Consequently, costs of raw materials are as follows in 1985:

1. for the first estimate of production target, it costs 261.3 million (LE) to produce 1.156 million ton .
2. for the second estimate of production target, it costs 309.4 million to produce 1.369 million ton .

Table (11): Relative Increase in Prices of Raw Materials and Final Products(1974-1978)

Year	Prices Increase in Raw Materials (1000 LE) (1)	Price Increase in Final Products (1000 LE) (2)	Relative Price Increase (1)/(2)	Penalty Rate on Raw Materials
1974	17177	7325	234	134
1975	26425	12192	217	117
1976	25220	11233	224	124
1977	27647	12168	227	127
1978	32817	28001	117	17
<b>Average</b>				<b>103.8</b>

Source: Yousef El Awaamy: Op.Cit. The last two columns are our calculations .

B. Wages :

In order to estimate the costs of labor in 1985, two pieces of information are required :

1. the number of employees .
2. the wage rate .

Most of the Egyptian industrial activities are plagued with redundant employment. The Egyptian steel industry is no exception. To verify this statement, an attempt is made to calculate the marginal wage rate for the year 1978—the last year of available time series. It is important to note that the exercise is carried out Ex Post. If there is a difference between current wages and the marginal wage rate, this means that labor is overpaid and an underemployment phenomenon is existent. The Constant Elasticity of substitution (CES) production function is used for this purpose<sup>(1)</sup>. The steps are exposed below .

The following three equations can be derived from the (CES) production function :

$$(1) \text{ Log } V/L = a + b \text{ log } W$$

V = gross value added (output), L = labor force, W = marginal wage rate, a = constant, b = elasticity of substitution

between labor and capital .

(1) The Constant Elasticity of Substitution production function takes the form :

$$V = \gamma \left[ \delta L^{-\rho} + (1-\delta) K^{-\rho} \right]^{-1/\rho}$$

(V = Output, K= Capital, L=labor,  $\delta$ =Share of labor in output,  $\rho$  = substitution parameter between labor and capital,  $\gamma$  = Efficiency parameter).

Equation(1) is a relationship between average productivity of labor and the marginal wage rate .

$$(2) \quad P = I - b / b$$

Equation(2) is a relationship between the exponent of the (CES) function and the elasticity of substitution parameter derived from equation (1) .

$$(3) \quad = \frac{(R/W) (K/L)^{I+P}}{I+(R/W) (K/L)^{I+P}} = A/I+A$$

(R=  $dV/dK$ , W =  $dV/dL$ , A = numerator of function (3),  $\delta$  = share of labor in output)

If we assume that the elasticity of substitution between labor and capital for the Egyptian steel industry equals unity<sup>(1)</sup>, it becomes easier to compute the share of labor in output and then apply the following formula to derive the marginal wage rate :

$$(4) \quad dV/dL \cdot L = \delta V$$

Equation (4) states that the marginal wage rate multiplied by the number of employees equals the share of labor in output multiplied by the level of output. The marginal wage rate is derived from equation (4) as :

$$(5) \quad dV / dL = \delta (V / L)$$

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(1) Prof. M. Girgis has given the estimate as I. 016 for Ferrous Metals Industry .

M. Girgis: "Aggregation and Mis-specification Biases in Estimate of Factor Elasticity of substitution : The case of Egypt" , Weltwirtschaft Archiv, 110, 1974, no. I.

We are seeking for the marginal wage rate in 1978 and formula (3) is used for this purpose . The average capital and labor productivities in 1978 will be used as a substitute for (R) and (W) respectively . If the average productivities are equal to the marginal productivities, formula (5) will prove that . If not, the right estimate for the marginal productivities will be calculated .

Applying formula (3), the distribution share of labor is equal to 0.45 and the marginal wage rate is equal to LE 618 . This means that workers are overpaid by the difference between current average wage in 1978 (LE 848) and the marginal wage rate (LE 618) . The rate of overpaying is 37 % . This is the evidence that labor employed in the Egyptian steel industry is underemployed,

Redundancy of labor in 1978 justifies the assumption of stabilizing the level of employment at its level of 1978. This assumption cares for the first problem in estimating the cost of labor in 1985. It remains to decide on the wage level in 1985 . Labor productivity is expected to increase by 6.4 % annually as indicated in the context of potentials of increase in production. It is suggested that wages increase annually by the same percentage. In order to approach a balance between productivity and wages and in the same time do not deprive workers from any gains so far achieved,

the annual increase, starting from year 1979, will be paid on the base of the marginal wage rate (618) and added accumulately to the nominal wage rate in 1978 (LE 848). On that base, the accumulated increase will be LE 277.5 from year 1979 till 1985 and the wage rate will be LE 1125 in year 1985. This wage policy entails an annual increase in the wage rate by 4.6 % - less than the increase in labor productivity- in order to come closer to linking wages to productivity and to start a new employment policy where wages never exceed productivity .

The wage bill will be LE 50.1 million in 1985.

c. Charges on Capital :

Charges on capital are composed of two components :

1. depreciation .
2. interest on capital employed .

As regards depreciation, there are two sources of information: the profit and loss account and the balance sheet statement . The two sources reflect differences in concept. The profit/loss account cares for the flow concept and the balance sheet cares for the stock concept. Data in table (12) concerning depreciation are compiled from information on company finance .

Table (12): Depreciation and Interest as Percentage of  
Capital Employed

Company	<u>Depreciation (LE 1000)</u>		Average Capital Employed (LE 1000)	<u>Depreciation Rate</u>		Interest (B/S) (LE 1000)	Interest /Capital
	Profit /loss Account	Balance sheet statement		P/L	F/S		
	(P/L)	(B/S)					
El Nasr Casting	155	558	4011	3.8	13.9	176	4.4
National Metal	188	1846	14097	1.3	13.1	95	0.7
Copper Works	778	4339	28150	2.8	15.4	1218	4.3
Hadid & Solb	10810	47973	268744	4.0	17.8	1951	0.7
EL Nasr Casting	535	3476	9221	5.8	37.7	32	0.3
General Metal	140	1247	5766	2.4	21.6	84	1.5
El Nasr Pipes & Fittings	595	4232	166	3.6	25.6	324	2.0
Delta Metal	333	2616	7651	4.3	34.2	298	3.9
Average				3.5	22.4		2.2

Source : Atkins Report, Company Finance .

It could be seen that the depreciation rate across firms defined as the value of depreciation divided by average capital employed is 3.5 % in 1975 according to the profit and loss account . This is decidedly a very low rate of depreciation . On the other hand, the average depreciation rate according to the balance sheet statements is 22.4 % and this is decidedly a very high rate of depreciation . A figure of 10 % is suggested. This rate will be applied to the stock of Machinery and Equipment in 1985. We restrict capital to Machinery and Equipment because this component of capital is the only one that makes sense with regard to capacity utilization .

The second component of charges on capital is interest . The value of interest paid by companies is very negligible which gives the impression that the industry as a whole ignores this component. To rationalize the use of capital , its cost must be recognized . Atkins calculated a rate of 14.6 % as representing a Factor Recovery of Capital employed in the industry . We will accept this rate of interest as cost of capital and will be applied also to the stock of Machinery and Equipment in 1985 .

Taking depreciation and interest together, charges on capital will be at the rate of 26.4 % . It is put so high to allow for the charges on working capital ignored in this study . It is left to estimate the stock of Machinery and Equipment in 1985 .

The formula used to estimate the sock of capital in 1985 is (1)

$$(K/L)_{1985} = \left( \frac{W_{1985}}{W_{1978}} \right)^b \cdot (K/L)_{1978}$$

Again, the meaning of the symbols are as before and we have all the information necessary to estimate the stock of capital in 1985. The stock of capital in 1985 will be LE 216.34 million as compared with LE 163.16 million in 1978 . It can be inferred that the capital/labor ratio in 1985 will become LE 3658 as compared with 3658 LE in 1978 , and the annual investment will be LE 7.6 million . The annual investment figure is a modest figure, It is suggested that new investment goes to the elimination of bottlenecks in capacity utilization (e.g. regulation of raw materials supply, maintenace, energy regulation, upgrading skills of labor) since the bulk of a heavy investment program was done in 1975 .

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(1) J.K. Boon : "Technology and Sector Choice in Economic Development", Sijthoff & Noordhoff International Publishers, 1971 .



Table (13) : Cost Structure (1985)

Item	Production Level (min. ton )	Raw Materials (226 LE) Per ton)	Wages (mln. LE)	Interest (mln.LE)	Depreciat -ion (mln.LE)	Total (mln.LE)	Cost per ton (LE)
Estimate(1)	1.156	261.8	50.1	31.6	21.6	364.6	315.4
Estimate(2)	1.369	309.4	50.1	31.6	21.6	412.7	301.5

Source : Our Calculation

Finally, charges on capital will be LE 53.2 million in 1985. The cost structure in 1985 is given item by item in table (13) below.

To end section (II), it remains to summarize the results so far obtained, the summary is contained in two tables:

1. Table(14) which compares cost per ton in 1975 and 1985, and
2. Table (15) which compares the structure of costs item by item in 1975 and 1985.

Table (14) indicates that the cost per ton will increase from LE 268 to LE 308 . The rate of increase is 15% between 1975 and 1985- a modest increase. If sales Prices are fixed below costs in 1985, there would be no financial benefits to the industry. But we postpone exposition of our ideas about price Policy till the next section .

Table (14) : Structure of costs and Prices in 1975 and 1985

(LE Per ton )

Year	Cost		Prices*
	Company Finance	Our\$	
1975	278-328	214 - 253	157.5
Average	(268)		
1985		301.5- 315.4	326.8
Average		(306)	

(\*) See table(16) below

In addition to the favourable results that costs per ton will increase only by 15 % above its level in 1975, there will be structural changes in the weights of different components of costs between 1975 and 1985 as reflected in table (15). wages will be more or less the same as in 1975( around 13 % ) , The percentage share of raw materials will drop from 84.3 % to around 73 % . It is striking to observe that the component of raw materials in 1985 coincide with its average percentage during the period 1971- 1978(74.2 %),<sup>(1)</sup> and this is a tremendous improvement . Lastly , the tremendous structural change is in other items of costs- the most important component of which is charges on capital. Other Costs will increase from 2.2% to about 14% . we know that this increase is attributable to higher rates of depreciation and interest than in 1975.

(1) The detailed shares are :

(67.1, 64.44 61.9, 76.1, 84.3, 79.9 74,5, and 70.0)

Table (15) : Comparison of Cost Structure in 1975 and 1982(%)

Year	Wages	Raw Materials	Others	Total
<u>1975</u>	13.5	84.3	2.2	100
<u>1985</u>				
Estimate(1)	13.7	71.7	14.6	100
Estimate(2)	12.1	75.0	12.9	100

Source:

Data for 1975 are taken from company finance, and they are our calculations for 1985.

Section (III) : Price Policy :

III.I. Prices of local Production :

Different types of steel are sold at different prices. From available data, we tried to identify the average sales price of a ton of steel irrespective of its technical specification . we know that this procedure has limits but we opt for simplicity. This has been said, the selling price per ton ranges between LE 140 and LE 175 for non - flat and flat products respectively in 1975 . It is apparent that the

consumer is subsidized by the difference between costs(LE 268) and selling prices . The rate of subsidy is 41.2 % on average . The result is well known: the deterioration of the financial position of the industry .

Atkins suggested that if the average price is increased by 29 % in 1975, some firms will realise substantial profits . This means that the price of a ton of steel will increase from LE 157.5 to LE 203.1-still less than costs. But this increase in prices by 29 % in 1975 alone is not practical, the increase is rather high for one year. We will phase the increase over three years starting from 1976, which entails an annual increase of 9.7 % in such a way that the 29 % will be exhausted in 1978 .

Since we have upgraded the price level till 1978 according to Atkins suggestion to bring the industry gradually near its breakeven point with costs , it remains to determine the price level in 1985. Some guidelines are pertinent :

1. prices should be close to the breakeven point with costs(or better higher),
2. the rate of price increase should be in line with the rate of increase in per capita income .

It is expected that the rate of increase in per capita income in Egypt during the eighties will be around 8.7 %<sup>(1)</sup>. If we use this rate of increase in income for price increase, the cumulative increase in prices from 1979 till 1985 will be 60.9 % . This rate applied to the average price in 1978 (LE 203.1) will bring the price of a ton of steel to LE 327 on average . The development of the price level between 1975 and 1985 is provided in table (16)

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(1) cf: The World Bank Domestic Resources Mobilization Model (DRM) - A Report subsequent to the series of : "Egypt: Economic Management in a Period of Transition".

Table (16) : Estimated Prices (1985)

(LE per ton )

Product	<u>Atkins</u>	<u>Atkins</u>	<u>Ours</u>	<u>Ours</u>
	(actual)	(suggested increase in 1975 by 29%).	(suggested Phasing out the 29 % over 3 Years from 1976)	(8.7% increase from 1979)
		---		
<u>1975</u>	Non-flat	140	180.6	
	Flat	175	225.7	
	Average	157.5	203.1	
1978	Average			203.1
1985	Non -flat			290.6
	Flat			363.1
	Average			326.8

Source : Our Calculations

Between 1975 and 1985 , Prices will increase by a rate of 107 % . From this figure write off the past subsidy of 41.2 % to the consumer to find out that the net increase in prices will be at a rate of 66 % . This means that the real burden of increase will be 6.6 % Per year and this is less than the increase in per capita income . Again , Table (14) above can be used to compare developments in costs and prices between 1975 and 1985 . The loss margin is 41.1 % in 1975 and the profit margin is 6.1 % in 1985.

### III.2. Prices of imports :

in order to evaluate the competitiveness of the industry against foreign producers, a comparison between local prices and import price (cif) Per ton of steel in both 1975 and 1985 is required. Available information on prices of imports are for the period 1976- 1979 in US dollars as presented in table(17). for Year 1976, we will apply a rate of exchange of 1.5 US dollars per an Egyptian Pound . The result is that the import price (cif) per ton is LE 215. The figure of LE 215 will be compared with the local price in 1976. The actual local price per ton is 157.5 LE in 1975. Add the suggested increase of 9.7 % , the local price will be LE 173 in 1976 as shown in table (18). This means that local prices are lower than (cif) prices by 24 % and this can be the rate of possible local price change excluding any tariff protection . In other words, there



is a deliberate policy of subsidizing the consumer of local steel production by 24 % . This comes closer to the suggested increase in prices by Atkins (29%) and is much lower than our suggested increase: 9.7 % from 1976 till 1978 and by 8.7 % from 1979 till 1985. If we know that the average tariff rate ranges between 20-30 % in 1976, it becomes evident that the consumer is subsidized by a rate ranging between 44-54 % . The conclusion for year 1976 is that-even with an increase in prices by 24 %- the industry will not lose its share in the local market given the tariff rate of 20-30 % .

Table(17): Import Prices (cif)

(US \$)

Product	Year			
	1976	1977	1978	1979
R.C. Bars	244	292	346	322
Light Angles	323	340	484	313
H.R. Sheet	323	340	484	313
C.R. Sheet	402	515	648	365
Average	323	371.7	490.5	328.2

Source : Year Book of International Trade Statistics, 1979.

Table(18): Rate of Possible price Change Excluding  
the Tariff Rate Protection (20-30 % )

Year	Import Price (cif) (1)	Local Price (2)	Possible Price Change (3)	Rate of Price Change (%) (4) = (3) / (2)
<u>1976</u> (LE)	215.0	173.0	(+) 42.0	(+) 24.0
<u>1985</u> (LE)	271.0	326.8	(-) 55.8	(-) 17.0
(US \$)	323.0	389.0	(-) 56.0	(-) 17.0

Source : Our Calculations .

No one can say what the import price will be in 1985. But if we know that steel industry in developed countries is facing tremendous difficulties in marketing its products and there is a race of steel subsidy among countries, one could assume that at best the (cif) prices of steel will stabilize at their level of 1976 (LE 215). This figure becomes LE 271 when we take the devaluation of the Egyptian Pound in 1981 by 26 % into consideration and assuming that no further devaluation during the eighties, In US dollars, the import price (cif) will be 323\$. The local price in US dollars is 389 \$ in 1985. This means that local prices will be higher than foreign prices in 1985 by a rate of 21%. If we add the rate of 20-30 % tariffs on imports to local prices, it is interesting to note that local price in 1985 just breaks even with import price?, The conclusion for year 1985 is that a rate of tariff of 20-30% is not enough to secure the share of the industry in the local market since (cif) prices are lower than local prices by almost the same rate of tariffs. Since we want to stick to the program of action, the local price cannot be decreased. The only variable to use to protect the share of the industry in the local market and to protect the industry against foreign competition is to raise the tariff rate by almost the difference in prices. This means that the tariff rate would range between 40-50 % in 1985.

Section(IV): Policy Instruments to Implement the Rationalization Program :

The government policy parameters inherent in the calculations are:

1. Wages
2. Charges on capital
3. Tariffs(or/and quotas)
4. Exchange rate
5. Investment .

Each of the above instruments represents a course of action open to the government . The option with regard to investment is limited because the bulk of investment is done in 1975 as mentioned before. Capacity installed has only to be used at the maximum rate possible and the meagre figure of investment during the period 1975-1985 should be used to eliminate bottlenecks in production. For other policy instruments, the door is open for a wide variety of choice . We begin with wages ,

Workers are overpaid by a rate of 37 % in 1985. This means that the link between wages and productivity is missing . The bias in wage policy should be corrected, we suggested a wage level of LE1125 in 1985 together with stabilization of employment at the 1978 level. An increase in employment or/ and the wage level means additional costs. Additional costs have to be matched by increase in labor productivity over and above our suggested rate of 6.4 % . Suppose that the government wants to compensate workers for the inflation rate - say 15% . The question is how the industry could finance this increase?. It could do that if production or sales prices increase by the same rate . But we know that there are limits

on productivity and price increases. In that case, the only course of action open to the policy maker in the industry is to satisfy himself with a rate of profit less than 6 % And the whole exercise should be worked out again to calculate cost per ton given the choice of wage policy.

The second policy instrument is charges on capital which comprise depreciation and interest. According to the profit/loss data on firm level, charges on capital are only 6 % in 1975 ( see table 12 ) . The striking remark is that while labor is overpaid, charges on capital are undervalued. There is a deliberate policy to subsidize capital- the most scarce factor of production in developing countries. In our case, Egypt is no exception . This needs corrections . Atkins suggested a Factor Recovery of Capital of 14.6 % as an unbiased rate of charges on capital . Thus, the bias in estimating charges on capital is an underestimation of around 7% in 1975. For year 1985, we suggested a rate of 25 % as charges on capital . This rate is the sum of the 15 % suggested by Atkins plus a rate of depreciation of 10 % . Obviously , this is a very high rate . The norm is a rate which ranges between 15 and 25 % . Financial Policy ( monetary and fiscal ) has the option of decreasing the suggested rate according to the performance of the industry and the conditions in the capital market. The

support given by the financial authorities is dependent upon the criterion of increases in capital productivity so that subsidies on capital are linked with rational utilization of installed capacity . We regard any reduction in charges on capital as a subsidy because the public sector owns the industry . The range of subsidy could be around 10 % - the difference between the norm of 15 % and our suggested rate of 25 %.

The third policy instrument is the exchange rate. The official exchange rate was US 2.4 % per pound in 1975 while the parallel (market) exchange rate was 1.5. Thus, the official exchange rate is overvalued by 60 % in 1975 . The importance of applying an unbiased exchange rate is three- fold, :Firstly , Costs of imported requirements of the industry are correctly calculated at the international prices, Secondly , exports of local Production will be more competitive in the international market. The first reason of applying the unbiased exchange rate is the most important one since steel exports are still meagre. Thirdly, the design of commercial policy ( especially the import policy) is dependent upon the exchange rate applicable to imports . This point has been discussed before when estimating the import prices in 1985 . The use of a correct exchange rate will determine the import prices in Egyptian Pounds and consequently the difference between local and import prices . It has been assumed that there would be no devaluation of the

Egyptian pound in the eighties except that devaluation of 1981 by 26 %. This makes the exchange rate as equal to 1.9 £ in 1985. At a different rate , different tariff policy emerges. This means that a macro- economic policy of exchange rate is not without repercussions on the micro- level. Any mis-specification of exchange rate policy entails widespread wrong decisions on the micro - level . This view will become clear immediately while discussing the last policy instrument .

The last policy instrument is tariffs (or/ and quotas). The observed Ad Valorem tariff rate in 1975 ranges between 20 and 30% across different kinds of steel . It was observed that local prices are lower than import prices by 24% so that the consumer is effectively subsidized (protected) by a rate of 44-54 % in 1975. This means that the effective tariff rate is higher than the nominal rate.

We have speculated about the import prices in 1985 in order to guess the direction of policy action with regard to tariffs. It has been found that import prices will be lower than local prices by around 21% - just equal to the nominal tariff rate. Consequently, the suggested level of nominal tariffs in 1985 should be 41-51% if the industry wants to preserve its share in the local market . It is interesting to observe that the suggested nominal tariff rate becomes closer to the effective tariff rate in 1975 just because



biases in cost/price structure are eliminated by our rationalization program. However, we preferred not to provide any estimate of the tariff rate in 1985 in the summary table of policy parameters (table 19).

Table (19) : Policy Package

Parameters Year	Wages	Charges on Capital	Exchange Rate	Tariffs
	LE	%	US \$	%
<u>1975</u>	(1978)			
Observed	848	6	2.40	20-30
Unbiased level	618	15 (a)	1.50	44-54 (b)
Bias (%)	(+) 37 (c)	(-) 7	(+) 60	
<u>1985</u>				
Suggested level	1124	25	1.19	- (d)

a. A Factor of Capital Recovery Suggested by Atkins .

b. With Allowance for Underpricing .

c. (+/-) : Upward/ Downward Bias .

d. Depends on the International Price level .



Conclusion :

The implementation of the program of action using our suggested policy package could lead to the following achievements:

1. Preservation of the industry's share in the local market.
2. realization of a profit margin of 6 % .
3. protection agaist competitive imports .

Price policy is a common denominator of the policy package. Throughout the exercise, operative guidelines for managing prices of imports and output are applied . A well designed price policy together with an optimal combination of factors of production undoubtedly lead to rationalized performance of any activity . It is worthwhile to note that our methodology is to be applicable only in the Process Industries like steel, textiles, and fertilizers where the final product is more or less homogeneous. Here the framework is Complex Analysis where forward/backward linkages are vital for designing any rationalization program . For industries with highly differentiated products like electronics, Sectoral Analysis is the best framework .

Egypt has attained a highly differentiated industrial sector. In order to study the problems of this sector, a breakthrough in methodology is inevitable . It is hoped that this study calls attention in this respect. A final remark is necessary: whatever the degree of confidence in the basic data used in this study, the methodology is not challenged. And if this study has any value, it will be its value as a study in methodology .