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ENGINEERING INDUSTRY - HISTORY, PROBLEMS AND PROSPECTS

BY

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SUMMARY

Industrial Revolution in the world was triggered off, about 200 years ago, by the Engineering Industry, so much so that by the year 1825, making things by machines had become a rule.

Industrialization in Pakistan started after only 1947 when the country emerged as an independent sovereign state. But here again only processing industries based on the imported machinery formed the basis for the industrial progress. Engineering Industry that designed, developed, fabricated and provided the machines for all the other industries did not receive the focus and encouragement.

Certain half-hearted measures had been taken at the State level to stimulate the formation and growth of the engineering industry but consistent commitment to this vital sector had not been in evidence. The result was that engineering goods still continued to form the single largest head under imports and tended to give the country an unfavourable balance of trade on current account.

Further, regarding its importance, Engineering Industry did not only support other industries but was also vital for agriculture and even defence.

Engineering Industry was, in fact, a symbol of self reliance and critical for a long term economic development of any country. A UNIDO report on capital goods industry states: "without a capital goods industry, the countries....., cannot emerge from dependence."

Some decisions had recently been taken and institutional frame work put in place to encourage growth of this vital sector of economy but skepticism as to the sincerity of the government still exercised the minds of those who had seen many ups and downs in this field where they saw one government treating it as a key industry and the other allowing it to recede into oblivion.

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BRIEF HISTORY OF INDUSTRIALIZATION

Macro World View

Industrial revolution, a phenomenon, which occurred in the later part of the 18th century, was started off by the invention of five basic machines in the textile industry. These inventions were the Spinning Jenny (1764); Water Frame (1769); Mule Spinner (1779); Power Loom (1785) and Steam Engine (1769).

These five inventions further led to the design and fabrication of machine tools which gave fillip to Industrialization at a mass scale. So-much-so; that by 1825 making things by machines had become a rule.

It was thus that the engineering industry led to the Industrialization process. Industrial revolution from England moved to Europe and then to the United States of America and other countries.

This revolution in Japan, the leading industrialized country in the contemporary world, commenced a little over 100 years ago with the Meiji Restoration (1867). Emperor Mutsuhito (1867-1912) or Meiji, the "enlightened-Ruler" in the Japanese language, after re-ascending the throne, ordered four reforms and one of them was INDUSTRIALIZATION. Thereafter Japan just took off to become an Industrial giant exporting mainly the Engineering and other value added goods that put the whole world into a state of shock.

This broadly was how the Industrial Revolution was brought about by the engineering industry, an industry which produced machines, implements and other equipment that, in turn, produced goods and services, needed by the communities.

Industry in Pakistan - General View

Industrial revolution in Pakistan started only after independence in 1947. Of course, Industrialization in the sub-continent was started by the British after the war of independence in 1857 but the bulk of this activity was confined to areas other than those which had predominantly Muslim population. Four industries were introduced by the British, starting from 1861, but only after protecting the social system with the necessary legislation including "Workmen's Breach of Contract Act, 1859".

The four industries started were textiles in Bombay Presidency, Jute industry in West Bengal, Mining in Bihar and Orrisa and Railways over the entire sub-continent. The machinery required for these industries was to be imported from England. Production and fabrication of these machines was not allowed locally. Only maintenance was permitted.

Above all, whatever little industry did come up in the West Punjab and now a part of Pakistan, was all placed in the hands of non-Muslim and these were also few. Mukand Iron Works in Badami Bagh, now the PECO plant had a small Rolling Mill and an Electric Arc Furnace and this was in the hands of Mukand Lal, who migrated after Independence to India and left this plant as evacuee property. This unit was allotted to C.M. Latif in exchange for his Batala Engineering Company left by him in Batala, East Punjab. The second unit in Mughalpura, another Rolling Mill with Electric Arc Furnace was in the hands of Gokal Chand Narang, who left after partition this factory as an evacuee property which was later allotted to the Railways, who named it as Steel Shop. Sutlej Cotton Mill in Okara was another factory owned by non-Muslim who left, after partition this plant as an evacuee property. Ganesh Ghee Mills in Faisalabad (earlier Lyallpur) were also under the management of non-Muslim and these also were left as evacuee property. Beyond these, no significant factory existed in the entire area which, later, constituted Pakistan.

After achieving independence from British in 1947, the people of Pakistan got an opportunity to move into the industrial sector. Before Independence, the people of this region were largely employed in menial jobs with a very few who had any sizeable business.

The process of Industrialization, incidentally, was further helped by the fact that hostilities with India blocked the inflow of manufactured goods from across the border. There was a vacuum and there was freedom. The people of this country rose to the occasion and set up industries quickly. The Pakistan Industrial Development Corporation (PIDC) which was set up in 1953, helped further in the process of industrialization.

Engineering industry which is the mother of all industries, was initially neglected. However, some engineering industries were set up in terms of rolling mills, steel furnaces, machine tool factories like the one in Landhi and another at Pakistan Engineering Company (PECO), Lahore. In addition, in the unorganized sector, a lot of talented people started to make machine tools and machinery for supply to the factories in the country.

The quality of the products in the unorganized sector largely remained poor and based on out-dated technology and non-specific metallurgy. Some fabrication units were also set up and foundries to cast machine parts installed. Slow speed diesel engines of small horse powers, agricultural pumps and turbines and also some agricultural implements were started to be manufactured both in the organized and the unorganized sectors.

Things moved initially with great speed and then there were ups and downs due to political upheavals. However, the processing industries largely flourished but the basic engineering industries continued to remain sick most of the time. Fiscal policies were blamed for the meladies in the engineering sector of industry.

Pakistan Steel (1982), at Karachi, was a major land mark in the Industrialization of Pakistan but this plant had to be massively protected having been created in the Public Sector with all its enormous over-staffing and other encumbrances.

This briefly is the story of industrialization in Pakistan.

Current Status

But what do the official statistics currently say ? If we measure the present status of industrialization by the ratio of value added by industry to the GDP, then according to statistics the degree of industrialization in 1993-94 was lower than what it was in 1987-88 and further lower than 19970-71. Supporting evidence is provided by PIDE Study (1981)[2], where Naqvi, Kemal and Aziz found that from 1971-72 to 1978-79 capital stock employed in large-scale manufacturing actually dropped by any where from 22 percent to 31 percent. Pakistan, today, thus is a less industrialized country than it was 25 years ago, on the eve of separation of East Pakistan.

THE ENGINEERING INDUSTRY

Definition

Engineering industry is generally defined as the sector that produces machines and plants and their components to enable the community to produce goods and service needed by the people.

In fact there were three main roles that the capital goods thus produced, played in the life of the community viz. Primary, Secondary and Tertiary :

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2. **Arshad Zaman, Industrialization & Tariff Cut, Daily Dawn, Karachi, Economic & Business Review, May 20-26, 1995.**

The primary role of engineering products lies in the fabrication of capital goods (i.e. machine tools, plants, construction and public works machinery, etc.).

- The secondary role of engineering goods lies in the production of intermediate goods (i.e. power production and distribution equipment, iron and steel equipment, petrochemical equipment, etc.).

The tertiary role of engineering goods lies in the production of consumer durable, including agricultural machines and implements and electrical goods, etc.

Another View

Some of the experts define Engineering Industry as "The Units manufacturing various products from ferrous and non-ferrous metals, polymer materials and assembly of electronic components by one or combination of the following recognized engineering processes :

Elements of an Integrated Engineering Industrial Activity is given in a schematic diagram placed below :

Categories of the Engineering Industry

During the last 48 years, efforts have been made for widening the range of goods produced in the country. Although our production capacities were very limited but now the range of production is fairly impressive from wire nail, machine tools, cutlery, hand tools, gas and household appliances and other hardware items in the light engineering sector to diesel engines, water and steam turbines, oil expellers, ships, barges, sugar, rice and cement plants, textile machinery, road rollers, concrete mixers, overhead travelling cranes, structural towers, printing and book binding machines, flour/rice milling machines, fishing trawlers, cotton ginning machines, boilers, trucks, buses, cars, jeeps, motor cycles, tractors, railway carriages, wagons and locomotives, containers and automobile parts, etc. In the electrical sector, the main products were transformers, motors, refrigerators, electric generating sets, switchgears, pumps, washing machines, electric fans and other domestic appliances. There were different ways of categorizing the engineering goods. If we divided them sector-wise i.e. all the related segments - they could be enlisted as :

1. **Basic metals and materials;**
2. **Metal products;**
3. **Mechanical equipment and machinery;**
4. **Electrical and Electronic goods; and**
5. **Transport and agricultural equipment.**

1. Basic metals

Pig iron, ingots, billets, castings, flat rolled products, iron and steel bars and rods, rolled sections, forgings, wire and wire products, non-ferrous metals and products including those of silver, copper, nickle, aluminum, zinc and tin etc.

2. Metal products

Surgical equipment, hand tools, fasteners, knives, cutlery, structural towers, scaffolding towers, windows, conduit pipes and tubes, utensils, nuts and bolts, pad locks and chains, etc.

3. Mechanical equipment and machinery

Power generating machinery, textile machinery, construction machinery, machinery for special industries, agricultural implements and equipment, processing plants, defence equipment, metal working machinery, pumps, mechanical handling equipment, heating/cooling equipment, hand tools, pneumatic tools, bearings, valves, office equipment, other industrial machinery and equipment.

4. Electrical and Electronic goods

Electric motors, generating sets, fans, switch gears, telecommunication equipment, transformers, control and relay panels, circuit breakers, domestic appliances, cables and conductors, HRC fuses and fuse boards, distribution boards, etc.

5. Transport and agricultural equipment

Passenger cars, wagons, busses and trucks, tractors, 2 and 3 wheelers, bicycles, automotive parts and spares, earth moving and construction machinery, railway engines and wagons, etc.

For a better and easy understanding, the basic engineering goods made in Pakistan have been grouped under separate headings. There is a detailed list of these products which is annexed to this paper.

Significance in Modern Economy

Today, we are standing amidst a lot of problems and confusion - everyone seems to be frustrated and disillusioned about the future.

It is obvious to all of us that over the next few years considerable efforts will have to be made in Pakistan to cover the somewhat stormy passage to economic independence. The realization is growing all around that we can cover this distance far more speedily if the country's economy speeds past its traditional agrarian heritage to an industrial growth and efficiency. We will need to gallop past the wooden plough and the Persian wheel to get the most out of human and other resources. So, in order to realize the country's economic

aspirations, industry will have to be reshaped - and of course, the most important route is through the **"ENGINEERING CAPITAL GOODS INDUSTRY"**.

The scope and importance of the Engineering Industry is highlighted when we place it in the perspective of the whole society and our overall system of economy. All manufacturing and the seventeen main divisions of the economy depend entirely on the engineering industry so far as their demand of fixed assets is concerned. These divisions are :

1. **Agriculture;**
2. **Mining and quarrying;**
3. **Food products;**
4. **Small scale manufacturing;**
5. **Construction;**
6. **Power generation and distribution;**
7. **Transport, and automotive sector;**
8. **Synthetic resins and plastics;**
9. **Iron and steel industry;**
10. **Textile industry;**
11. **Railways;**
12. **Refineries;**
13. **Paper and board;**
14. **Chemical industry;**
15. **Fertilizers and pesticides;**
16. **Forestry;**
17. **Glass and glass products; and**
18. **Fishing.**

Engineering Industry is, thus, the foundation of industrialization of any society. Engineering goods play a key role in economic development because these act as catalysts in both the national and social aspects of development. Talking from the socio-economic point of view, engineering goods industry is the centre for cultural change. It contributes, more than any other industry, to developing the labour, technical acumen and managerial skills. It upgrades indigenous technology and improves organizational methods.

Industries that provide inputs to the engineering goods industry are stimulated by a network of sub-contracting arrangements that are more extensive than those prevailing in any other industry. All these factors combine to make the engineering goods industry a harbinger of economic development. No country wishing to attain rapid economic development and a high standard of living, can afford to neglect this sector.

Pakistan has the ambition for an Industrial Revolution. But if the country keeps on importing engineering goods, it may perhaps never make it.

Import & Export of Engineering Goods

In the context of Pakistan's economy table 1 below would indicate that the value of Engineering goods imported every year by the country forms a very major part of the total imports, a fact which is little realized.

TABLE -1

MAJOR IMPORTS

Items	YEAR								
	86-87	87-88	88-89	889-90	90-91	91-92	92-93	93-94	%of Total
Engineering Goods	33.4	39.4	49.1	49.4	55.8	95.7	108.0	97.1	33-42
Petroleum & Products	14.0	17.3	18.5	24.9	37.8	34.4	40.0	42.5	14-22
Chemicals & Fertilizers	12.1	13.6	16.6	19.7	21.4	28.4	29.6	37.8	12-13
Grains, Edible Oils, Drugs, etc.	8.5	13.0	20.5	21.2	17.3	25.2	35.5	30.3	9-15
Other important	24.6	29.1	31.1	33.6	38.8	46.2	45.5	48.7	18.27
TOTAL :	92.4	112.6	135.8	148.9	171.0	229.8	258.6	256.4	100

Source : Economic Survey, 1993-94, Trade Policy, 1994-95

By comparison the export data of the country presented an interesting picture. It showed that the total exports of the country were much lower than the imports, resulting in a sustained deficit. See **Table - 2** on next page.

TABLE - 2
PAKISTAN'S EXPORTS

Item	YEAR							
	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94
Total Exports	63.4	78.2	90.2	106.5	138.3	171.7	177.0	204.0
Total Imports	92.4	112.6	135.8	148.9	171.0	229.8	258.6	256.4
Trade Deficit	29.0	34.2	45.6	42.4	32.8	58.1	81.6	52.4
Trade Deficit as % of Export	45.5	43.5	50.6	39.8	23.7	33.8	46.1	25.7

Source : Economic Survey, 1993-94, Trade Policy, 1994-95

If one was to further analyze the exports of Pakistan, one would find that according to the figures available from 1980 to 1990 (please see table 3), the value of all the Engineering goods exported was only one percent of the total exports in the year 1990 and if one was to deduct from these exports the value of the surgical goods, which formed 87% of the "Engineering Goods" exported, then the value of machinery and such other equipment, further dropped to a minuscule figure which would not even show on a chart.

TABLE - 3
PAKISTAN EXPORT OF ENGINEERING GOODS DOLLAR-WISE

(US$ Billion)

Exports	1980	1982	1983	1986	1988	1990
Engineering Goods	0.06	0.06	0.04	0.1	0.04	0.06
Other Exports	2.54	2.34	3.06	3.3	4.46	5.54
TOTAL :	2.60	2.40	4.10	3.4	4.50	5.60

Source : (SITC 7 : Machines and Transport Equipments) : International Trade Statistics Year Book 1983.

By contrast, one would like to give below a bar chart which indicated the progress made in the export of machinery and other engineering equipment by some of the emerging East Asian Economies during the 20 year period from 1971 to 1991. It would be observed from this chart that these countries had continued to increase their export of engineering

goods in a significant manner. Most of these economies, in fact, had far less favourable endowment factors as compared to what Pakistan was blessed with.

In this context, it would be important to state that exports of engineering goods needed to be promoted as it was through export that the industry could develop international competitiveness, establish the necessary market linkages, create cost effectiveness and quality and generate financial and other resources to furnish sustained long term development.

A table -4 showing Total Demand of Engineering Goods in Pakistan and local supply to meet a part of the demand might be seen below which indicated that 3 quarters of the demand was being met by imports and only one quarter by local fabrication. This showed the market potential available which needed attention of the investors, the planners and the government of the country.

TABLE - 4

DEMAND AND SUPPLY OF ENGINEERING GOODS IN PAKISTAN

(Rs. Billion)

Item	YEAR						
	86-87	87-88	88-89	89-90	90-91	91-92	92-93
Local Supply of Engineering Goods	18.0	21.0	22.0	24.9	27.2	29.4	33.8
Total Demand of Engineering Goods	51.4	60.6	71.1	74.3	83.0	125.1	141.8
% Share of Local Industry	35.1	34.6	30.9	33.5	32.8	23.5	23.8

Source : Economic Survey, 1993-94, Trade Policy , 1994-95

Projected figures for the demand of engineering goods for the year 1997-98 as estimated by the State Engineering Corporation of Pakistan were given in Table 5 below.

TABLE - 5

PROJECTIONS FOR ENGINEERING GOODS FOR 1997-98

Imports	Local Supply	Total Demand	% Share of Local Industry
174	68	242	28

Source : SEC Estimates

By increasing share of local supply, it would be seen that the country could save billions of Rupees and create hundreds of thousands of additional jobs.

Going a little more in details for analysis one might like to examine the table (# 6) below which gave category-wise details of the engineering goods that Pakistan had been importing during the last 7 years. This table might give a clue as to the segments that the country could concentrate on for self-reliance and reducing the import bill which, in a great measure, was currently being met through borrowings with all the conditionalities that tended to erode the national freedom and self respect.

TABLE - 6
PAKISTAN'S IMPORT OF ENGINEERING GOODS

(Rs. Million)

Sr. No.	Items	YEAR						
		87-88	88-89	89-90	90-91	91-92	92-93	93-94
1	Power generating machinery equipment	3641	7131	6970	5527	8893	5125	7711
2	Agriculture Machinery, Chemical Plants, Civil Engineering Plants and other Machinery and Parts.	5400	6678	4457	5802	12653	12062	11873
3	Textile Machinery and Parts.	3853	4948	5674	8493	19526	21430	11619
4	Machine Tools and Metal Working Machinery.	495	745	609	853	825	759	858
5	General Industrial Machinery and Equipment Parts.	3084	3401	2966	4538	7384	6983	8164
6	Office and Data Processing Machinery.	790	993	2388	1024	1298	1620	2048
7	Telecommunication Appliances / Equipments, etc.	2355	2701	2374	3958	3946	7671	5751
8	Electrical Appliances and Parts, e.g. Transformers, Control Panels, Circuits, Resistors, etc.	3688	4962	4259	4929	7469	6955	8901
9	Transport Equipment e.g. Motor Cars, Trucks, Pic-ups, Passenger Vehicles, Motorcycles, Scooters, Trailers, Railway Vehicles. Ships, Boats, etc.	9563	8403	10119	11443	20640	32745	25029
10	Basic Metals	6764	9149	9587	9210	13020	12895	15179
	TOTAL :	39633	49111	49403	55777	95654	108245	97143

Source : Federal Bureau of Statistics, Government of Pakistan.

In the context of its importance and the supply/demand imbalance, one might like to see the present situation of the engineering industry in Pakistan.

According to the study of the State Engineering Corporation of Pakistan, there were currently about 2000 manufacturing units installed in the country, employing nearly 200,000 workers in all categories. The annual production value of these units was nearly

40 billion Rupees. The capital employed was about 50 billion rupees. The capacity utilized was less than 30%. This was much below the break even point of any industry and collectively therefore engineering industry was necessarily making persistent losses and was therefore, perpetually sick, all the time looking upto the government to provide the right policies and priorities. It was rather ironical that domestically we had a waste of capacity and we continued to import finished goods. The most glaring examples were the massive import of yellow cabs and the green tractors putting out of business, for months together, the local automotive industry - the assemblers and their vending associates.

In this context, it would be appropriate to make a special mention of the vending industry.

Deletion Programme

For once, in the industrial history of Pakistan, a very enlightened policy was framed, which later suffered many ups and downs. The policy was known as the Deletion Programme. This was done in the late seventies and early eighties. This meant that the automotive and other assembly plants must necessarily delete from the import lists in a progressive manner a certain percentage by value of the imported components and replace them with locally developed parts either by themselves or through their vending associates and for that purpose they must obtain and make available the manufacturing drawings and technical know how to build up local engineering capability. Precisely speaking, it mandated that within 5 years of the commencement of the business 75 % of the components by value must be deleted from the import list if that assembler and the foreign supplier had to do business in Pakistan. This progressive deletion programme, under the scheme, had to be presented in advance, for approval, to the Government of Pakistan, who developed an institutional frame work to monitor the programme for strict implementation.

The programme brought into the country some sophisticated technology and generated a fair size employment opportunities. By one count, there were at present 500 small, medium and large vending industries that had developed some very sophisticated products. But for the deletion policy, this progress would not have been possible.

According to the study made by the State Engineering Corporation of Pakistan, the extent of deletion had in some cases even surpassed the 75 % limit otherwise visualized and laid down in the various SRO notifications.

The position on ground currently was given in the Table 7 below.

TABLE - 7
ACHIEVEMENT OF GOVERNMENT DELETION POLICY

Sr. No.	Industry	Deletion Level Achieved	Annual Estimated Foreign Exchange Saving (1987-94) (Million $)
1	Distribution Transformers	100%	190
2	Pumps	95%	10
3	Electric Motors	100%	10
4	Tractors	85%	115
5	Electricity Meters	90%	10
6	Deep Freezers / Refrigerator / Air-conditioners	89%	18
7	Switchgears	75%	150
8	Sugar Plants	75%	45
9	Motor Cycles	73%	91
10	Packed Air-conditioners	61%	05
11	Motor Vehicles	50-55%	117
12	Trucks and Buses	45-50%	100
	TOTAL SAVING :		861

Source : Ministry of Industries and Production

In addition, one might like to admire the Public Sector State Engineering Corporation for achieving an impressive level of deletion in the fabrication of large plants, despite handicaps inherent in the State Sector Management. Table 8 below gives some data in this connection.

TABLE - 8
CAPABILITIES OF STATE ENGINEERING CORPORATION

Products	Level of Deletion Achieved (%)
- Sugar Plants (500-12,000 TCD)	70
- Cement Plants (150-300 TPD)	40-45
- Cranes	30-55

Products	Level of Deletion Achieved (%)
- Road Rollers	60
- Transmission Towers	100
- Railway Equipment	100
- Steel Structures	100
- Industrial Boilers	65
- Thermal Power Plant Equipment	20
- Chemical and Petrochemical Plant	25-30
- Machine Tools	80
- Concrete Mixer	100
- Textile Machinery	30-75
- Hydro Power Plants	30-50
- Electric Motors	80
- Pumps	80-100

Source : State Engineering Corporation of Pakistan

Despite enormous advantage of the Deletion Policy the government functionaries, from time to time, had tended to lapse into confusion and liberally given relaxation to the assemblers. The result seemed to be that there was in evidence amongst the assemblers an attitude of laxity and they were not showing any more the eagerness that was witnessed in the earlier stages.

It needed vision and it needed courage to stand up to the strong lobbies that most of multinationals and transnationals they represented. It was not important what was good for the vendors or the assemblers. What was important was as to what was good for the country in the long run. This the people in the government had to continue to realize.

Encouragement for Engineering Industry

For encouraging the growth of engineering industry, the government would have to change the overall concepts. Enough incentives would be required to induce entrepreneurs to invest in this sector. Even today we did hear an occasional appeal to Adam Smith and laissez faire amidst all the rush of free enterprise. It was desirable therefore to set at rest

this occasional appeal and this odd posture so as to do away with the rare but irksome discordant note which could affect overall harmony of our national economic integration. Mostly with the analogy of the Industrial Revolution in the advanced countries, it was argued that then as now the best policy was to leave private enterprise alone to function in accordance with the dictates of free market forces. Such assumptions were rooted in time. Times had changed. Assumptions therefore needed to be reviewed. Economic forces in the world were not free. There were subtle controls which the under-developed people could not even perceive.

Agriculture and Industry

Agriculture was a pampered sector of the economy but poorly managed. The productivity of the Agri Sector in Pakistan was one of the lowest in the world. Even though more than 47.0%[3] of work force was devoted to agriculture the contribution made by this sector was only 25.0 % to the GDP. And on the food insecurity scale Pakistan was the most vulnerable in the world. 17%[4] of Pakistan's imports constituted food. This was the highest for any country in the world.

The industry in Pakistan, on the other hand, employed only 12.3 % of the work force and contributed 17.26 % to the GDP.

We were giving below a **Table - 9** showing the share of employment and share of GDP comparing agriculture with mining and manufacturing to show how much more the industry could add value as compared to agriculture and where should our future thrust be. It was, even though yet another matter that industry could raise productivity of the agriculture sector as well.

In the table we would also like to give comparative figures for another Asian economy that started its road to development almost at the same time as Pakistan did, viz. South Korea. These figures will, perhaps, give another insight into the process.

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3. Economic Survey, 1992-93, Economic Division, Government of Pakistan, p.114.
4. World Bank, Pakistan & Gulf Economist, Nov. 6-12, 1993, Economic Publications, p.55.

Sr No. And Item	1980		1985		1990		1993	
	AGR	M&M	AGR	M&M	AGR	M&M	AGR	M&M
PAKISTAN								
1. Share of Employment (&)	52.7	14.40	50.6	13.8	51.1	12.8	47.0	12.30
2. Total Work Force (Million)	12.7	3.50	13.6	3.70	15.8	3.90	15.03	3.92
3. Share of GDP (Rs. Billion)	76.4	38.40	121.30	69.6	197.4	137.7	304.60	218.10
4. Share of GDP (US$ Billion)	7.72	3.89	8.01	4.60	9.20	6.40	11.90	8.50
5. Output per Capita (Rs.)	6016	10971	8920	18810	12490	35300	20270	[illegible]
6. Output per Capita (Us.$)	608	1108	589	1242	582	1646	791	2170
SOUTH KOREA								
1. Share of Employment (&)	32.0	21.0	24.0	23.0	18.0	27.0	--	--
2. Total Work Force (Million)	4.7	3.1	3.7	3.7	3.3	4.9	--	--
3. Share of GDP (Rs. Billion)	--	--	--	--	--	--	--	--
4. Share of GDP (US$ Billion)	9.3	19.4	11.8	28.4	71.1	--	--	--
5. Output per Capita (Rs.)	--	--	--	--	--	--	--	--
6. Output per Capita (Us.$)	1979	6258	3112	8119	613	14514	--	--

Source : Economic Survey 1992-93 and key indicators of Developing and Pacific Countries.

Mechanization of Agriculture

The present government had declared the policy of Mechanizing the Agriculture to raise farm productivity. And for that purpose 120,000 tractors were planned to be distributed amongst the farmers at some very easy credit terms. With a nominal down payment the Agricultural Development Bank of Pakistan would provide credit at 13.5 % mark up rate (against 19.5 to 22 % commercial rate) to be paid back in 10 years and for those who made timely payment of installments the interest rate would be lowered to 12 percent.

The only weakness of the policy was that the government had proceeded to import a huge number of low price, low quality tractors from East European countries for supply to the farmers, whereas the local Tractor Industry could easily meet the entire demand with the tractors which had stood the test of time under the local conditions, fully backed up by after-sale service.

Majority of the imported low price tractors might not last for 10 years, the period for which the credit has been extended and the ADBP might eventually be heaped up with junk brought in by the defaulting farmers and all such loans might have to be written off.

Industrial Policy of the Government of Pakistan[5]

With regard to industrial policy, Pakistan's history can be divided into eight phases.

First Phase

The first phase started from 1948 with the issue of the first Industrial Policy Statement by the Government. It outlined the objectives and the strategy of industrialization of the new state. The public sector was required to perform a complementary role for the private sector. In 1949, government allowed a tax holiday of 2 years to industries primarily based on indigenous raw materials and for public limited companies with a subscribed capital of not less than Rs:200,000 and reinvesting 60% of their profit during the tax holiday period.

The process of setting up industrial estates started in 1947 with the establishment of Sind Industrial Estates (SITE) and then it spread to other places, as well.

Second Phase

The next industrial policy was announced in 1959. The revised policy aimed at accelerating the pace of industrial development and provided greater incentives to the entrepreneurs. Tax scheme was used to increase the overall level of investment and to trigger the development in the less developed areas of the country. This period recorded an all round growth of the economy with the private sector as the main vehicle for development. The eligibility of any area for availing the opportunity of tax holiday depended upon the level of its development. A list of eligible industries qualified for the tax holidays was also chalked out, which did include some sub-sectors of the Engineering Industry.

These days of the private sector came to an end with fall of Dhaka in 1971.

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5. **Research Series, Vol. I, Study Report by the Department of Research & Development, of Research and Development, Lahore Commerce and Industry, PP 53-57.**

Third Phase

It began with the Economic Reforms Order of 1972. The focus shifted from private to public sector. The nationalization policy of the government made the entrepreneurs nervous and shook their confidence.

Engineering Industry got hurt in this period because huge investments were required in this field and for the initiation of projects bold steps were required. Private investment, therefore, became shy especially in this sector. Commencement of work in Pakistan Steel was the only significant contribution during this period.

Fourth Phase

In 1977, the military government revised the policy relating to tax holiday and also provided additional incentives to the private sector. These incentives somewhat changed over the years but the essence remained the same.

The process of nationalization was also decided to be reversed, but civil bureaucracy and military hierarchy were very cautious and did not proceed beyond disinvesting a few of the taken over units. Thus, the government failed to instil confidence in the private sector in this "period of adhocism" which lasted till 1983.

Fifth Phase

A new Industrial Policy was announced in 1984, with the launching of the Sixth Five Year Plan, an important aim of which was "to evoke an active and confident response from the private sector to the responsibilities and opportunities offered by the Sixth Plan". This sought a major acceleration in private investment. The completion of the Steel Mills added a new element of hope and enthusiasm to the atmosphere.

Sixth Phase

In this phase greater emphasis was placed on exports, employment generation and increased efficiency of production units. Important measures taken, for implementation, included deregulation and Tariff reforms. "One Window Facility" at the industrial estate level was promised, which of course, never matured. The new industrial policy did revive

the investment climate to some extent but the law and order situation in Sindh and later the dismissal of Junejo Government again plunged the country into a state of uncertainty.

Seventh Phase

The new government took over in December, 1988. In April, 1989 a new industrial policy was announced which aimed at removing the bottlenecks faced by the prospective investors.

Sanctioning procedures were further liberalized, list of restricted industries was reduced and a Board of Investment headed by the Prime Minister was formed to monitor the progress of the pace of investment.

Privatization and denationalization were declared by the government as the basic policies to attract private investment. But, unfortunately they remained as political slogans and nothing practical came on the scene.

Till now, lack of policy continuity had been the major hampering constraint. The switching over of policy and priorities by changing governments discouraged investment especially in areas requiring large capital and long gestation periods. Jumping from key industry approach to area specified incentives again caused a lot of confusion. The capital remained shy.

Eighth Phase

The present government had taken a bold initiative for the development of industry. The new industrial policy package provided for liberal fiscal and monetary incentives, and meaningful deregulation to bring about revolutionary changes.

The salient features of the new policy were :

- No restriction on setting up in respect of area of any industry except industries producing alcohol and defence goods.
- Three years tax holiday, for new industries set up in Urban areas, five year tax holiday for those established in rural areas, which increased to eight years for backward areas.

- No question to be asked about the source of capital, provided letters of credit for machinery were opened before June 30, 1992 or machinery was booked locally.
- All new industries to be exempt from income tax.
- The debt/equity ratio was fixed at 70:30, against the past 60:40 and at 80:20 for locally manufactured machinery.
- Concessions also given in custom duty, surcharges and licence fee. The total incidence of these charges had been reduced from 41 percent to 7 percent. There was complete exemption from custom duty, sales tax and import surcharge.
- In order to protect the local engineering industry, duty concessions had been restricted to plant and machinery which were not manufactured locally.

PROSPECTS FOR ENGINEERING INDUSTRY

Pakistan had established some heavy and basic industries like steel, fertilizer, cement, basic chemicals, sugar, railway rolling stock, etc. In the Engineering sector, it produced ships, plants and machinery for sugar, cement, vegetable ghee, rice and ginning factories, etc. It had moved now from assembly to progressive manufacturing of tractors, cars and other automobiles. Pakistan was now entering into sophisticated and high-tech industries.

An engineering base had been developed which could now be moved vertically to manufacture machinery, equipment and intermediate products required by other sectors of the economy. Preference would continue for the development of key industries which included bio-technology, fiber optics, solar energy equipment, computers and soft-ware, electronic equipment and fertilizers. These industries would enjoy a special package of incentives.

Strategy for Development of Engineering Goods Industry

1. Priorities

The importance of the Engineering goods sector had already been discussed and it might be recalled that about one third of our imports consisted of the engineering goods. At the same time, over 70 percent capacity remained unutilized in the country. Major thrust should, therefore, be on the consolidation and development of the existing facilities through liberal financing facilities at lower interest rates, assistance in local R&D, acquisition of know-how from abroad, followed by

creation of new capacity. Where imports were substantial, to achieve these objectives, the strategy might be so framed as to cover :

a) Increase in capacity utilization from 30 to 75 percent, while the local production share should increase from 31 to 60 percent or higher.

b) Utilization of 60 percent of indigenous resources in the development of power projects like Chashma Nuclear, Kalabagh Dam, etc. besides utilizing the available coal for power generation.

c) Development of back-up support/logistics conducive to the growth of this sector, including R&D through the public sector institutions.

Definite priorities need to be established for industrialization in general and development of the Engineering Industry in particular. Following priorities have been recommended for the Engineering Goods Industry :

a) The first priority should be given to those industries that lead to all round growth in the economy, by consuming local raw material, and were export oriented.

b) The second priority should be given to those industries that used domestic raw materials for domestic consumption.

c) Third priority should be given to those industries that used imported raw materials for re-export.

d) Fourth priority should be given to those industries that used imported raw material for domestic construction (import substitution).

2. Criteria for Development

The development strategy might also be made to cover the following :

i) Utilization of the existing capacity;
ii) Import substitution;
iii) Export lead growth;
vi) Utilization of indigenous resources;
v) Value added impact on local raw materials;

vi) Multiplier effect by way of backward and forward linkages.
vii) Development of new technologies through local R&D or import or/by other means of transfer; and
viii) Defence orientation of the industry both through BMR and new capacity development.

PROBLEM AREAS OF THE ENGINEERING INDUSTRY

General

There were certain inherent problems in the Engineering Sector, which could briefly be summarized as: the heavy investment, long gestation periods and the limitation of requisite know-how. The last problem had further been compounded by the massive emigration of skilled labour from the country. In addition, the training facilities of international standard for engineers, technicians and workers were very limited in the country.

The problems, enumerated above, had serious implications which adversely affected the units in this sector from the very beginning. Engineering Industry had failed to attract big investors mostly due to the lack of knowledge about it and the knowledge about its importance; lack of promise of unlimited profit which could otherwise be obtained from textiles consumer goods and other process industries; and above all, lack of whole hearted political will resulting in a national commitment and realistic policies.

According to the Research Section of the Lahore Chamber of Commerce & Industry, some of the specific problems which this industry was facing presently and had been impeding the growth of this sector, were given below.

Lack of Clear Policy Directive

The policies covering engineering industry did not show a clear direction. Also, the various departments and agencies of the government, at times, issued directives which were not coherent with one another either in intent or in purpose. Furthermore, many of these policies were changed without giving due attention to other directives/policies issued already by other agencies, creating considerable confusion and even hardship. Many a time, policy directives were issued without consultation with the concerned industrial units or their associations which made many of these directives unpracticable.

In fact the government of Pakistan had yet to develop a clear vision and commitment to this basic and vital sector of economy which not only helped Agriculture and other Industries in the country but also could support another vital sector which was defence.

Foreign Competition

Our industry's production could not compete quality-wise with the machines and equipment manufactured by the developed countries who had refined their systems over centuries. Further the economic size of heavy engineering units abroad was quite large as against limited local market, though export market amongst developing countries could make-up for this deficiency.

The other factor was the delivery time of the local, mostly large size, units viz-a-viz industrially advanced countries because of variety of reasons such as an erratic supply of critical inputs, difficulty in access to modern technology, low productivity, non-availability of enough skilled labour, etc.

The foreign competition became all the more serious when tax concession was provided for import of machinery for backward areas and also for BMR and the process of under-invoicing resorted to by large scale units, which made thereby the cost of local machinery look highly uncompetitive.

Cost of Production

The engineering industry involved high initial investment but relatively low profit margin as a percentage. The long gestation periods, coupled with intricate tooling and production processes, further resulted in delayed returns to the investors. The other factor, affecting the cost of production in the engineering goods industry, was the low volume of production due to the very nature of it, which did not lend itself to mass production methods. In addition, since very heavy working capital had to be borrowed and the cost of money in Pakistan was many times more than the rate of interest in the countries with which we had to compete, Pakistan's engineering industry suffered by contrast.

Unnecessary restrictions and cumbersome procedures which had been imposed on the loans for locally manufactured machinery needed to be lifted, to make this concession meaningful. Even otherwise, the rate of 13 % on LMM machinery was very high and in any case did not apply to the working capital borrowed by the engineering goods manufacturers.

In addition to the above factors, the cost of production of various inputs such as raw material procured from Pakistan Steel, energy drawn from WAPDA, were very high and were all the time on the increase. As the industry by its nature was high in energy consumption, its dearth and prices had adversely affected the cost pattern of the engineering goods. The prices of electricity, gas, furnace and diesel oil had almost more than doubled during the last decade.

Purchasing Policy of Government Institutions

Main institutional buyers of engineering goods particularly of heavy electrical and mechanical equipment, were the government institutions and autonomous bodies like WAPDA, KESC, Railways, NSC etc. The purchasing policies of these institutions were not conducive to the growth of local engineering industry particularly smaller units. Most of these institutions preferred to buy from foreign sources. This factor put the local industry at an obvious disadvantage. While taking such step, little consideration was given to the fact that significant amount of foreign exchange was being drained out of the country, and the foreign loans we take had to be paid back.

Tax Structure

The existing tax structure was not in line with the development objectives of the country. On one hand, the local manufacturers have to import raw material at high rate of custom duties, and on the other, a number of finished engineering products are imported duty free in the country. The import duties on some raw materials were as high as 70 percent plus 15 % sales tax on duty paid value. This fiscal anomaly had to be removed in a manner that provided impetus to the local engineering goods industry, rather than cause discouragement

An interesting study made in this context by the National Tariff Commission of Pakistan revealed certain startling figures which spoke for themselves. Table 10 below was presented.

TABLE - 10
INDUSTRIES WORKING UNDER NEGATIVE / LOW TARIFF PROTECTION RATE

Production	Effective Protection Rate (Percentage)
Agriculture Machinery	- 50.60
Insulated Wire and Cables	- 43.20
Sewing Machines	- 7.30
Other Non - Electrical Machinery	- 1.50
Structural Metal Products	7.7
Metal and Wood Working Machinery	4.9
Telephone and Telegraph Equipment	1.0

Source : National Tariff Commission Report 1993

Negative Tariff

According to another study prepared by the National Tariff Commission[6], about 68% imports of Engineering goods during 1991-92 fell under the category of net negative protection, and were imported duty free.

Smuggling

Due to rampant smuggling, some engineering goods manufacturers were facing problem in selling their products. It was a serious violation of national territory to damage vital national interests such as revenue for the State, jobs for the unemployed and capacity utilization for the investors.

Aid Programmes

Most of the aid to Pakistan from developed countries was in the form of tied loans repayable in foreign exchange. Under these arrangements the terms were dictated by the

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6) **"Engineering Goods Industry", Report of the First Working Group of the Committee of December 22, 1994, p. 18.**

donor countries and due attention was seldom given to the development potential of local industry. Pakistan had to buy plants and machinery in a package form regardless of country's own manufacturing capabilities. Tied assistance had thus restricted the market of locally manufactured goods.

Lack of Trained Manpower

The training facilities for technical personnel were very limited in the country. It was, therefore, imperative that cohesive programmes be drawn up to develop engineering institutions like engineering universities, polytechnics and other vocational training centres which produced personnel of requisite skills for this vital sector.

Technical Constraints

The engineering sector was facing various types of technical constraints as well, which were described below :

- **Obsolescence**

  Most of the units in this sector needed balancing and modernization, as well as retooling. It was imperative that if Pakistan had to advance technologically, new technologies would have to be imported or appropriate technologies suited to local conditions had to be evolved by local research programmes.

- **Designing Capabilities**

  Most of the engineering units were ill-equipped in terms of both hardware and software needed for design work. These deficiencies impeded the development of designing capabilities needed to meet the specific requirements of customers. Capacity and capability in this important area needed to be built up. Market pull induced by supportive national policies, would help in this direction.

- **Sub-Contracting Services**

  Sub-contracting was a vital tool of large-scale manufacturers of engineering goods to economize on the costs. However, for this purpose, it was essential that specialized medium and small-scale units existed in the country. The absence of

such specialized units escalates the cost of the bigger units. It was, therefore, essential that facilities available with the light engineering sector be developed, expanded and improved in order to economize the over all production costs. Mandatory deletion programmes, if laid down by the State, would help to initiate and support this process.

Lack of Standardization

Lack of standardization in a presently narrow market had led to proliferation of makes and models of various types of engineering goods being imported currently into Pakistan, which adversely affected the local manufacturing of component parts for replacement because of the lack of economies of scale. The situation was particularly alarming in the case of transport equipment such as trucks, tractors, motor cars and cycles, etc.

Lack of R&D

This factor was almost absent despite existence of some R&D organizations like PCSIR, PITAC, MIRDC and a few others. These units, with very rare exceptions, suffered from being out of touch with industry, unapproachable by small entrepreneurs and being too expensive.

RECOMMENDATIONS

To sum up, we could do no better than to quote from some of the recommendations framed by no less an organization than the State Engineering Corporation of Pakistan which was the flag ship of the Engineering Industry in the country. To these, we add our own suggestions as follows :

1. Government Policy

- Government support be provided, based on understanding, political will, vision and national commitment.
- Import of turnkey projects be discouraged.
- Concept of co-manufacturing and co-financing be promoted.

2. Tariff Rationalization

- Reasonable tariff support be provided.
- Even handed protection to all levels of processing in the industry be extended.

3. Technology Acquisition/Development

- Technology and industrial service centres be set up.
- Incentives for continuous upgradation of technologies be provided.

4. Manpower Development

- Training and re-training be encouraged.
- Technical education at all levels be restructured and made more relevant.

5. Appropriate Institutional Arrangements Be Put In Place

6. Fiscal and Financial Incentive

- Investment in setting up of engineering industries be encouraged.

- For reducing costs of manufacturing for making local industry competitive, costs imposed by the State agencies like ad-hoc increases in labour costs (having no link with productivity), top heavy WAPDA and Pak Steel Transfer prices, interest rates on borrowings etc., be reduced.

7. Export Promotion

- Adequate and cheaper credit be made available.
- Procedural formalities be simplified.
- Help, in obtaining quality certification under ISO 9000 be extended.
- Export/Import Bank be established.
- Sub-contracting for large multi-nationals be promoted.

8. Miscellaneous

- The Automobile assemblers and other progressive manufacturers in the country be forced through suitable measures to follow the deletion programme guide lines, without any relaxation.
- Smuggling of components, autoparts and other materials should be checked in a determined manner.
- Productivity movement should be started.
- Quality culture should be created.
- Very low rate of duty be levied on the import of industrial raw materials.
- Mark up on the industrial credit be substantially lowered.
- Engineering being a high gestation industry consistency of policy be ensured, say, for 5 years, so that frequent changes do not affect the viability of the projects.

EPILOGUE

The targets visualized by the Pakistan government for the development of the Engineering Industry were broadly stated to be as follows :

- Increase the capacity utilization of the engineering goods industry from the present less than 30 % to 50 % by 1997 and then to 75 % by the year 2002.
- Increase exports of engineering goods from the present, say $:140.0 million to $:1.00 billion by 1997 and $:3.0 billion by the year 2002.
- To increase the local component of engineering goods needs from the current Rs:50.00 billion (33% of the country's demand) to Rs:300.00 billion (60% of the country's demand).
- To increase the value added of our engineering goods from the present level of around 16% to 35% by the year 2003.

For suggesting ways and means to achieve these objectives a Working Group was formed by the Committee for Engineering Goods Industry. The Working Group in turn listed the following problems of the Engineering Sector :

- Lack of clear vision and commitment by GOP policy makers.
- General lack of modern and efficient manufacturing facilities due to scarcity of funds for investments in new equipment and technology.
- Poor R&D support for new product development and process innovations.
- Dependence on foreign expertise in critical technical areas due to lack of focus and incentives for development of local institutions with the required technical capabilities.
- High cost structure due to high financing costs, very high percentage of imported materials and components, and poor labour productivity.
- Lack of awareness and understanding of the international markets and technological developments.
- Low labour productivity caused partly by ill-conceived and ineffective labour laws.
- High inventory carrying costs due to long procurement cycles for imported raw materials and components.

After due deliberations the Working Group submitted their report to the Government in December, 1994

The Federal Cabinet having considered the report on May 15, 1995, decided on a number of Fiscal Benefits and Institutional arrangements for promotion of Engineering goods industry in the country.

The institutional arrangements included setting up an Engineering Development Board as a central coordinating body; setting up an Institute of Technology Development and an Implementation Committee to monitor the progress of the Package.

One hoped some good would flow from these decisions and something tangible would come out of all these top level decisions.

With all the optimism, however, the author would like to quote a learned professor of a Medical College at Lahore who had often to deal with his own ministry. Drawing similie from a biological reality, he matter-of-factly said that "the decisions at the ministries

looked like elephants making love. Things happened at high level. Lot of noise and dust were raised. Results took time to come. And usually there were abortions."

ACKNOWLEDGEMENT

The author had drawn heavily on the research work done by Lahore Chamber of Commerce & Industry and also the data so generously shared by the State Engineering Corporation of Pakistan.

Of course, the author also owed gratitude to many other writers from whose publications, some material for the paper had been taken. Gratitude was due also to a large number of entrepreneurs particularly in the vending industry who helped with information to make the paper, reasonably comprehensive.

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ANNEX

LIST OF ENGINEERING GOODS MADE IN PAKISTAN

ENGINEERING PLANTS

1. Cement Factories.
2. Cane Sugar Factories.
3. Vegetable Ghee Manufacturing Plants.
4. Oil Mills.
5. Cold Storage and Ice Factories.
6. Flour Mills.
7. Poultry and Cattle Feed Making Plants
8. Cotton Ginning Factories.
9. Rice Husking and Milling Plants.
10. Paints and Resins Plants.
11. Paper and Card Board Making Plants.
12. Straw Board Making Plants.
13. Plastic Extruders and Injection Moulding Machines.
14. Printing Presses including Offset Printing Machines.
15. Match Manufacturing Units.
16. Soap Factories.
17. Food Processing Plants.
18. Sulphuric Acid Plants.
19. Water and Sewerage Treatment Plants.
20. Wire Drawing Plants.
21. Solvent Extraction Plants.
22. Electroplating Plants.

MISCELLANEOUS INDUSTRIAL MACHINES AND EQUIPMENT

1. Boilers - Steam and Hot Water.
2. Heater (Oil and Gas).
3. Compressors (Air, Ammonia and Freon).
4. Evaporators and Condensers (for Cooling Plants and Chemical Industries.
5. Engines (Compression Ignition, Diesel-Slow and Medium) , Auto Engines.
6. Electric Furnaces, Ovens.
7. Steel Melting Inducting Furnaces.
8. Pumps - Centrifugal, Turbine, etc.

9. Tanks and Vessels all types including Jacketed Tanks .
10. Reactors and Kettles.
11. Mixers for Paints, Chemicals, Food, etc.
12. Ball Mixers.
13. Drying Ovens.
14. Filter Presses.
15. Conveyors.
16. Tannery Leather Processing Machines including Buffing, Glazing, Shaving, Jack-Setting Machines, etc.
17. Steel Structures, Towers, Bridges, Derricks, etc.
18. Tobacco Processing Machinery Parts and accessories, Leaf Drying Ovens.
19. Dehydrators, Hot Air Tunnels for Fruit and Vegetable Dehydration.
20. Grain Storage Bins and Silos.
21. Cane making, Sealing and Packing Machinery.
22. Powder Filling Machines, Tabletting Machines.
23. Strip Packing Machines.
24. Bottle Filling Machines.
25. Ball Bearings.

TEXTILE MACHINERY PARTS AND ACCESSORIES

1. Baling Presses
2. Batching and Mixing Machines.
3. Bobbin Changers.
4. Bundling Presses.
5. Calendering Machines.
6. Card Clothing.
7. Caustic Heaters.
8. Printing Machines.
9. Drying Range.
10. Dying Vats.
11. Ginning and Delinting Machines.
12. Hosiery Knitting Machines.
13. Looms Plain and Automatic.
14. Looms for Hessian and Sacking.
15. Mercerising Plants.

16. Prin. Winders.
17. Pressure Kiers for Bleaching.
18. Reeling Machines.
19. Rinsing Machines and Hydroextractors.
20. Rollers and Roller Grinding Machines.
21. Scouring Machines.
22. Singing Machines.
23. Spindles.
24. Stinters.
25. Starch Mangle.
26. Twisting and Doubling Machines.
27. Warping Machines.
28. Washing Machines.
29. Willowing Machines.

ELECTRICAL MACHINERY AND EQUIPMENT

1. Generating Sets.
2. Motor, all kinds.
3. Transformers.
4. Switchgears and Bus Bars.
5. Electric Sub-Stations.
6. Distribution Boards.
7. Power Factor Improvement Plants.
8. Voltage Regulators.
9. Welding Transformers.
10. Spot-welting and other Equipment.
11. Insulators.
12. Battery Charges.
13. Wires and Cables including Underground Cables.
14. Industrial Fans and Blowers, etc.

MACHINE TOOLS AND WORKSHOP EQUIPMENT

1. Boring Machines.
2. Honing Machines.

ANNEX

Sheet 4 of 4

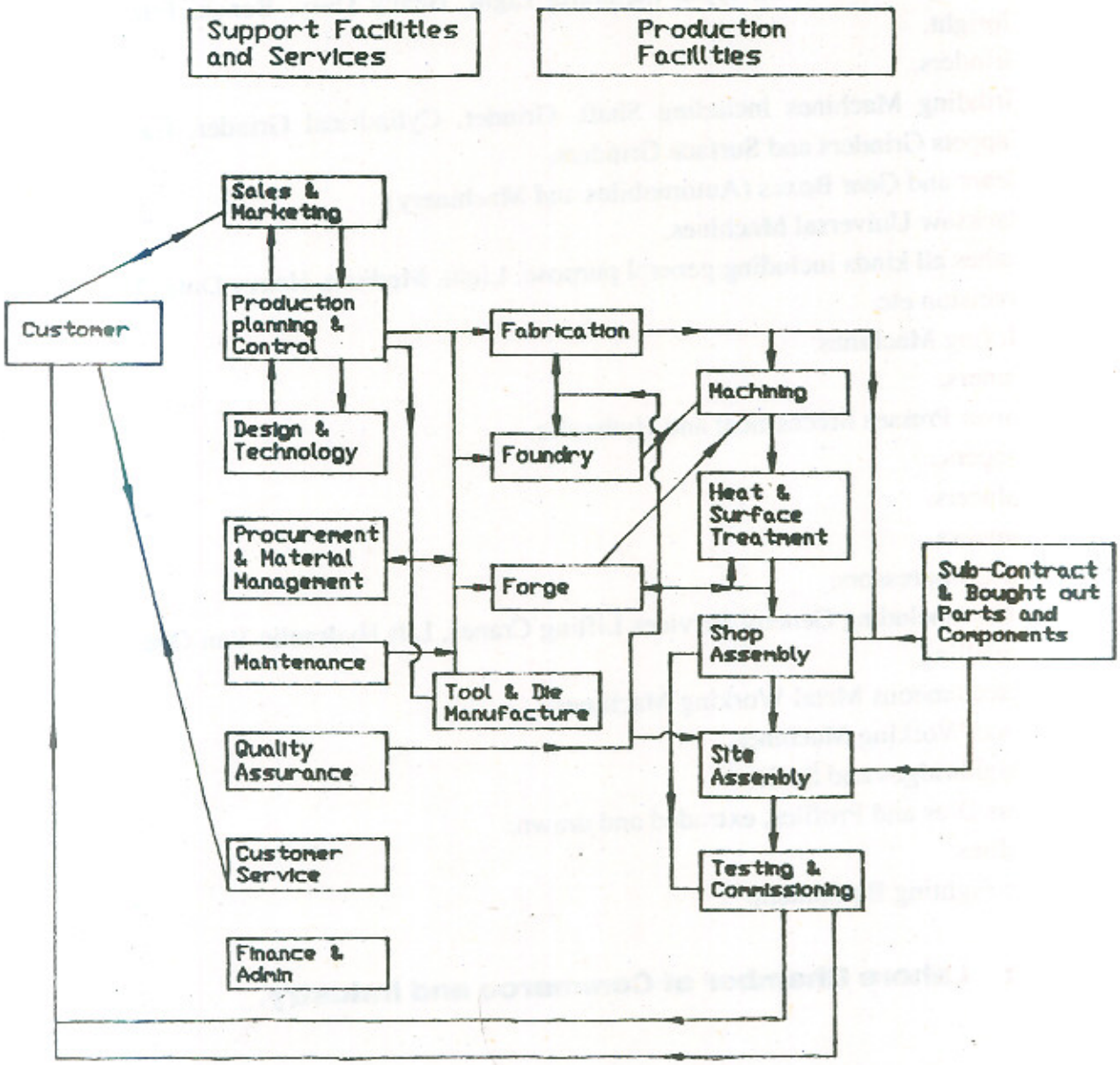
3. Drilling Machines all types including Light, Heavy Duty, Bench, Pillar and Upright.
4. Grinders.
5. Grinding Machines including Shaft, Grinder, Cylindrical Grinder, Cam and Tappets Grinders and Surface Grinders.
6. Gears and Gear Boxes (Automobiles and Machinery).
7. Hacksaw Universal Machines.
8. Lathes all kinds including general purpose, Light, Medium, Heavy Duty, Turret, Precision etc.
9. Milling Machines.
10. Planers.
11. Power Presses Mechanical and Hydraulic.
12. Shapers.
13. Refacers.
14. **Blowers.**
15. Air Compressors.
16. Cranes including General Services Lifting Cranes, Lift Hydraulic Van Overhead Travelling.
17. Miscellaneous Metal Working Machines.
18. Wood Working Machines.
19. Weighbridges and Scales.
20. Press Dies and Profiles, extruded and drawn.
21. Trollies.
22. Fire Fighting Equipment.

Source : Lahore Chamber of Commerce and Industry.

PAPER NO.562

DIAGRAM

ELEMENTS OF AN INTEGRATED ENGINEERING UNIT ACTIVITIES



Credit : State Engineering Corporation of Pakistan

BAR CHART

PAPER NO.562

COMPOSITION OF MACHINERY AND EQUIPMENT EXPORTS OF HIGH PERFORMANCE ASIAN ECONOMIES

