INDUSTRIAL AND ECONOMIC PATTERNS APPLIED IN EGYPT

by

Nader Noshi Riad

A Dissertation Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy
with a Major in
Industrial Engineering

INDUSTRIAL AND ECONOMIC PATTERNS APPLIED IN EGYPT

by

Nader Noshi Riad
has been approved
October 12, 1989

PACIFIC WESTERN UNIVERSITY

ACCEPTED FOR THE UNIVERSITY

Vice President

Herbert W. Haberland

Dean of Faculty

H. Malik Tabash

Advisor

Acknowledgement

In a deep appreciation and gratitude, one cannot but address his utmost thanks to :

Prof. Dr. **Frank Sutter** , Vice President of PACIFIC WESTERN UNIVERSITY , who is one of the pioneers in promoting the non-traditional education system around the world . ;

Prof. Dr. **Herbert Haberland** , Dean of Faculty , for his acceptance to sit in my doctoral committee . ;

Prof. Dr. **James Hayes** , for his guidance and prospective remarks which has been very useful to my research . ;

Prof. Dr. **Madih Dabbash** , for his lasting patience and continuous encouragement which was of great support bringing this work into this form .

Dedication of this work goes to :

my parents ;

who gave light to my eyes ,

and strength to my soul ;

my beloved wife Mona ;

who gave warmth to my heart ,

and paid the cost for my struggle ;

my children Amir , Maggie and Sandra ;

who gave meaning to my life ,

with a clap on the shoulder ,

a wish in the heart ,

and a whisper into the ear to ;

DO BETTER and BE BETTER .

TABLE OF CONTENTS

	Page
INTRODUCTION AND AIM OF WORK	1
PART ONE - INDUSTRIAL ENGINEERING	4
INDUSTRY IN EGYPT :	
- The Public Industrial Sector.....	6
Egyptian Industrial Production 1986/87	9
Food Industry Leading in 1986/87.....	9
- The Private Industrial Sector	11
- Industrial Joint Venture	13
- Private Job Shop	17
PRESENTATION OF THE CASE STUDY :	18
- Capital Development	18
- Development of Technical Facilities	19
- Development of Manpower	20
- Development of Industrial Productivity	21
- Staffing, Training & Links to	
Social / Economic Backgrounds	22
Human Resources in Egypt	22
Structural Transformation & Growth	23
Social Indicators	24
Labour Resources & Technical Background	25
- Patterns of Staffing & Training	26
- Organizational Structure of The Production Plant	28

TABLE OF CONTENTS (contd.)

Page

IMPLEMENTATION OF NEW PATTERN TO IMPROVE PRODUCTIVITY & PHYSICAL / SOCIAL CONSTRAINTS : .. 30
- Basic needs Consideration 31
- Elimination of Second Grade Class of Workers 32
- Incentive System 33
- Modern Lifting & Handling Equipment 34
- Standard Pallets & Containers 34
- Optimization through Conveyor Belt Concept 34

PRODUCTION SCHEDULING : 36
- A Pattern for Simple Scheduling Rule 36
  Variable Order Quantity & Average Inventory 38
  Complementory Job Orders 39
- Question of Optimization 39
- Lead Time Chart 40

SIMULATION ANALYSIS : 41
- Abstract 41
- Conceptual Plan 43
  Work Flow Characteristics 43
  Processing Time Distribution 44
  Shop Configuration 44
  Shop Rules 45
  Shop Load Level 46
- Methodology 48
- Flushed Vs. Unflushed Behaviour 50
  Tabulation & Computation of Results 51
  Shop Performance Tabulation 54

TABLE OF CONTENTS (contd.)

Page

- Results 57
- Concluding Remarks 58
- Tabulation & Results of Tardiness 59

A LOOK INTO THE FUTURE : 64
- New Organizational Structure with logistical Related Functions 65
- Analytic Techniques Computerized 65
- Flowchart 66
- New Modern Factory & Office Premises 68
- Automation & More Conveying Belt Concept Applications 68
- Better Area Utilization 68
- Better Working Conditions 69
- Management & Administration Joining Production Plant 69

PART TWO - IMPLIMENTATION OF NEW MARKETING APPROACHES

INTRODUCTION 70
- A Question of Product 71
- A Question of Customer 72
- A Question of Market 73

MARKET PROFILE
- Food Gap 74
  Tabulation (Food Diet Balance Actual) 76

TABLE OF CONTENTS (contd.)

Page

Meat Production 78
Future Forecast in Animal Protein Till 2000 79
- Development in Production of Major Industrial Commodities (1981 / 82 till 1985 / 86) 80
- Major Industrial Gaps 81
Food Industries 81
Electrical and Electronical Industries 81
Textile Industries 82
Building Materials and Refractories Industries 83
Engineering Industries 84
Metallurgical Industries 85
Chemical Industries 85
- General View of Market Deficits 86
- Prices as Inflation Indicators 87
Wholesale Price Index (Figure) 88
General Consumer Price Index (Tabulation) 89
- The Export View 90
Prime Egyptian Exports (Table) 91
Egyptian Exports Geographic Distribution 92
Agricultural Exports Potential 93
Industrial Exports Potential 95
Export Partners (Table) 96
Countertrade - mirage or reality ? 98
- Description of Product of the Case Study 100
Quality Vs. Price - A Hard Choice 101

TABLE OF CONTENTS (contd.)

Page

Technical Standards 102
A Reading of Market Tendency and Relative Trends 104
Consumer Price Index Related to Case Study
Product Price 105
Analysis 106

- Traditional Marketing Problems and
Non-Traditional Patterns of Soulation 107
Problem of Distributors Product Disloyality 107
Problem of Facing New Dumping-Priced Competition .. 113
Problem of Irregular Availability of Products
due to Long Distance Supply Line of Raw Materials 115
Export ... A Target Not Problem - Free 116

- **PRODUCT LIFE CYCLE** 117
Segment Analysis for Industrial Life Cycle 119

- **INDUSTRIAL PROMOTION STRATEGY** 120
Sales - Promotion of the Case Study 123

PART THREE - ECONOMIC PROBLEMS & PROPOSALS

INTRODUCTION 125
STAGFLATION PROBLEM : 126
- Profile of the Economicy 126
- Basic Economic Indicators 127
- The Balance of Payments - Table 129

TABLE OF CONTENTS (contd.)

	Page
- Balancing The Budget	130
- The Five - Year - Plan 1987/88 - 1991/92	130
Tabulation	132
CAUSES OF STAGFLATION :	
- Considerable Shrinkage in Oil Revenues	133
- Shrinkage in Tourism Revenues	135
- Rate of Investment Decrease (Private Sector)	137
- Rate of Investment Decrease (Public Sector)	139
- Shrinkage of External Aids	141
The Aid Programs	141
- Financial & Monetary Policy	144
- The Financial Monetary Policy and The Stagflation in Egypt	145
MEASURE OF THE PROBLEM :	
- Rate of LE. Devaluation Aginast USD	147
- Readings of Evaluation of 3 Periods (1980 - 1986)	147
- Capital Markets	150
- Protest & Bankruptcy Cases (1983 - 1985)	151
- The Business Sector in Crisis	154
PROBLEMS , PATTERNS APPLIED , .. THEIR COST :	157
Commodity Classification	157
Bank Credit Limits	157
Escalation of the Problem	158
- Boundaries of the Problem	159

TABLE OF CONTENTS (contd.)

Page

The Trade Sector 159
The Industerial Sector 160
- Floating of the Egyptian Pound 161

PERSONAL COMMUNICATION : with MR. THOMAS RANSOM, VICE PRESIDENT, BANK OF AMERICA, IN CAIRO 162
Floating Possibilities of LE. 162
Banking System Policy 162
Economic Structure 163
Economic Reform 164
- Advantage of Changing into Floating System 164
- Foreign Debts 165

CONCLUSION 167

LIST OF TABLES 172
LIST OF FIGURES 176

BIBLIOGRAPHY 177

INTRODUCTION AND AIM OF WORK

It is rather evident that developing countries do much differ from industrial countries , not only in the nature of problems they face, but it also seems that their mode of analysis, reflexes and approaches regarding similar problems, is different .

In many cases, it could be quite difficult, for an external party to evaluate and judge a certain decision making taken in such a country according to plain managerial rules; as local substantial conditions such as; culture, religion, production means, manpower background, market nature, working and financial conditions, etc. , might interfere bringing out just the opposite decision to be most appropriate.

The main concern of this thesis would be discussing and analysing certain patterns of decision-making successfully applied in the field of industrial engineering in Egypt. Whether or whether not such decisions do comply with managerial rules and to which extent, would be a part of the study but not a main objective.

This paper will handle three main different topics, each being governed by its own features and rules:

1) Industrial Engineering Applications
2) Implementation of New Marketing Approaches
3) Economic problems and proposals

Each of these main three parts, will not be dealt with in its nature and capacity as a separate and independent identity, but through the area of contact and influence with one another, casting it into an integrated and applied framework representing in the first place the Egyptian local conditions of application. The casting and treatment of the work has not overlooked the academic sciences and managerial rules, but was more concerned about the actual handling of the work in practice and its conformity to the Egyptian industrial society rather than its pure academic nature.

The treatment of the work , though based on a specific case study taken as a sample of common features, however reverting back to macro parameters had to be almost a main line in this thesis stressing back and forth the unseparable links and bonds between micro and macro economics .

Our choice taking BAVARIA/EGYPT factory as a basic module case-study, is to be regarded most unique for various reasons. On one hand, the writer has witnessed the establishment and development of this company from his position as a Managing Director, since its start. On the other hand, the nature of this company as a German/Egyptian joint venture enabled remarkable managerial flexibility to take over in the decision-making, and allowing a rather free-hand to explore uncommon paths in seek of radical solutions to problems.

Thus, we consider this applied case-study, a most practical example for a modern industrial plant that is well acquainted with both managerial sciences and updated technology. This Company, however, has had to live with every-day local and environmental problems, most of which are imposed for reasons the company is irresponsible for.

Therefore, such an example is suitable, being most expressive for the task of seeking the target of achieving balanced production, which is only at-

tainable through proper interfacing between production, marketing and financial economies.

It is most apparent that one can hardly imagine a production engineering problem to be solved apart from either economic or marketing influence. In other words, the conformity of looking into a problem belonging to one part can never be properly done without an integration with both other parts.

Accordingly, we believe that the approach we are making, bringing all three parts together under the same hat, in intervention with the case-study, is most appropriate serving the main objective of our thesis which is:

INDUSTRIAL AND ECONOMIC PATTERNS APPLIED IN EGYPT

PART ONE

INDUSTRIAL ENGINEERING

PART ONE

INDUSTRIAL ENGINEERING

INDUSTRY IN EGYPT

Industrial production in Egypt represented 26,7% of the gross national product in 81/82. In absolute value this represented 8.777,- Million LE going up to 20.898 Millions LE in 86/87. Exports of this production amounted to 4,1% while imports to cover the needs of this production (raw material and components) were 9,2%. [1]

Manufacturing industry is responsible for 14% of GDP and 12% of employment. Significant growth and diversification have changed the structure of industry so as to produce a more balanced range of intermediates as well as finished products. During the decade ending 1985/86, the highest growth rates in industrial production were for aluminium and aluminium products, cement steel bars and other building materials, fertilizers, consumer durables, and military equipment. These trends reflect the continued strategy of import substitution which the government pursued over the period.

There is enormous potential for raising the share of exports from the manufacturing sector. Many studies have shown Egypt to enjoy a remarkable comparative advantage in exporting products of the textile, food processing and engineering sectors, based on an abundant and relatively cheap skilled labour force, long experience in the technical and management aspects of industry and the domestic availability of many raw materials. The two factors which have hampered the development of exports over the past decade are an overvalued exchange rate and

---

*1) Dr. Heba Handoussa, Professor of Economics, American University in Cairo, The Egyptian Economy: Recent Growth & Prospects, Fiani, 1987, p 5.

protective policies which together made production for the home market far more profitable than exports.

Many studies have shown Egypt to enjoy a remarkable comparative advantage in exporting products of textile, processed food , engineering components , based on an abundant cheap skilled labour , relatively longer experience, technical and management background compared with the neighbouring export markets , and the domestic availability of raw materials.
The major factors that hampered the export activity over the past decade was the overhauled exchange rate that made production for the home market far more profitable.

The government's package for trade, protection and exchange rate reforms are explicitly tailored to give a boost to the export of manufactures. In parallel, the Ministry of Economy and Trade has introduced a series of reforms designed to eliminate administrative bottlenecks that discourage export activity. Trade relations have also improved significantly with some of Egypt's old trading partners in the Eastern block as well as with its Arab neighbours. The positive impact of all of these changes is already reflected in export indices for the first four months of 1987 which show an increase of 260% [1] in export revenue for semi finished manufactures and 99% for finished manufactured goods.

Industry in Egypt can be classified into four categories that completely differ from one another:

---

*1) Dr. Gazarin, Adel, Chairman Egyptian Industry, Al Ahram Iktissadi, No. 954, p. 45.

a) The Public Industrial Sector:

During the regime of Gamal Abdel Nasser, head of the Revolutionary Council of Egypt (1952-1970), and by a series of Presidential Laws and decrees in July 1961, all mining, utilities, communications, transportation, wholesale and foreign trade, banking and insurance activities, and large construction firms were nationalized and became public sector entities ("parastatals"), owned by the Government of Egypt.

In this way, a series of special organizations were established. For example, the foodstuffs industry, weaving and spinning industries, chemical industries, building materials and ceramics companies, metallic industries, engineering industries, petroleum companies, and small industrial organizations were attached to the Ministry of Industry. In a similar manner the agricultural enterprises communications, trade, building, land reclamation, social insurance were all attached and subordinated to a sectoral ministry, and ultimately responsible to that particular minister.

In 1983 various "Public Sector Authorities" were established by Presidential decrees. The objective in establishing an Authority is to contribute towards the development of the national economy, to endeavor to achieve the goals set under the development plan, pursuant to the Government's public policy and plans through the public sector companies under its supervision, and to undertake the necessary research and studies for the achievement of this objective. Each public sector Authority supervises its affiliated companies with private individuals or companies, and the funds allocated directly to the authority by the Government.

The resources of the Authority included is shared in the net profits of its affiliated companies, the donations, grants, local and foreign loans to the

authority, and any other resources obtained by the Authority. The funds of the Authority are regarded as public funds.

The management of the Authority is undertaken by a Board of Directors appointed by Presidential decree for a period of four years. The Board is composed of a chairman, five presidents of the companies under its supervision, four to five experts in the fields of the companies, and a representative of the general trade union of the workers of the sector.

The Board of Directors of the Authority is the main decision-making mechanism regarding the running of the business. The Board has the power to approve the Authority's budget, approve its balance sheet, establish the Authority's by-laws and issue resolutions relevant to its financial, administrative and technical affairs. The Authority also coordinates between the companies under its supervision with a view to achieve the maximum limit of vertical and horizontal integration in such a way as to provide a remedy for production and financing bottlenecks, etc. It also proposes to amalgamate one or more of its companies to another company or divide or affiliate it to another public sector authority subject to agreement between the two authorities. The chairman of each Authority has a direct access to the Minister concerned and advises him on the activities of the Authority and its affiliated companies.

The Industrial Sector is composed of Six Public Sector Authorities For :

- Spinning and Weaving Industries
- Metallurgical Industries
- Mining and Refractories
- Engineering Industries
- Chemical Industries
- Foodstuffs Industries

Chairmen of these authorities report directly to the Minister of Industry and Mineral Wealth. In a similar manner, chairmen of all other authorities in the different sectors, report to their respective Ministers.

This sector should have a leading role of the industry in Egypt due to its size.

The net worth of the public sector is estimated to be 10 times that of the private sector[1], which has a net worth of LE. 3 Billions[2]. In the next five year plan it is expected that the public sector will be able to share with only 50% of the total investments, leaving an equal share of 50% to the private industrial sector[3].

The coming five year plan forces the increase of the industrial production of both public and private sectors from LE. 20.9 billion to LE. 29.9 billions i.e. a total increase of 42.1 % , an average of 8 % annually.

On the other hand , it has been announced that the public industrial sector will not enter into any new projects except those of strategic importance such as fertilizers and cement . [4]

*1) Dr. El-Salmy, Ali, Former Minister of Planning Al-Ahram Iktissadi, No. 910, page 7.
*2) Dr. El-Salmy, Ali, Former Minister of Planning Al-Ahram Iktissadi, No. 916, page 9.
*3) Dr. Abdel Wahab, Mohammed, Minister of Industry Al-Ahram Iktissadi, No.917, page 23.
*4) Dr. Gazarin, Adel , Chairman Egyptian Federation of Industries. Al Ahram Iktissadi No. 981, page 44.

1. Egyptian Industrial Production 86/87

Table 1.

	Millions LE	% age
- Food Industry	6853.1	33.80
- Textile Industry	5010.9	23.97
- Chemical Industry	4002.1	19.25
- Engineering Industry	2939.6	14.06
- Metallic Industry	1846.2	8.83
- Metallurgical and building materials	191.4	0.73
- Others	55.2	0.36
Total	20896.5	100.00%

Food Industry Leading in 86/87

The public sector share in the total industrial production 86/87 amounted to 10,545 Millions LE amounting to slightly over 50% of the total, the remaining being the private sector output. If we look into the distribution of the total production over the different industrial sectors we find that in 1986/87, as indicated in the enclosed table, the main industry in Egypt is the food industry including sugar out of sugar- cane, oil,... then weaving and textiles including ready-made garments which is developing at a very quick rate, cotton being the main material.

Then chemical industry including production of fertilizers, soap, rubber, then comes the engineering industry including a wide variety of applianc-es and goods from trucks and boilers to T.V. and radio sets .

Finally comes the metal and metallurgical industries including building materials like cement, gypsum and bricks. As basic metal industries there exists production of iron and steel out of local and imported ore as well as aluminium out of imported ore.

Oil industry is hereby not included. To complete the picture of industry in Egypt at present it remains to say that during the last five year plan 81/82 - 86/87 what was invested in industry attained a total national investments.

The private sector part of these investments amounted to 25.5% with the public sector covering the rest.

---

source: Ministry of Planning: Five year plans for 1982/83 to 1986/87 and 1987/88 to 1991/92.

b) The Private Industrial Sector:

This sector, though, of a rather smaller size, but its role grew much bigger since 1972 as a new open door policy has been initiated by President Sadat[1].

Main Profile : [2]

For the fiscal year 1987/88, the private sector share in industrial production will reach a comfortable 50% with an average growth rate of 7.5% compared to the preceding year.

According to Ministry of Planning sources, the global industrial production, public and private sectors combined will be in 1987/88 of 22.355 million LE. with an increase of 1.456 million LE, and an average growth rate of 7% whereas the average growth rate in the industrial public sector is of 6.4%.

This year industrial plan aims indeed at accelerating growth rates in key sectors, chiefly the food industry sector should reach 7.7%.

As such, the total private investments in industry in the last 5 year plan amounted to 1,722 million LE. In the coming plan, the private sector is to represent 39% of the global Investments and in regards to the industrial sector, in particular, to devote to it 36% of its global investments, against 21% for the public sector.

---

*1) Law 43, for the year 1974.

*2) Dr. Gazarin, Adel, Chairman Egyptian Federation of Industries announcement, Al Ahram Iktissadi, 954, p. 48.

In terms of joint venture industrial projects, the number of projects approved under law 43 was 381 projects out of which about 60% started production, whereas 66% is Egyptian national capital, 18% Arab and 16% Foreign.

To encourage further the private initiative and overcome the problem of finding proper sites for the new ventures, the government established a number of industrial cities within reasonable distances from Cairo and Alexandria. Thus the 10th of Ramadan City on the road to Ismailia was founded and has already more than 300 factories producing. Several other cities like Sadat City and 6th of October are already taking a very active shape and others are following.

At present time , six new industrial cities that, upon the obtain of an " industrial licence " from GOFI , could be made use of the advantages and privileges allowable such as 10 - year tax free grace period :

City	Location	Average LE. / M^2 price
10 th Ramadan	55 km, on Cairo/Ismailia Road	30 - 35
6 th October	35 km, on Cairo/ Fayoum Road	20 - 30
Sadat City	93 km, on Cairo/Alexandria Rd.	10 - 20
New Ameria	55 km, south to Alexandria	10 - 20
New Salheya	115 km, Cairo/ Ismailia Road	15 - 25
New Damietta	6 km, west to Damietta old Port	30 - 35

GOFI stands for " General Organization for Industrialization "

c) Industrial Joint-Venture:

This sector came to existence through the establishment of Law 43 for the year 1973, and has proven by now being of substantial size and relatively achieving more success in revenue measures.

It comprises foreign Company activities in Egypt, local companies implementing foreign funds, and joint-ventures with private or public sector. The cases of joint-venture with public sector would be considered as a private sector.

The private sector and private investment framework together with the government strategy to boost the private sector, presented in this chapter, have been prepared on the basis of material provided by the General Authority for Investment & Free Zones.
The Authority, also known as GAFIZ, has created in the mid-seventies within the Ministry of Economy and Foreign Trade as the Government Agency responsible for implementing the Law 43/ Investment law, regulating the newly born open-door policy.
It has gradually grown in becoming the"One Step-Over" for both Egyptian and Foreign investors, and is consistently advocating the private sector role and needs in governmental committees.

An Ambitious Policy

Comprehensive peace, stability, economic development and democracy continue to form the backbone of Egypt's national policy objectives.
Through a fuller utilization of its human and physical resources, Egypt has the potential towards its long term goals of growth and stability.The need of the Egyptian economy for more investments is quite obvious.

The Government is pledging its full support to investment activities. It invites the private sector to have a substantial share of its planned investments in the new Five Year Plan (1987-1992).

Total investments of this plan are estimated at about L.E. 46.5 billion, of which L.E. 18 billion will be allocated for the private sector.[1]
The policy is really aiming at making full use of the administrative, marketing and business skills of the private sector to attract Arab and foreign investors as partners in new joint ventures in Egypt.
Needless to say that building up a new conducive investment climate depends on solving any problem that may be facing existing projects, projects, securing coordination between all agencies concerned, and setting up decision making process in the government with a new sense of efficiency and delivery on time. Such is the Investment Authority goal.

A major step on the path of recovery is the recent economic measures announced by the government to create a free foreign exchange market and a partial floatation of the Egyptian Pound, presenting in fact the boldest attempt yet to liberalize the money and foreign exchange markets.

The most interesting feature of the new policy relates to the exchange rate applied to investment in foreign currencies. A new decision has been issued recently which changed the investment rate for investors to a free rate set daily by a national bank committee. The new system is designed to improve a foreign investor's competitive edge and encourage further investment in Egypt.

---

*1) source : GAFIZ Annual report 1987.

Main Profile :

As of 3/3/1987, total number of projects approved under law 43 of 1974 amounted to 1624 projects with total invested capital of L.E. 7.4 billion, and total investment costs of L.E. 14.4 billion.

Out of 1624 projects, the total number of projects in operation amounted to 1049 projects, with total invested capital of LE. 4.2 billion and investment costs of L.E. 7 billion. The projects in operation constitute 65% of total projects approved up to 31/3/1987.

The invested capital participation per nationality indicates:

Egyptian participation accounts for 65% of total invested capital of projects approved up to 31/3/1987.Arab participation constitutes 18% of total invested capital, whereas foreign participation ranks third as it represents 17% of total invested capital.[1]

The following table shows shares of Egyptian, Arab and foreign Investors in total invested capital as of 31/3/1987.

Table 2.

Projects Approved 1974 / 87

Projects	Number	Invested Capital L.E Million	Investment Costs L.E Million
Inland projects	1357	6425	13230
Free Zone projects	267	926	1182
Total	1624	7351	14412

Source: GAFIZ Annual report 1987.

Table 3.

Projects Operation 1974 / 87

Projects	Number	Invested Capital L.E Million	Investment Costs L.E Million
Inland projects	808	3332	5939
Free Zone projects	241	877	1182
Total	1049	4209	7048

Table 4.

Level of Implementation of Law 43 projects

	Percentage to total Projects Approved		Percentage to total Projects Approved
Inland projects	60%	Free Zone projects	90%
Industrial projects	53%	Cairo Free Zone	89%
Agricultural projects	41%	Alexandria Free Zone	89%
Construction projects	52%	Port Said Free Zone	95%
Financial projects	84%	Suez Free Zone	83%
Services projects	64%		

Source : GAFIZ Annual Report 1987

Table 5.

Origin of Invested Capital

Invested Capital Participation	Inland Projects L.E Mill.	%	Free Zone Project L.E Mill.	%	Total L.E Mil.	%
Egyptian	4457	69	282	30	4739	65
Arab	892	14	444	48	1336	18
Foreign	1076	17	200	22	1276	17
Total	6425	100	926	100	7351	10

d) Private Job-Shops:

This sector comprises more than 300,000 registered job-shops[1], but the actual amount may come up to 500,000. They mostly follow their own working rules and regulations, and do not stick to the official working conditions.

Their activity on the overall lacks standardized quality, however, has its significance quantity-wise.

*1) Register of the Egyptian confideration of Industries.

PRESENTATION OF THE CASE STUDY

The data to follow represent those belonging to BAVARIA/EGYPT, an Egyptian /German joint venture established in 1973, activity of which is the production of fire extinguishers of advanced types. This data will help giving an idea about the development of the case study within the span of 13 years under the environmental conditions and the economic climate this study is subject to.

i) Capital development 1973/1986 (LE.)

Table 6.

Year	Production Capacity	Capital
1973	15 000 units of different sizes	54 000
1974	30 000 units of different sizes	108 000
1975	30 000 units car extinguishers 30 000 units of different sizes	108 000
1982	60 000 units car extinguishers 30 000 units of different sizes	500 000
1984	60 000 units car extinguishers 60 000 units of different sizes	500 000
1986	120 000 units car extinguishers 120 000 units of different sizes 40 000 Halon units automatically operated	1 000 000

ii) Development of Technical Facilities 31/5/1974 until 31/12/1986

Table .7

Details / Date	Machinery & Equipment	Transport & Handling Means	Dies & Jigs	Tools	Total	% - age Growth
1974	14067	2988	746	8266	26067,-	100%
1975	38780	2988	966	9314	52048,-	200%
1976	40092	2988	1546	9314	53940,-	207%
1977	45915	2988	1966	9314	60183,-	231%
1978	54925	2988	2531	9314	69758,-	268%
1979	97465	11238	3886	9942	122531,-	470%
1980	260923	11238	4586	10176	286923,-	1101%
1981	320912	23998	25496	12084	387490,-	1486%
1982	408643	26971	25916	16082	477612,-	1832%
1983	468140	37178	25989	18939	550246,-	2111%
1984	600288	37859	26230	21559	685936,-	2631%
1985	630392	37859	57305	25436	750992,-	2881%
1986	647133	54838	167307	41206	910484,-	3492%
1986	743831	56477	202843	43931	1047082,-	4016%

It is apparent that the first years of the company's activity did not have sufficient technical facilities coping with its production activity and many operations had to be done at external job shops. As from the year 1978 on, one could consider the technical facitilies acquired as a true measure for the actual technical means developed.

iii) Development of Manpower - 1981 until 1985

Table 8.

Year	Workers	Employee	Total
1981	56	70	126
1982	60	79	139
1983	65	87	151
1984	70	103	173
1985	78	107	185

It should be put into consideration that the ratio workers/employees is quite rational due to the fact that more than 60 employees are assigned to work at 9 branches in 9 different cities.

iv) Development of Wages and Salaries - 1981 until 1985

Table 9.

Year	Wages	Salaries	Total
1981	51 870,-	73 835,-	125 615,-
1982	75 221,-	96 021,-	171 242,-
1983	94 710,-	111 822,-	206 532,-
1984	125 270,-	158 587,-	283 857,-
1985	174 150,-	187 354,-	361 504,-

Wages and salaries did not follow in their rise just the official rate proposed by the unions, but did exceed that putting into consideration the rate of inflation on an own initiative trait from the side of the Company.

v) Devlopment of Industrial productivity 1981 until 1985

Table 10.

Year	Revenue	Labour	Productivity per Labour LE.
1981	2 520 878	56	45 015,-
1982	1 988 325	60	33 139,-
1983	2 130 772	65	32 781,-
1984	1 338 566	70	19 122,-
1985	1 421 325	78	18 222,-

vi) Devlopment of Adm. / Sales productivity 1981 until 1985

Table 11.

Year	Revenue	Labour	Productivity per Labour LE.
1981	3 850 352	70	55 005,-
1982	3 828 249	79	48 458,-
1983	3 223 037	86	49 105,-
1984	4 734 030	103	45 961,-
1985	4 525 441	107	42 293,-

vii) Devlopment of Revenue per one LE wage/salary 1981- 85

Table 12.

Year	Wages (Factory)	Salaries (Adm./Sales)	Total LE.
1981	48.5	52.1	30.75
1982	26.4	39.8	22.3
1983	22.4	37.7	20.4
1984	10.6	29.8	16.6
1985	8.16	24.15	12.5

Staffing, Training and Links to Social/Economic Backgrounds:

a) Human Resources in Egypt:

Preliminary results of the 1986 census put Egypt's population at 50.5 million with a continued high rate of growth of 2.8%. The burdens of a fast growing population under the age of 12, a widening food requirement is currently imported, and a fast growing labour force with about 400,000 new entrants seeking jobs every year.

Against the many costs of rapid population growth, Egypt's abundant labour resource is also considered one of its major strengths. The bulk of employment is still in agriculture where farmers achieve some of the highest yields per crop by international standards. The average wage rate of L.E.. 1,256 per year (570 USD) for the economy as a whole, compares Egypt with a comparative advantage in all labour intensive manufacturing activity.

Relative to countries at similar stages of development, Egypt also enjoys a very high proportion of technical and managerial skills in its labour force. In 1986, the ratio of the labour force holding university degrees stood at 4.4% , up from 2.2% in 1976.Skilled workers are also an important asset to the economy as evidenced by the large numbers engaged in both construction and production activity at home and abroad. A conservative estimate puts Egypt's expatriate labour force at 2 million (15% of the total labour force), saving close to USD 6 billion every year, only part of which is remitted to Egypt.

Source: Ministry of planning for period, 1980/1981 to 1986/87.

b) Structural Transformation and Growth:

Table 13.

	SECTORIAL BREAKDOWN			REAL ANNUAL GR. RATE	
	1974	1980/81	1986/87	1974-1980/81 -	1980/81-1986/87
GDP at Factor Cost	**100**	**100**	**100**	**9.1%**	**6.8%**
Agriculture	32.1	21.0	16.7	3.0%	3.5%
Industry and Mining	16.0	13.5	14.8	8.3%	9.1%
Petroleum	5.0	15.4	13.8	30.9%	7.7%
Construction	5.0	5.4	4.4	14.3%	3.3%
Suez Canal	0.0	3.5	2.4	13.1%	0.6%
Transp.,Trade,Commun.	18.6	22.7	20.0	18.1%	8.5%
Finance, Insurance			6.9		7.1%
Social Services	22.6	17.7	19.0	6.6%	8.0%
Final Consumption	**94.2**	**85.9**	**92.2**	**6.8%**	
Gross National Savings	**8.5**	**19.5**	**7.8**		
Gross Domestic Investm.	**22.5**	**29.5**	**18.5**	**13.0%**	**3.8%**

N.B.) Growth rate over 1976 to 1980/81 period, given Suez Canal was reopened in mid 1975.

Source: Ministry of planning for period, 1980/1981 to 1986/87.
World Bank reports for earlier period.

c) Social Indicators: [1]

Table 14.

INDICATOR	1975	1985
per Capita Income	USD 279	USD 720
Infant Mortality	116	90
Population per physician	1050	800
Life Expectancy	55	60
Population per Nursing person	110	790
Daily Calorie supply per capita (percent of requirements)	109%	126%
	1976	**1986**
Illiteracy, males	43%	38%
Illiteracy females	73%	62%
School Enrollment, primary	70%	88%
School Enrollment, secondary	55%	58%
Access of households to:		
Electricity urban areas	77%	96%
Potable water urban areas	—	92%
Electricity rural areas	19%	79%
Potable water rural areas	—	56%

*1) Source: Central agency for public mobillization and statistics. Preliminary results of 1986 General Census, April 1987, and World Bank Annual report 1986.

I) Labour Resources and Technical Background :

There is no regulation in power in Egypt making a certain level of apprenticeship a pre-requisite for the establishment of a private job-shop practicing technical activities.

As a result, apprenticeship on its various levels, became a major qualification for labour to join governmental technical hierarchy and would move up in masses irrespective of the measures of individual productivity or technical level development.

On the other hand, the countless number of small sized job-shops hardly use any of the labour with apprenticeship background. They seem to have their own calculations based mainly on the cost / productivity factor, and would rather take very young beginners as the main labour element and have them trained according to their specific requirement.

In doing this, they do not only afford themselves an economical and reliable workmanship, but furthermore they intentionally act as undrainable exporter of masses of high productivity labour in almost all technical branches, that is being well made use of by the whole industry.

Of course, one cannot overlook in this respect that most of these workers lack the sense of discipline and organization, as they are more adjusted for productivity / bonus rule.

II) Patterns of Staffing and Training.

The case study we are taking into this paper relied for its labour demand on two sources:

a) Foremen and technicians were selected from well qualified and reputable manpower proven successfully for years at private industrial enterprises, and were offered sufficient motivations and incentives to quit.

b) All other regular workers were selected from young beginners ranging between 14-16 years of age and were offered 6-month trial period, governed by easy-hire/easy-fire rule.

As a result of the fact that the personal ability of learning and adaptation to regulations and rules was the only measure of acceptance for the majority of young workers, a good deal of those found acceptable were found to be illiterate.

Thus, the training program provided to them had to include elementary courses for reading and writing.

In addition to the practical experience acquired through daily technical practice, qualified technical teachers and instructors were assigned to give regular courses to small similar groups of workers, which not only included basic technical practice, but exceeded that to technical drawing, industrial and occupational safety, in addition to the reading/writing courses.

It might be worthwhile mentioning that it was noticed that adaptation abilities to regulations and acceptance of shop strict discipline was of a much higher rate among young workers compared to that among qualified technicians[1].

An explanation of this phenomenon is related to two major factors:

a) Social and Psychological Background:

The rather wide shift that acts as a big dose of added value to such very young beginners of workers, turning them from just being the kids of yesterday into actual dependable and reliable members of their families.

b) Economic Background:

The economic shift turning these young elements into fully self-sufficient and independant citizens has been quite remarkable.

In other words, the process of Adjustment of Workers is far easier among beginners than among those of higher ranks . This opinion finds support by other arguments published on various levels. [2]

---

*1) Firth, Raymond; In Human Types:
An Introduction to Social Anthropology, Thomas Nelson & Sons Ltd. , London 1956, page 71.

*2) Roethlisberger, Fritz and Dickinson W.J. :
Management and the Worker, Harvard University Press, Cambridge, Mass. , 1939, Page 280.

III) Organizational Structure of the Production Plant.

Since this chapter is more concerned with industrial engineering rather than management, in its big sense, only the organizational structure of the production plant will be displayed for analysis, in page 29 .

Line or Staff Organized:

There might rise a question whether this structure type of plant organization is more constructed for line or staff type, i.e. , for operational task performance or more with planning[1].

We consider this specific case-study a true example that this classification is more theoretically biased rather than practically. The impact of total information management upon logistics is beginning to remove the traditional staff-line classification. The two groups are emerging into a managerial resource base dedicated to maximum integration of the logistical operating system. This opinion is supported by other arguments published recently [2] . The staff - line combination of function is signified in its striking form in the function and job - classification of the " Department Foreman " . Such a Department Foreman could be described as the most adequate and illustrative example of this combination of function within the structure of the plant organization .

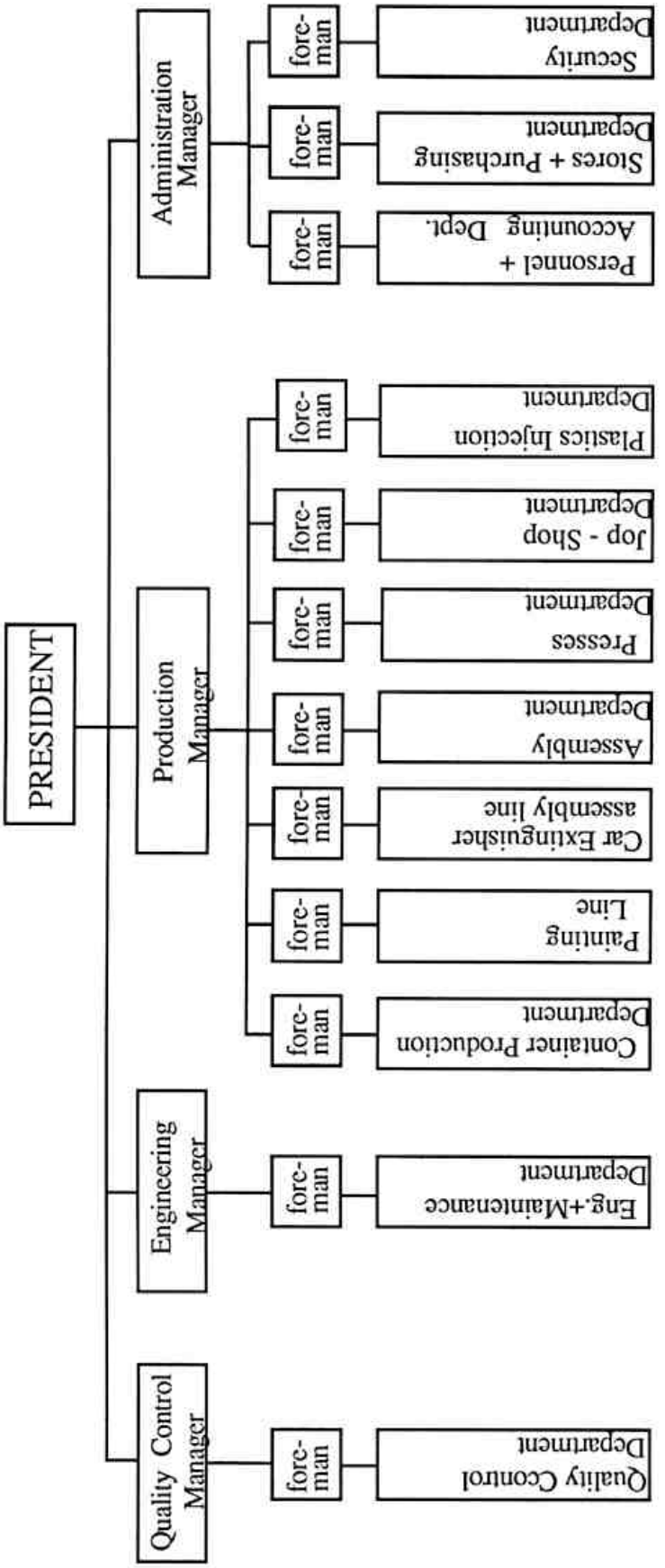
---

*1) For a discussion on Live vs. Staff, see John F. Stolle; How to Manage Physical Distribution, Howard Business Review, July/August 1967, Page 93-100.

*2) Bowersox, Donald J. ; Logistical Management Collier Macmillan Publisher, Pages 32-35.

Figure (1)

ORGANIZATIONAL STRUCTURE OF THE PRODUCTION PLANT



IV) Implementation of New Pattern to improve Productivity and Physical/Social constraints.

The production plant organizational structure has been constructed in this form, stressing out in the first place a significant and unique function given to every department foreman. He is considered to be the absolute group-leader of his department and thus enjoys full authority, in the meantime is regarded limitlessly responsible within his domain.
In other words, every department foreman is responsible for the proper guidance of his workers inside and outside the factory, and is expected to extend his sponcership to them at their homes, solving their social and even family problems if necessary.
This act has its explanation which is that most of our young workers have been selected at an age of 14-16 years old. The social background they have would not very much qualify their homes for the task to deliver the proper guidance required.

Argyris has expressed the same view:

> *"The employee must be provided with more **'power'** over his own work environment and therefore he must be given responsibility, authority, and increased control over the decision-making that affects his immediate work environment. He must become self-responsible. This suggestion is supported by the writer's findings. The degree of self-actualization increases sharply for individuals as their dependance, subordination, and submissiveness are decreased and as their control over their work is increased and as the time perspective is enlarged. "* **1**

*1 Personality and Organization: The Conflict between System and the Individual, Harper& Row, Publishers, Incorporated, New York, 1957, Page 181.

Several patterns of managerial decisions proved to be very efficient in improving productivity such as:

a) Basic Needs Consideration:

It is a fact that the easy-hire/easy-fire concept being applied, which is based on the humanistic school of management, does have its cost, which is the considerably higher rate of wages to start with. This, together with the fact that many of the young beginners do come from very poor environments, have initiated a special attention to be paid to the basic needs fulfilment, such as:

i) Compulsory Saving plan for Junior Workers.

A saving book has been opened for each worker who successfully terminates his training and probation period, at one of the banks. A monthly fixed saving amount is to be delivered in favour of each worker deduced from his payroll. Such saving amount has been estimated corresponding with the excess to his regular needs. This act brought workers to gain new useful social habits about saving, and solved many problems related to either unpropper utilization of excess money, or in many cases, the misuse of such by the parents.

ii) Sports - Social Activities.

One of the facilities organized and made available twice a week, is that workers enjoy a free access to one of the unions sport communities on cost of the company. They are offered a playing ground and a trainer for 2 hours, and are offered a meal at half price.

The social bonds generated proved to be very useful for both the factory inter-relation, and the workers own individual development.

b) Elimination of Second-Grade Class of Workers:

It is common under local conditions that certain unpleasant tasks to be assigned to a second or even third grade class of workers, who consequently are less paid. The pattern applied is to assign the entire department to do any low graded work, such as removing spilled oil or even cleaning their own toilets, etc. , proved to be adequate, solving this problem and turning all available manpower into an equally productive capacity.

> *"Even the dullest man has a brain, and it is not used at all when he turns four screws. In fact, only an infinitesimal proportion of his muscles are utilized. It is fundamental to the dignity of man that he owns his work. . . By 'owning' his work, I mean that he must do it in his own way, in his own time, and subject to his own conditions".*[1]

This concept explains a great many things. It explains why workers on a mechanized assembly line sometimes work extra fast for a short period, so that they can then slow down and still keep up with the line.

---

*1) Niall Brennan, The Making of a Moron, Sheed& Ward,Inc. , New York, 1953, pp. 79, 81.

c) Incentives System generating Inter-Departmental Quality Control:

The incentive system applied is based upon a qualitative-quantitative concept.

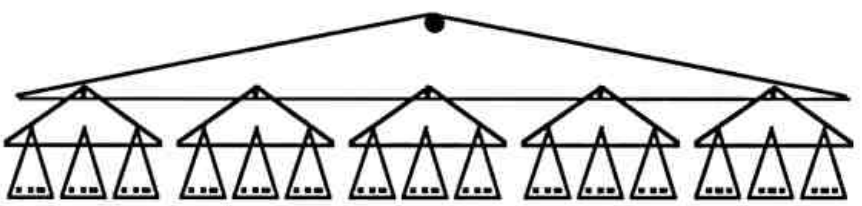
The simple concept adds (one+) point to all quality accepted units produced. A reject unit would take (two) points off, if interdepartment determined. If a reject unit was discovered after being moved into another Department and additional operations were run on it, this will take (ten) points off from the department responsible for it.

The result is that every member of a production department became so keen that neither he nor any of his colleagues would produce a defective part to be rejected.

> *"It can be concluded, therefore, that management will make full use of the potential capacities of its human resources only when each person in an organization is a member of one or more well knit, effectively functioning work groups that have high skills of interaction and high performance goals".* [1]

This has generated, last end, a very good interdepartment self controlled form of quality control, which has stressed out the fact that the quality policy is everybody's matter.

Figure (2)



Unified - Target Incentive Chart

*1)- Likert, Rensis:
"A Motivational Approach to a Modified Theory of Organization and Management". in Mason Haire (ed.) ,
- Modern Organization Theory: A Symposium of the foundation for Research on Human Behaviour, John Wiley& Sons, Inc. , New York, page 192.

d) Modern Lifting and Handling Equipment:

This pattern has helped a lot increasing the efficiency of this operation and affording at the same time, better measures of safety. This finds support by other managerial researchers, who, expandingly consider lifting and handling equipment a complete subject in itself, ending with completely sophisticated systems[1].

e) The use of Standard Pallets and containers for Production and Stores:

Using European standard types of pallets and containers afforded several advantages:

1. Safety of handling & transporting.
2. Uniform loading in production and stores.
3. Unifying shelving system at stores.
4. Speedy handling by lifting facilities.
5. Safety improvement.

This pattern finds support by logistical management[2].

f) Optimization through Conveyor Belt Concept:

The power driven conveyor belt has proven on a practical basis to be able to improve productivity by 250 to 300 percent.

---

*1) Sims, Ralph, E, Jr. , Material Handling Systems, Handbook of Industrial Engineering, Salvendy, John Wiley & Sons, 1982, page 10.3.15

*2) Bowersox, Donald J. , Logistical Management, Collier Macmillan, 1978, p. 206-207 .

This was recorded in two cases, and lead to the application of an assembly line balancing concept[1].
The findings of the writer have been confirmed by a majority of researchers[2].

Excellent optimization results have been practically experienced in two specific cases :

i. Continuous Flow Painting Line:

Whereby the production capacity for painting recorded an increase of up to 300% and a decrease of manpower in this department by 30% was attainable, compared to the manual productional capacity previously practiced.

ii. Automatic Assembly Line for Car Fire Extinguisher:

This assembly line is based on linking several automatically run operations by a belt conveyor, whereby the workers have to interfere taking work pieces off conveyor belt to add assembly work, and return back to conveyor belt. Three workers are assigned for the assembly work in succession, while three others are in charge of feeding of the line, removing of the packed product, and controlling of the line.
The production increase compared to manual assembly of the same product was recorded to be above 250% , while the manpower needed for the same job could be reduced by 60%.

---

*1) Moodie, Colin L. , Assembly line Balancing, Handbook of Industrial Engineering, ISBN 0-481-05841-6 page 3,4
*2) Wester, L and Killbridge, M, Modern Materials Handling, How Conveyors Organize Assembly Operation, Nov. 1979, page 114.

VI) Production Scheduling.

Nowadays, there are so many theories and approaches getting indulged into this very important subject. The system of scheduling successfully applied in the case study is rather simple and very adequate for the application in a mid-sized factory of standard types of production. For a comparison, we are bringing a simulation analysis of scheduling at the end of this chapter, which bears its own significance.

A Pattern for Simple Scheduling Rule.

This pattern is based on a systematic sequence of scheduling for job orders based on certain pre-requisites:

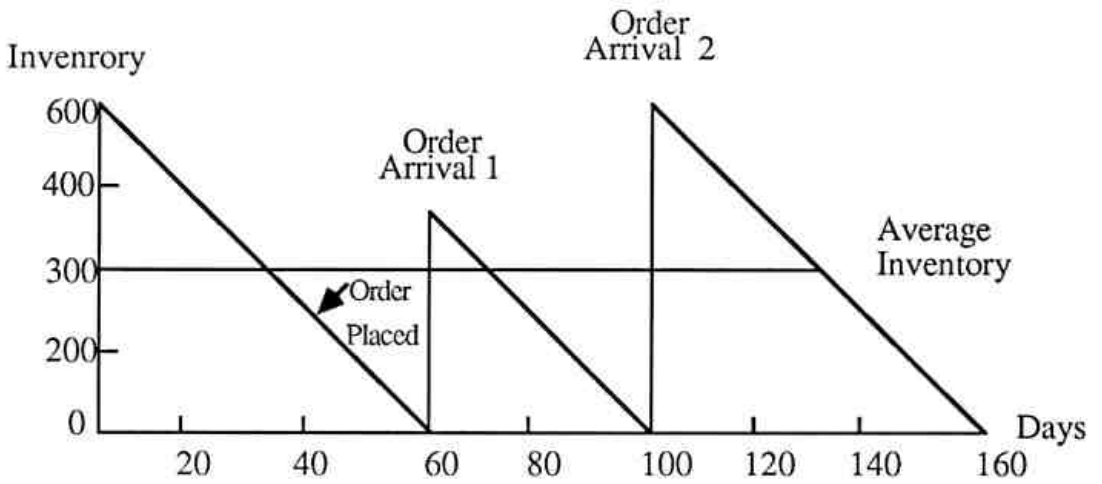
1) Average inventory of each product sufficient for a specific period of time.
2) Average demand of a type for the specified period of time.
3) The weekly mean and maximum production capacity of a type of product.

The rule is once the inventory level of a certain product reaches the average value specified to form a safety margin inventory, it automatically gets a priority for scheduling. The production manager has a free hand to decide the size of job order for this type of product. In other words, it would be up to the obligations and commitments the production manager has, to decide whether a job order for a specified type would take one week or more, bringing it back to an optimum inventory level, or exceeding that.

It would be up to the obligations and commitments the production manager has, to decide whether a job order for a specified type would take one week or more; bringing it back to an optimum inventory level, or exceeding that. In doing this, a production manager has always the chance to inspeculate marketing forecasts of this type with the marketing manager, and whether exceptional orders should be expected or not.

the graph below illustrates the simple basic concept of production scheduling as described:

Figure (3).

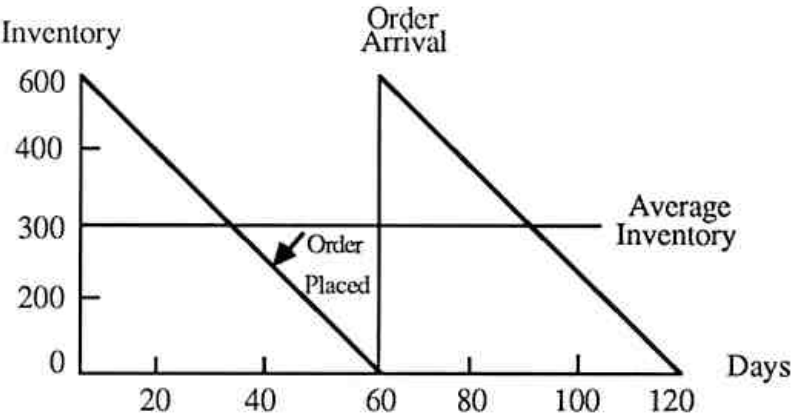


Example : Order on flexible basis

Apparently this rather flexible ordering system has its limitation by its turn. It should remain within the Economic Order Quantity (EOQ) . Balancing the cost of maintaining inventory against the cost of ordering is quite an interesting subject.

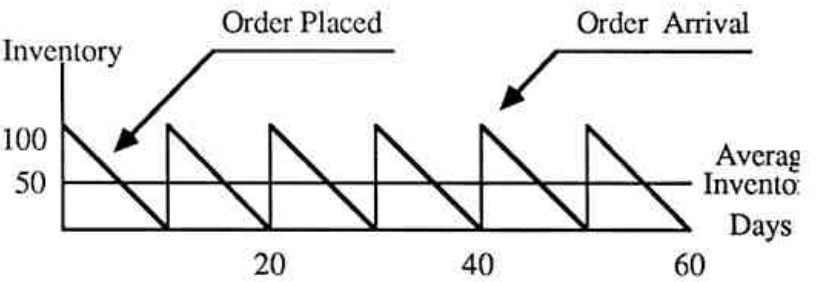
Illustration of Variable Order Quantity & Average Inventory

Figure (4).



Example : Order 600

Figure (5).



Example : Order 100

An exact policy concerning order quantity can be calculated by balancing the cost of ordering and the cost of maintaining average base inventory. EOQ provides a specific answer to the balancing of these two critical groups of cost. By determining the EOQ and dividing it into forecasted annual demand, the frequency and size of order that will minimize the total cost of inventory is identified, prior to typically associated with ordering and maintaining inventory.

Identification of Inventory Costs:

Because inventory is related to all apsects of logistical operations, it is difficult to isolate the cost of inventory ordering and maintenance. In fact, accounting practice is to group inventory costs. The net result is that the functional cost of inventory is difficult to isolate for purposes of policy formulation.

Complementory Job Orders, *A USEFUL PATTERN* :

This type of scheduling system, however, would not give much attention to the question of loading, although it is doing well with the scheduling problem. For this, a complementory job order possibility is given to each department foreman, to decide or not for a complementory order and the size of such order, in view of the raw material available, plus the loading of the various machinery labour of his department. This procedure allowing every department foreman an access to act as such, can be considered as a unique experiment mixing line and staff functions successfully together, bringing favourable loading results.

Question of Optimization:

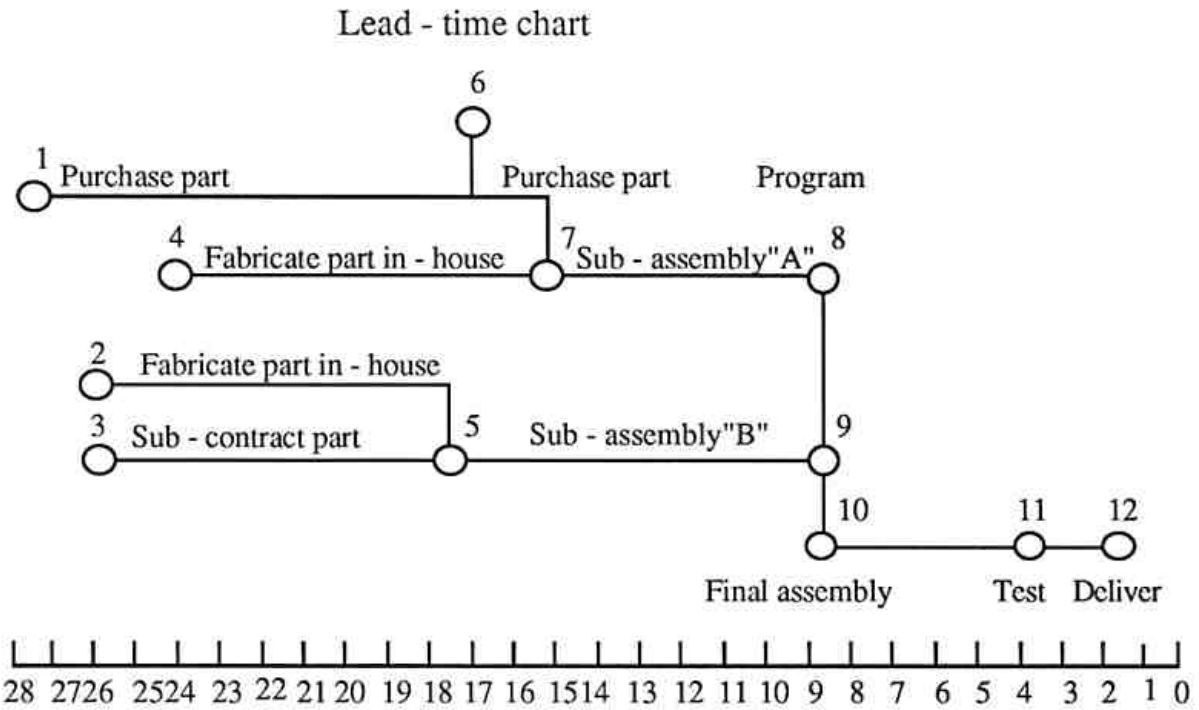
From the forthgoing, one may consider that the scheduling system proposed would function last end, up to the movement of the average inventory, i.e. , the movement of sales.

On the other hand, the complementory job order system would function last end up to the talents and efficiency of each foreman. This would raise an important argument; whether an automatic optimization of scheduling affording best loading of machinery/labour through computerization of job orders would work for the better or the worse. A question that cannot overlook the cost of production, the inventory cost and its limit, which is the practical linkage between production, marketing and production economy.

Lead Time Charts:

The lead time chart has proven being a very useful tool for scheduling. Its main task is to show plans and operation schedules visually, which is a basic step in the construction of the Line-of-balance scheduling techniques.

Figure (6).



Working days prior to Delivery - 26 working days per month

In our case, the lead-time chart remains being useful within the range of non-repetitive tasks, for the good sake of keeping schedules and time plans intact.

SIMULATION ANALYSIS

The objective of this simulation is to try a scientific approach to the problem of scheduling for a small sized job-shop, a common case most identical to our case study. Whether seeking a systematic scheme for a scheduling would be regarded as an added value, or just a simpler method like that applied now in the case study would prove being still good enough. A question, the results attained through this simulation, may give an answer to.

A great deal of gratitude and appreciation goes to my old colleague of Aachen University, Dr. -Ing. Joachim Malasch, now a researcher at VW Research Center, for his support extended to me during the construction treatment and analysis of this simulation.

Abstract:

This approach comprises a systematic analysis of shop performance against different scheduling rules, using a computer simulation model of a conventional job-shop as a basis. The simulation model is used to identify dependant parameters, such as shop load and service distribution for a set of scheduling rules. These conditions should represent different existing shop conditions. Six different scheduling rules and two different performance measures were used in this simulation.

A complete statistical analysis and categorization of the simulation results were performed, which produced certain interesting anticipated and unanticipated results as well.

In spite of all the effort that has been exerted into the development of new scheduling rules and algorithms, we are still in a poor position to guide plant management personnel in the selection of an appropriate priority scheduling rule to be used in the scheduling and control of their facility.

It is realized that optimal strategies are either untraceable or so limited in scope that their use in actual manufacturing facilities is virtually non-existant. At the same time, priority dispatching rules have produced conflicting results for differently configured systems. Some of the problems encountered in using priority rules will be discussed in this simulation.

As priority scheduling rules are usually designed for production plants, the criteria used were chosen as follows:

1) Minimum job tardiness
2) Minimum job tardiness and minimum overtime
3) Minimum overtime, i.e. tardiness = 0

We hypothesize that different processing time distribution could favour one type of rule over others. For example, exponentially distributed processing time could favour Shortest Operation Time (SOT) Overslack per Remaining Operation (SLK/RO) for load factors from low to medium-high.

Uniformly distributed operation, in turn, could favour SLK/RO over SOT. There is a need to explore this characteristic.

When shop load ratios are low; the shop is able to handle the traffic using any priority rule. Usually queues are periodically built up and then eliminated altogether. Queues normally exist when the bad ratios are high, therefore, we should be interested in whether or not jobs are held in the queues over an extended time.

Conceptual Plan:

This investigation aims at providing a framework of synthesizing job shop scheduling research so that practitioner has a logical means of selecting his operation parameters. The following factors were considered effective:

1) The work flow characteristic.
2) The processing time distribution.
3) The due date distribution.
4) The shop configuration.
5) The shop rules.
6) The performance measures.
7) How the performance measure is determined.
8) The priority rule selected.
9) The shop load level.

Work Flow Characteristics:

We have decided to explore the general case of mixed flow and multiple processing on the same machine as being typical of many job shops:

2 - 3 - 1 - 3 - 2 - 4

Processing Time Distributions:

The three types of time distribution are defined as:

1) exponential (commonly assumed)
2) normal
3) uniform

We hypothesize that real life situations will yield processing time distribution following somewhere within the range offered by these three types.

Due Date Distribution:

Among the three distribution shapes, uniform distribution (i.e. randomly selected for each job) was chosen for being most appropriate as uniform distribution offers the best balance for the lead times expected in practice.

The exponential distribution is unsuitable since too many jobs are too near the high priority state; conditions which we do not expect to see much of in practical shops. Normal distribution is unsuitable too since shops tend to experience jobs with little or non-static slack all the way through to jobs having plenty of lead time available.

Shop Configuration:

The shop simulated is a conventional job shop. It consists of four machines each performing a unique activity (pooling is excluded).

Shop Rules:

We were of the opinion that rules which provide the optimum results under more stringent conditions will also provide the best results under more liberal operating conditions. Consequently, tests done without overtime, no job splitting, no use of alternative machines, etc. . .

Performance Measure:

Taking in principal the "minimum job tardiness", we proposed using "Root Mean Square" or (RMS) of tardiness as a measure, as the only relevant job shop performer criterion (since overtime is not allowed). We realize that RMS of tardiness would penalize.

Determining Performance Measures:

The least we can do is to "clean shop" at termination of the simulation. Thus, jobs that have been held over a considerable period would now be included in the performance measure. Actually, a priority rule that results in the continuing tardiness for even one job, is unsuitable since we got increasing "tardiness scores" in spite of a fine performance for minimum flow times.

1) Shortened Operation Time (SOT) for its generally superior performance in so many investigations.
2) Slack per Remaining Operation (SLK/RO) since this rule performance in so many investigations.
3) Work in Next Queue (WINQ)
   Generally good results are achieved with this rule.

4) Due Date (DDATE) a simple static rule.
5) Last-In-First-Out (LIFO) to provide a contrast.
6) First-In-First-Out (FIFO)
   The most democratic rule.

Shop Load Level:

The shop will be simulated under three load categories . . low at 70%,medium at 77%, and high at 85%.

We assume shop loads much below 70% provide insufficient capital utilization, and that shop would better do something about reducing overhead and workers producing redundant tasks.

Increased shop loads are likely to result in unnatural queue lengths and delays for all priority rules. A situation in which overtime becomes manditory, or else, increasing plant capacity becomes a realistic alternative.

Thus, our approach will be based on the following assumptions:

Arrival	: Exponential distribution
Work Flow	: Mixed flow - multiple processing
Processing Time	: Exponential, Normal and Uniform distributions
Static Slack	: Uniform distribution
Shop Rules	: No overtime, no job splitting, no job flow alternative

Performance Measure	: Mean tardiness (RMS)
How Performance Measure Determined	: Empty shop at end of simulation
Priority Rules	: SOT, LIFO, DDATE, WINQ, SLK/RO, FIFO
Shop Loads	: 70%, 77% and 85%

Table15.

List of Rules and Abbreviations

Rule No.		Abbreviation
1	Job with Shortest Operation Time is ordered first in machine queue	SOT
2	Job with smallest ratio of Slack Time to the number of Remainig Operations is orderd first in machin queue	SLK/RO
3	Job with the least Work In Next queue will be ordered first in current machine queue	WINQ
4	Job with the earliest due Date will be ordered first in machine queue	DDATE
5	Job Last Into the queue will be First out of queue	LIFO
6	Job First Into the queue will be First out of queue	FIFO

Methodology:

The general job shop considered in this chapter is one in which the incoming jobs may require any machine in the shop, and may visit the same machine more than once. However, successive operations cannot be performed on the same machine. Any ordering of machines can appear on the route sheet of a job.

Routings for jobs are generated by means of a probability transition matrix. The machine for the first operation of a job is chosen by using a probability entry sector. Other enteries in this matrix give the probability of going from a specific machine to any other machine in the shop. The process is repeated until all the operations for a specific job have been completed. The jobs arriving to the shop are randomly assigned between one and six operations.

The inter-arrival time between jobs is generated from an exponential distribution, while processing time for a job at a given machine centre is generated from:

1) Uniform distribution
2) Normal distribution
3) Exponential distribution

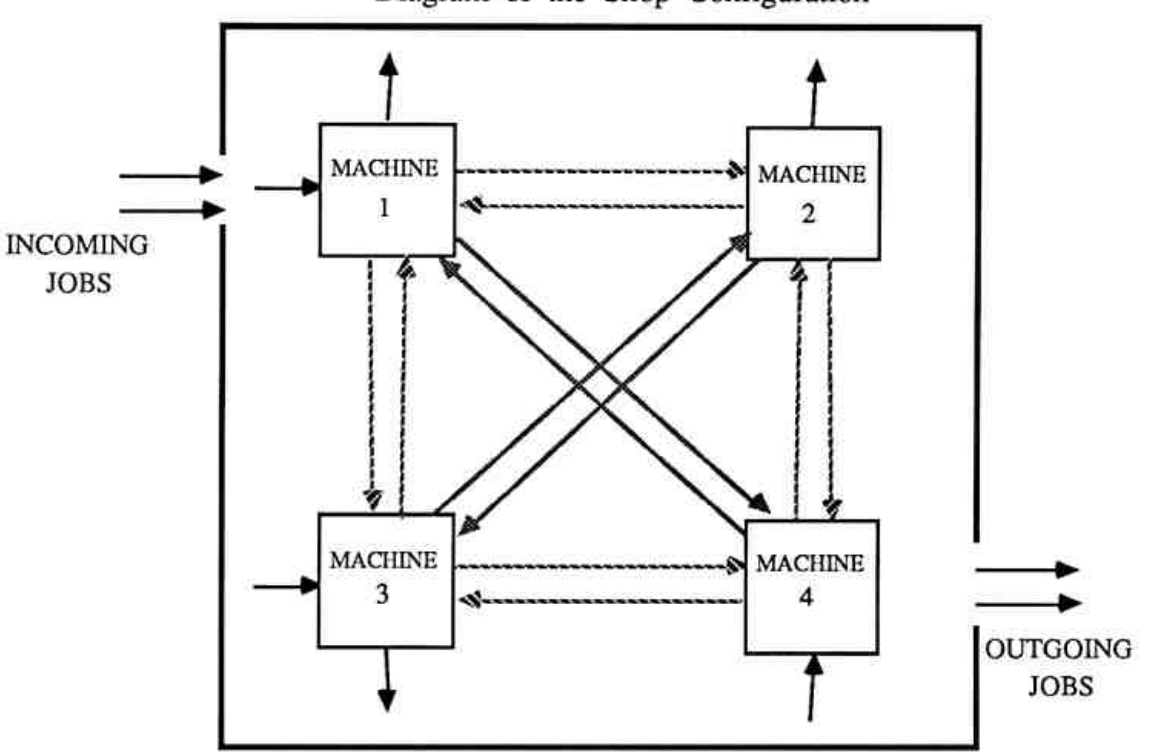
A due date is assigned to each job upon entry to the shop. Due date is defined as the summation on the present time, total work content, and a certain amount of slack selected at random from a uniform distribution.

The basic assumptions governing this research are as follows:

1) No machine may process two operations in succession.
2) Each operation must be performed to completion once started.
3) Each job has its entity, and no lot may be processed by more than one machine at a time.
4) No lap-phasing of operations, i.e. , no successive operations can be performed on the same Work-piece at the same time.
5) The operation time includes the set up time and the transportation time between machines.
6) No alternative routes permitted else than the given routing.
7) Machines are limited to four units and have similarity and can only perform different operations on a job.

Figure (7).

Diagram of the Shop Configuration



When a machine is available, priority of job in the queue awaiting service will be carried out in accordance with the simulation time, i.e. , the one of highest priority will be serviced next.

The flow pattern of jobs is indicated in Figure 2 showing the diagram of shop configuration.

The simulation program was created so that standard priority rules would follow the following manner.

The priority rules were applied in a classical way, where 1000 scheduling periods were simulated using six priority rules. These six priority rules were simulated using three different service time distributions (normal , uniform and exponential) and this for three different shop loadings, i.e. 70%, 77% and 85% . Each of these conditions was then replicated three times so that statistical differences in the shop performance could be measured.

In total, the experiment involved 162 simulation runs (6 rules, 3 service distributions in 3 shop loads and 3 replicales).

Flushed Vs. Unflushed Behaviour:

Job shops must operate continuously in practice and jobs that are excessively delayed become easily identified, and must be dealt with individually. In other words, simulation studies can only be concerned for the behaviour of completed jobs and not those subject to excessive or continuous delays.

Table 16a

Percentage Difference in Unflushed and Flushed Data for Average Tardiness

Shop Load 77 %	EXPONENTIAL			NORMAL			UNIFORM		
	Unflushed	Flushed	% Diff.	Unflushed	Flushed	% Diff.	Unflushed	Flushed	% Diff.
SOT	8.74	9.41	7.7	5.33	5.52	3.6	10.06	10.52	4.6
SLK/RO	24.79	25.99	4.8	6.31	6.39	1.3	13.76	13.82	0.4
WINQ	18.93	19.36	2.3	5.69	5.74	0.9	12.53	12.55	0.2
DDATE	18.34	19.66	7.2	6.51	6.68	2.6	13.06	13.21	1.1
LIFO	21.42	26.03	21.5	7.31	7.75	6.0	15.13	15.85	4.8
FIFO	19.20	19.70	2.5	5.92	6.01	1.5	12.72	12.72	0.0

Shop Load 85 %	EXPONENTIAL			NORMAL			UNIFORM		
	Unflushed	Flushed	% Diff.	Unflushed	Flushed	% Diff.	Unflushed	Flushed	% Diff.
SOT	14.90	21.18	42.1	13.93	14.60	4.8	20.32	27.57	35.7
SLK/RO	44.47	50.06	12.6	15.43	15.52	0.6	29.76	31.35	5.3
WINQ	38.40	43.47	13.2	15.95	16.11	1.0	30.40	31.74	4.4
DDATE	34.55	45.43	31.5	16.18	16.68	3.1	26.9	30.59	13.7
LIFO	32.92	55.08	67.3	17.25	18.99	10.1	24.48	38.88	58.8
FIFO	40.23	42.62	5.6	14.9	15.4	3.2	31.95	32.60	2.0

Table 16b

Percentage Difference in Unflushed and Flushed Data for RMS Tardiness

Shop Load 77 %	EXPONENTIAL			NORMAL			UNIFORM		
	Unflushed	Flushed	% Diff.	Unflushed	Flushed	% Diff.	Unflushed	Flushed	% Diff.
SOT	21.09	22.54	6.9	14.35	14.76	2.9	30.91	32.50	5.1
SLK/RO	34.05	35.31	3.7	10.14	10.20	0.6	21.19	21.6	0.3
WINQ	25.56	25.97	1.6	8.91	8.92	0.1	18.70	18.71	0.1
DDATE	33.93	35.45	4.5	13.41	13.41	1.8	28.58	28.77	0.7
LIFO	45.13	56.86	26.0	19.27	20.02	3.9	42.17	44.42	5.3
FIFO	36.73	37.41	1.8	13.60	13.60	0.0	21.20	21.06	9.2

Shop Load 85 %	EXPONENTIAL			NORMAL			UNIFORM		
	Unflushed	Flushed	% Diff.	Unflushed	Flushed	% Diff.	Unflushed	Flushed	% Diff.
SOT	37.95	57.01	50.2	36.60	38.48	5.1	57.83	79.14	36.0
SLK/RO	58.68	65.10	10.9	20.89	20.93	0.2	39.56	41.25	4.3
WINQ	47.77	53.75	12.5	20.04	20.16	0.6	37.09	38.45	3.7
DDATE	62.62	80.42	28.4	29.86	30.62	2.5	50.75	56.77	11.9
LIFO	70.44	120.99	71.8	45.14	49.05	8.7	61.67	101.87	65.2
FIFO	65.63	71.10	7.7	30.02	30.01	0.0	41.62	42.06	1.0

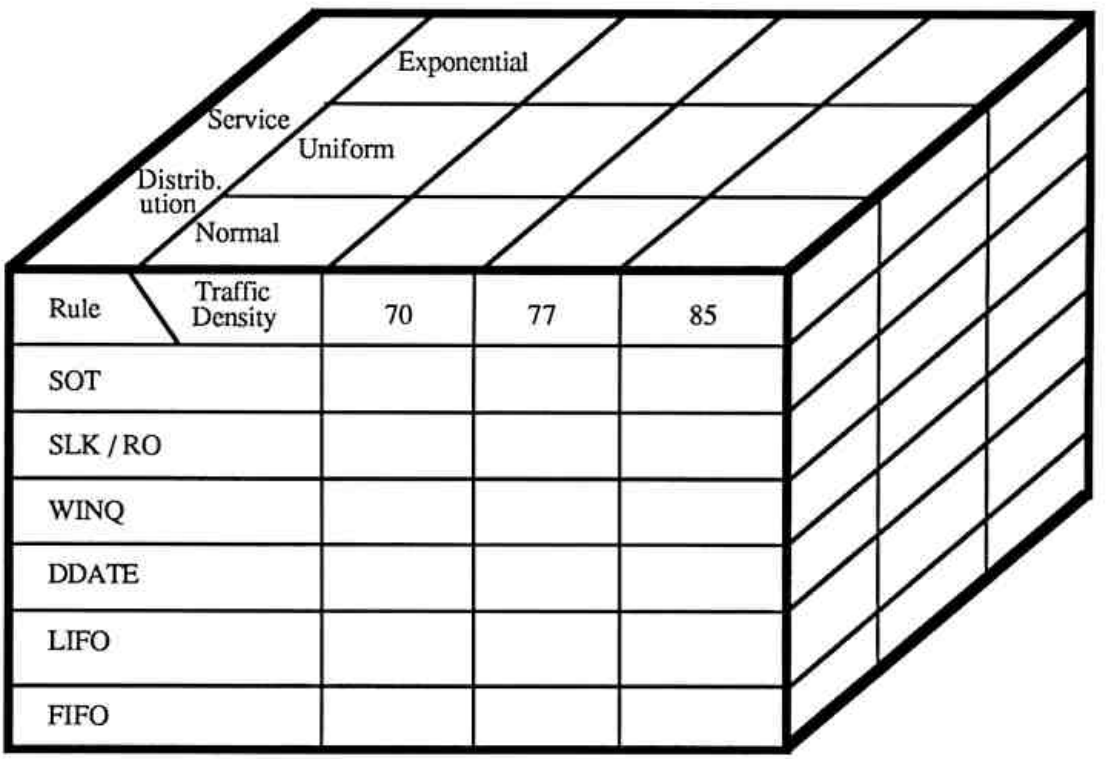
If such a case of excessive delay takes place, the shop may refrain from accepting any new jobs until all existing jobs are completed and "flushed".

The behaviour of not accepting new jobs is called as being "unflushed".

Tables 16 (a) and 16 (b) show the percentage increase between the "Flushed" and "Unflushed" conditions for an Average tardiness and RMS Tardiness respectively. The comparisons are made for shop loads of 77% and 85% and as expected, the effect of "Flushing" becomes much more pronounced with increased shop loads.

Figure (8).

Random Block



Ignoring the LIFO rule, since it gave consistently poor results, we see that SOT and DDATE, in this order, exhibits a greater percentage difference through the flushing operation.

Thus "flushing" or "not flushing" may very well influence the job performance.

This actually occurs in several places in the two tables.

For example; see table 16 (b) "85% Exponential" conditions SOT and WINQ interchange positions in moving from the unflushed to flushed conditions.

The greater shop loads at 77% and 85% again places the SOT rules. This is illustrated in Table 22 which also shows no clear winner for 70% shop load; though SOT probably outforms SLK/RO, which in turn, is not statistically different from DDATE.

Overall ranking for RMS Tardiness performance is given in Table 24.
It is seen that the SOT rule has effectively slipped into 4th place behind WINQ, FIFO and SLK/RO in the order. We also see from Table 25 that the service time plays an important part in these ranking with the SOT being "a lot" favourite for exponential service times, while with uniform and normal service times, SOT drops on the ranking scale to between the 3rd and 5th positions respectively.

Table 17.

SHOP PERFORMENCE FOR UNIFORM SERVICE TIME

17a. - 70% Shop Utilization

Rule	Average Tardiness	Std. Dev.	RMS Tardiness	Std. Dev.
SOT	6.55	2.72	21.99	12.57
SLK / RO	8.55	3.77	14.38	5.32
WINQ	7.46	3.96	12.67	5.57
DDATE	8.06	3.70	19.34	9.11
LIFO	9.69	4.56	30.53	17.64
FIFO	7.36	2.42	16.94	4.95

17b. - 77% Shop Utilization

Rule	Average Tardiness	Std. Dev.	RMS Tardiness	Std. Dev.
SOT	10.52	5.39	32.50	21.57
SLK / RO	13.82	6.30	19.17	9.29
WINQ	12.55	6.36	17.04	9.0
DDATE	13.21	6.85	24.90	15.60
LIFO	15.85	7.77	34.33	28.66
FIFO	12.72	5.20	25.09	10.40

17c. - 85% Shop Utilization

Rule	Average Tardiness	Std. Dev.	RMS Tardiness	Std. Dev.
SOT	27.57	10.65	79.14	36.04
SLK / RO	31.35	12.26	41.25	16.06
WINQ	31.74	14.78	38.45	17.56
DDATE	30.59	12.65	56.77	25.43
LIFO	38.88	18.80	101.87	49.92
FIFO	31.95	10.21	46.32	15.05

Table 18
SHOP PERFORMENCE FOR UNIFORM SERVICE TIME

18a. - 70% Shop Utilization

Rule	Average Tardiness	Std. Dev.	RMS Tardiness	Std. Dev.
SOT	3.19	1.41	8.70	2.93
SLK / RO	3.05	9.90	6.04	1.24
WINQ	2.74	0.98	5.24	1.16
DDATE	3.94	1.20	9.19	2.65
FIFO	3.56	0.76	7.02	2.04

18b. - 77% Shop Utilization

Rule	Average Tardiness	Std. Dev.	RMS Tardiness	Std. Dev.
SOT	5.52	3.67	14.76	4.37
SLK / RO	6.39	1.66	10.20	2.01
WINQ	5.74	1.56	8.92	1.67
DDATE	6.68	1.76	13.71	3.37
LIFO	7.74	1.72	20.02	6.12
FIFO	6.04	1.56	12.62	2.47

18c. - 85% Shop Utilization

Rule	Average Tardiness	Std. Dev.	RMS Tardiness	Std. Dev.
SOT	14.60	3.42	38.48	8.69
SLK / RO	15.52	3.52	20.93	4.30
WINQ	16.11	3.40	20.16	3.82
DDATE	16.68	3.94	30.62	6.72
LIFO	18.99	2.97	49.05	6.36
FIFO	16.75	2.67	22.42	3.79

Table 19
SHOP PERFORMENCE FOR UNIFORM SERVICE TIME

19a. - 70% Shop Utilization

Rule	Average Tardiness	Std. Dev.	RMS Tardiness	Std. Dev.
SOT	6.38	3.04	16.84	8.89
SLK / RO	17.18	6.68	25.70	8.95
WINQ	12.42	6.69	18.55	9.07
DDATE	12.52	5.09	24.56	10.13
LIFO	15.96	5.50	35.90	13.02
FIFO	12.95	4.86	16.06	8.93

19b. - 77% Shop Utilization

Rule	Average Tardiness	Std. Dev.	RMS Tardiness	Std. Dev.
SOT	9.42	3.70	22.54	9.44
SLK / RO	25.99	9.00	35.31	11.04
WINQ	19.39	7.23	25.97	11.17
DDATE	19.66	9.24	35.45	12.48
LIFO	26.03	10.32	56.86	21.54
FIFO	19.70	6.23	37.41	8.02

19c. - 85% Shop Utilization

Rule	Average Tardiness	Std. Dev.	RMS Tardiness	Std. Dev.
SOT	21.18	9.98	57.01	30.42
SLK / RO	50.06	15.82	65.10	18.18
WINQ	43.47	18.64	53.75	20.78
DDATE	45.43	19.19	80.42	32.90
LIFO	55.08	26.21	120.99	58.54
FIFO	42.62	9.87	71.10	16.32

Results

The heuristic scheduling procedures were simulated so that the average job tardiness and the Roots Mean Squared (RMS) Tardiness were calculated in the simulation. The random block design shown in figure 8 was then used for identifying significant performance variations. Tables 17 - 19 contain the means and standard deviations of the average tardiness and RMS tardiness of the simulated job shop.
The analysis was run on an IBM 870/158 system using SAS.
Paired comparisons were also made with every run, and these are given in table 19a and 19b, for the average Tardiness and RMS Tardiness respectively.

Overall ranking for average tardiness performance based on paired comparison tests is given in Table 21. All column enteries are statistically different unless connected by vertical arrows. Priority rules appearing in the same row are not statistically different (95%) from each other, however, an arrow directed downwards from a rule in the same row suggests domination of this rule by others in the same row. An arrow terminating in an empty box in the row below indicates no statistical differences between the two rules at that row level. In table 21, for example, WINQ dominates SLK/RO and possibly dominates DDATE, which, in turn, is no different in its performance, statistically, from SLK/RO.

The SOT rule is the clear winner when "Exponential" and "Uniform" service times are used as shown in Table 22.

With "Normal" service times however, SOT shows no statistical differences from WINQ, FIFO and SLK/RO, though it "appears" to do better than them. DDATE is dominated by WINQ and FIFO but shows no statistical differences from SLK/RO.

The greater shop loads at 77% and 85% again places the SOT rules as " number One ".

The poor Ranking of SOT becomes even more apparent if we separate data for the lighter shop loads (i.e 70%) , since at that level, most priority rules perform well and it is difficult to discriminate between them. Thus, Table 26 which shows the performance ranking for Uniform plus Normal service times at shop loads 77% and 85 % , puts the SOT rules clearly in fourth place .

To complete the picture , Table 27 shows the RMS Tardiness ranking according to the shop load. As expected , exponential service times tend to confound the ranking though the WINQ rule maintains its overall supremacy .

Analysis of the ANOVA also yields the fairly obvious conclusions that performance of both Average and RMS Tardiness are dependant on the service distribution and the shop utilization (loading) .

Concluding Remarks

The choice between the five rules obviously boils down to a selection of one out of two priority rules i.e. between WINQ and SOT . Discussions with the production managers have led to the consistent view that it is preferred that many orders be a little late rather than a few orders being very late; the very factor that clearly distinguishes between Average and RMS Tardiness .

Table 20 a

Average Tardiness Paired Comparisons

		SLK / RO			DDATE			WINQ			LIFO			FIFO		
		E	N	U	E	N	U	E	N	U	E	N	U	E	N	U
SOT	70 %	3 / 0	2 / 1	2 / 1	3 / 0	3 / 0	3 / 0	3 / 0	0 / 3	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	2 / 1	3 / 0
	77 %	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	2 / 1	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	2 / 1	3 / 0
	85 %	3 /0	2 / 1	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	2 / 1
SLK / RO	70 %	0 / 3	3 / 0	1 / 2	0 / 3	0 / 3	0 / 3	1 / 2	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	0 / 3	0 / 3	1 / 2
	77 %	0 / 3	2 / 1	0 / 3	0 / 3	0 / 3	0 / 3	1 / 2	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	0 / 3	1 / 2	0 / 3
	85 %	1 / 2	2 / 1	1 / 2	0 / 3	3 / 0	1 / 2	2 / 1	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	0 / 3	1 / 2	1 / 2
DDATE	70 %	2 / 1	0 / 3	0 / 3	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	1 / 2	1 / 2	0 / 3
	77 %	1 / 2	0 / 3	1 / 2	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	1 / 2	0 / 3	1 / 2
	85 %	2 / 1	1 / 2	2 / 1	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	1 / 2	1 / 2	1 / 2
WINQ	70 %	3 / 0	3 / 0	3 / 0	1 / 2	2 / 1	0 / 3	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	1 / 2	2 / 1	0 / 3
	77 %	3 / 0	3 / 0	3 / 0	2 / 1	2 / 1	1 / 2	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	2 / 1	2 / 1	1 / 2
	85 %	3 / 0	3 / 0	3 / 0	1 / 2	2 / 1	1 / 2	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	1 / 2	2 / 1	1 / 2
LIFO	70 %	0 / 3	0 / 3	1 / 2	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	1 / 2	2 / 1	0 / 3
	77 %	0 / 3	0 / 3	0 / 3	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	2 / 1	2 / 1	1 / 2
	85 %	0 / 3	0 / 3	0 / 3	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	1 / 2	2 / 1	1 / 2

Key :

SLK/RO \ DDATE	E	N	U
70 %			
77 %			
85 %	1 / 2		

Table 20 b

RMS Tardiness Paired Comparisons

		SLK / RO			DDATE			WINQ			LIFO			FIFO		
		E	N	U	E	N	U	E	N	U	E	N	U	E	N	U
SOT	70 %	3 / 0	0 / 3	1 / 2	3 / 0	3 / 0	1 / 2	3 / 0	0 / 3	0 / 3	3 / 0	3 / 0	3 / 0	3 / 0	2 / 1	2 / 1
	77 %	3 / 0	0 / 3	1 / 2	3 / 0	0 / 2	1 / 2	3 / 0	0 / 3	0 / 3	3 / 0	3 / 0	3 / 0	3 / 0	1 / 2	2 / 1
	85 %	2 / 1	0 / 3	0 / 3	3 / 0	0 / 3	0 / 3	1 / 2	0 / 3	0 / 3	3 / 0	3 / 0	3 / 0	3 / 0	2 / 1	1 / 2
SLK / RO	70 %	1 / 2	3 / 0	3 / 0	0 / 3	0 / 3	0 / 3	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	1 / 2	2 / 1	1 / 2
	77 %	2 / 1	3 / 0	3 / 0	0 / 3	0 / 3	0 / 3	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	1 / 2	1 / 2	1 / 2
	85 %	2 / 1	3 / 0	3 / 0	0 / 3	1 / 2	0 / 3	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	0 / 3	1 / 2	1 / 2
DDATE	70 %	0 / 3	0 / 3	0 / 3	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	0 / 3	1 / 2	0 / 3
	77 %	0 / 3	0 / 3	0 / 3	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	0 / 3	1 / 2	1 / 2
	85 %	0 / 3	0 / 3	0 / 3	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	1 / 2	0 / 3	0 / 3
WINQ	70 %	3 / 0	3 / 0	3 / 0	1 / 2	2 / 1	1 / 2	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	1 / 2	2 / 1	1 / 2
	77 %	3 / 0	3 / 0	3 / 0	1 / 2	2 / 1	1 / 2	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	1 / 2	2 / 1	2 / 1
	85 %	3 / 0	3 / 0	3 / 0	2 / 1	1 / 2	1 / 2	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	2 / 1	1 / 2	1 / 2
LIFO	70 %	1 / 2	0 / 3	0 / 3	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	1 / 2	0 / 3	0 / 3
	77 %	0 / 3	0 / 3	0 / 3	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	0 / 3	0 / 3	0 / 3
	85 %	0 / 3	0 / 3	0 / 3	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	3 / 0	0 / 3	0 / 3	0 / 3

Table 21

Average Tardiness Overall Ranking

Rank	Priority Rule		
1.	SOT		
2.	WINQ	FIFO	DDATE
3.	SLK / RO		
4.	LIFO		

Table 22

Average Tardiness - Ranking by Service Distribution

Exponential		Normal			Uniform		
1. SOT	1. SOT	WINQ	FIFO	SLK/RO	1. SOT		
2. WINQ FIFO DDATE	2. DDATE				2. WINQ	FIFO	DDATE
3. SLK / RO	3. LIFO				3. SLK / RO		
4. LIFO					4. LIFO		

Table 23

Average Tardiness - Ranking by Shop Load

Shop Load		
70 %	77 %	85 %
1. SOT WINQ FIFO SLK/RO	1. SOT	1. SOT
2. DDATE	2. WINQ FIFO DDATE	2. WINQ FIFO SLK/RO DDATE
3. LIFO	3. SLK / RO	3. LIFO
	4. LIFO	

Table 24

RMS Tardiness Overall Ranking

Rank	Priority Rule		
1.	SOT		
2.	WINQ	FIFO	DDATE
3.	SLK / RO		
4.	LIFO		

Table 25

RMS Tardiness Performation Ranking

Service Time Distributions					
Exponential	Normal		Uniform		
1. SOT WINQ FIFO	1. WINQ		1. WINQ		
2. SLK/RO DDATE	2. SLK/RO	FIFO	2. SLK/RO	FIFO	[SOT]
3. LIFO	3. DDATE	[SOT]	3. DDATE		[ ]
	4. LIFO	▼	4. LIFO		

Table 26

RMS Tardiness Ranking - Normal and Uniform Service Times for Shop Loads of 77 % and 85 %

Rank	Priority Rule
1.	WINQ
2.	SLK/RO FIFO
3.	DDATE
4.	SOT
5.	LIFO

Table 27

Shop Load								
70 %			77 %			85 %		
1. WINQ	[SOT]		1.WINQ		[SOT]	1. WINQ		
2. SLK/RO FIFO	[ ]	DDATE	2. SLK/RO	[FIFO]	[ ]	2. SLK/RO FIFO	[SOT]	
3. LIFO			3. DDATE	[ ]	[ ]	3. DDATE		[ ]
			4. LIFO			4. LIFO		

Thus, while the SOT rule is the indisputed leader of Average Tardiness, it would appear that industry would favour the WINQ rule for its ability to keep down extensive delays in job completion dates, no matter what shapes the various shop process service distribution has.

While the WINQ rule is proposed as the one to give good results in job shop, additional research may be needed to show it would perform against other priority rules that are designated to reduce extensive job tardiness, such as the COVERT rule and Turnexated SOT rules.

On the other hand, the actual choice to be taken among the performance criteria has always proven being the most realistic ones. In many cases, priority is given to the rules that are most easy to handle, operate and verify.

A good example for this relates to the case study of our BAVARIA/ EGYPT Factory, referred to formerly, which has made good advantages of the fact that its production comprises mainly of systematic standard types of fire extinguishers, in different sizes, however having inter-changeable components. This fact led to the development of a simple rule for scheduling, successfully applied for years, which is mainly governed by direct linking to the components stock inventory, i.e. , minimum stock inventory system.

According to the pattern applied, once an item comes under a minimum stock inventory level, it acquires a first priority for getting serviced. In the meantime, this is done on a rather flexible manufacturing policy, allowing the production manager a completely free hand, to decide the size of job, in view of the loading of the machines and his obligations at that time.

In other words, the priority of the job is automatically decided; sequence-wise, but the size of the job is decided by the production manager who will determine whether the job size will bring the stock inventory back, just above the minimum inventory level, or exceeding it to several months' sufficiency ahead.

This rule was applied to the contentment of the production managers for years, probably due to its simplicity, easy handling and flexible nature. We cannot of course, overlook its cost which actually is the size of inventory, which apparently is higher in the case study than in following other methods.

A comparison between the time cost and inventory cost in applying different methods, compared to the method applied in the case study, cannot eventually be determined, not being a part of this study.

A LOOK INTO THE FUTURE :

The term "Future" is usually put in use in connection with better times to come, or at least the exploration for the possibilities of advancement and progressive development.[1]

For an industrial enterprise as that of our case study, advancement and progressive development could have only one interpretation which is efficiency.

Efficiency in its big sense should necessarily sustain an optimum balanced form comprising efficiency in productivity measures, financial measures and quality measures as well.

Apparently, the task seeked would have its cost and time span, which has been started two years ago, and is expected to take two more years to be completed, and owing to which several professional consultations were sought.

US Executive Volunteer Consultation:

For the task of Industrial Engineering Optimization, the support of I.E.S.C.[2] was approached at this stage of Industrial planning.

---

*1) Webster's Seventh New Collegiate Dictionary,1971, G&C Merriam Co., P. 340.

*2) I.E.S.C. is a non-profit supplement to USAID Organization aim of which is to supply developing countries with retired expertise for a limited period on a cost sharing basis. (IESC) stands for International Executive Service Corporation.

I . E . S . C . assigned one of their executive volunteers[1] , to spend 8 weeks to furnish his report, which approved 70% of the steps and acts proposed and submitted further recommendations.[2]

A briefing of the acts and steps to be taken, giving the case study its new features in a two-year schedule, could be outlined as follows:

1) New Organizational Structure with Logistical Related Functions:

This structure will not only give an added value binding financial management, production and marketing, at a much higher logistical level, but it will also be able to spare a number of jobs to be utilized elsewhere.
This structure has various academic back-ups[3] .

2) Analytic Techniques Computerization:

The system proposed consists of center-of-gravity techniques and a variety of linear programming that would be adapted to logistical system design problems.It will also care for an optimization of production orders , scheduling of the delivery of orders to customers among the sub - stores spread among 9 branches .

*1) Eng. Neyhart, Eugene, Ex. Production Manager of Akron Brass Co. , Wooster, Ohio, USA, where he had retired and started his mission on our case-study in March 24th until May 23rd 1987.
*2) Eng. Neyhart, Eugene, unpublished private report submitted on the case-study, on May 11th 1987.
*3) Bernard J. La Londe and James F. Robenson, Profile of the Physical Distribution Executive (Columbus, Ohio: The Ohio University) P . 1. Also Fisch, Gerhard G. , "Line-Staff is Obsolete" Harvard Business Review, Vol.39, No. 5, Sept./Oct. 1961 pp. 67-86.

The following flowchart illustrates a two production plant/nine-distribution branches with warehouses. Geographically oriented, three main branches, i.e. ,x, y and z will sponcer further six branches, i.e. ,
$x_1 + z_2$, $y_1 + y_2$ and $z_1 + z_2$.

Each of the production plants ship to all three distribution branches with supplementary possibility to ship to the other six distribution branches. All nine distribution branches have communication capacity with each other and with the central control.

Distribution branches can interbranch-transfer when the situation is warranted. When conditions justify, shipments can be made directly from production plants to customers. Customer orders are routed directly to distribution branches for shipment, if possible, and inventory control location, which is linked to distribution branches by data transmission.

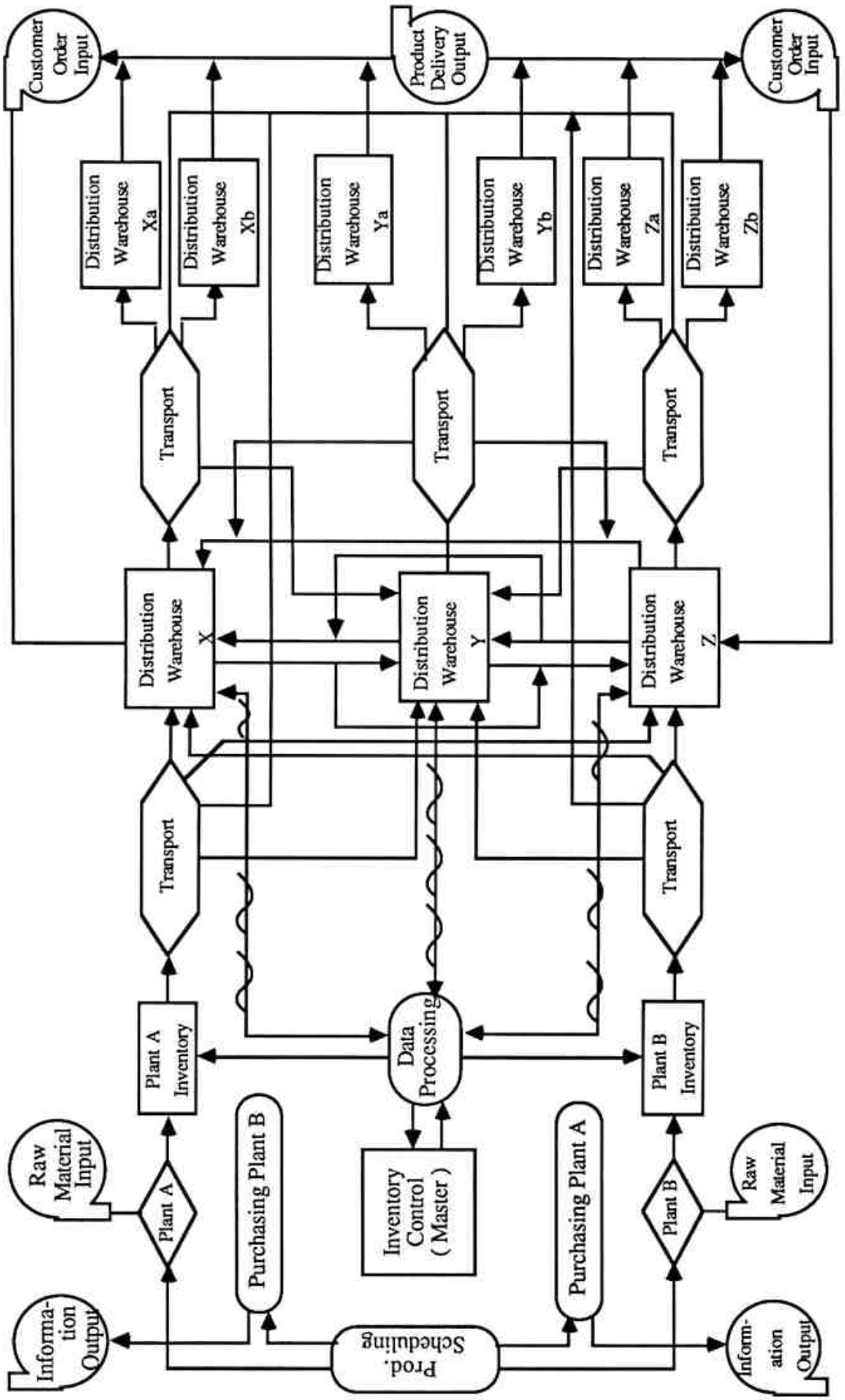
The flowchart displays the complete structure of a physical distribution system, the normal procedure would be development of diagrams for each sub-system .

The unique feature of an analytical technique is the capability to isolate a precise mathematical solution to the problem under analysis. The solution will be then a mere mathematical optimum. The main disadvantage would be the requirement that all relations be fully identified and quantified.[1]

*1) Bowersox, Donald J. , Logistical Management, Collier, Macmillan, 1978, p . 341

Figure (9).

Flowchart Illustration for Two Production Plants and Nine Distribution Branches :



3) New Modern Factory and Office Premises:

The factory and office premises that has been worked on for two years already, was realized to be a most adequate decision, mostly essential for stepping into higher efficiency stage.

This premises will afford more than 6000m^2 production and office area compared to 2600m^2 in the present case.

The production should be liable of 280% increase at only 20% more working posts.

The major advantages, this new building would make available, could be briefed as follows:

a) Automation and more Conveying Belt Concept Application:

The stream-line concept which is a pre-requisite for conveying belt applications will be available according to the architectural design of this building. The technical added value reflected on productivity has actually all support academically.[1]

b) Better area Utilization Serving for Higher Productivity and Lower Cost:

The design of the production area will help in an integration and better flow of production and in the same time keeping physical interdepartmental disintegration among the various divisions.

*1) Herzog Donald R. , Industrial Engineering Methods and Controls, Reston Publishing Co. Ins . , 1985, pp221-223.

c) Better Working Conditions:

The availability of individual service facility adjacent to each production area, such as recreation rooms, sanitary facility and wash rooms, will surely afford better working conditions. At the same time, wasted time for using such facilities will be diminished due to nearness of facility. It has been said that only neat workers can bring neat production.[1]

d) Management and Administration Joining Production Plant will save Doubled Expenses and lead to Better Control:

It is apparent that a good deal of doubled posts filled by telephone operators, telex operators, bell-boys, guards, mailing personnel and drivers, can be spared if management and administration were moved to the production plant premises. Not of less importance is the transport costs of persons and information transfer that can then be saved.

The added value due to a better control would be remarkable in addition to better functioning of certain activities such as accounting, cost accounting, scheduling priorities and goods transport economy.

PART TWO

IMPLEMENTATION OF NEW MARKETING APPROACHES

PART TWO

IMPLEMENTATION OF NEW MARKETING APPROACHES

I) INTRODUCTION

This part will deal with the marketing of a specific, product which is FIRE EXTINGUISHERS in Egypt. A rather complicated subject due to both the nature of the market and the nature of the product itself. The approach for a market study should usually start with determining the market's profile, exploring its various parameters such as market size, growth dynamics, product technicalities and impact magnitude, competition . . . . . etc.

In order to do this properly many questions will have to be answered first regarding the product , the customer and the market nature:

i) A Question of Product

From the point of view of the Egyptian market, would a FIRE EXTINGUISHER be considered as an engineering technical product, that may then follow the technical marketing rules and regulation ? Or regarded as a simple protection device that should conform with health and safety measurements ? Is it a strategic or non-strategic article, and to which extent ?

The features of the product and the marketing strategy would together put the rules of the game.

Apparently this engineering product signifies itself as an industrial commodity that differs tremendously from consumer products .

This fact finds managerial sciences support. [1]

ii) A Question of Customer

The major differences between industrial and consumer marketing occur because of differences in the buyers in the two markets. The following illustrate some of these differences: (1) the industrial market is normally characterized by more technically qualified and professional buyers; (2) their buying motives are usually more rational than those found in the consumer market --their buying decisions are often made on the basis of such factors as specifications, vendor analysis, and cost effectiveness as opposed to emotional or impulse purchasing; motives; (3) multiple buying influences are involved in almost all industrial purchases; this means that decisions to buy are not made by one person, but rather by those individuals within a purchasing company who will have use for the product being bought either in a direct or an indirect manner; (4) committee buying often found in the industrial market where a committee in various positions in the purchasing firm have the responsibility of making the buying decision and choosing the vendor; (5) there are very few women buyers in the industrial market in contrast to the large amount of purchasing by women in the consumer market;(6) industrial purchasing people often

*1) Haas, W. Robert, Industrial Marketing Management, Kent Publishing Co., 1982 p. 26

will select two or more suppliers from which to buy the same product just to protect themselves against the possibility of a single supplier not being able to supply required amounts; (7) the industrial market is characterized by situations of reciprocity whereby buyers buy only from their own customers when the opportunity presents itself-two companies are both buyer and seller to each other; and (8) buyer expectations of future price changes often bring about situations of reverse elasticity of demand in short-run instances. What this means is that buyers buy more goods when suppliers increase price because they expect still further price increases, and they hope to protect themselves against these anticipated changes.

iii) A Question of Market

Market studies in a developing country like Egypt, made on a certain product, should not do without paying sufficient consideration to more strategic commodities and their deficits. Apparantly this will be liable to a considerable and drastic influence on the marketing impact of other strategically inferior commodeties.

If we take, an example for this, of a severe shortage of two commodities such as bread and motor car tyres, whereby the first signifies a more strategic article and the latter a less strategic one.

The only image one could figure out would be that the "queue" waiting for bread will consist of those seeking bread only and these seeking bread and tyres. Apparently the "queue" for tyres will not exist at all, or at least will start to develop after everybody gets his needs of bread.

This explains the reason for the considerable effort paid in introducing the strategic commodities gaps as a major part of the Market Profile.

II) MARKET PROFILE

A) Food Gap:

For years, it became one of the major objectives for the government to limit the expansion of the food gap which has increased from 2.298 - Million Pounds worth in 1981/182 to 4,144,-Million Pounds in 1985/86 to reach an estimation of 6,012.- Million pounds in 1987/88.
If the production and consumption of the seventies continues in the future, the Egyptian imports of food will amount to USD 16 Billion over the next five years.
Due to this serious situation, the food problem became the major national issue, requiring the mobilization of all resources.

Limiting: the food gap will require the following:

- Increase of agricultural productions at relatively high rate
- Rationalization of food consumption .
- Lowering post - harvest losses.
- Export expansion.

It is also planned for that food exports, mainly horticultural crops, increase to USD 994 Million in 1986/87.
It must be mentioned that most of the increase in production over the next five years will come through vertical expansion in the old land. It is hoped for, that further increases in production, in the long run will be achieved through the new lands and joined project with Sudan.

Source : National Planning Institute

Egyptian food diet compared to balanced food diet ratios [1]

Table 28.

Food Components	Balanced Food Diet	Egyptian Food Diet In 1984
GRAIN	150	268.6
ROOTS	50	18.9
OIL AND FATS	30 - 50	3.8
FISH	20 - 10	5.9
MEAT	22	12.8
SUGAR	27	26.8
VEGETABLES	80	105.9
MILK AND DAIRY PRODUCTS	80 - 70	50.2
LEGUMES	10 - 7	7.8
FRUIT	80 - 70	61.5
EGGS	8 - 5	2.4

Oil seeds production and edible oil processing

Egyptian local production of edible oil have been consistently decreasing over the past decade and created an import bill of average 150 million USD / year . As such, edible oil extraction mills as well as oil seeds production have a guaranteed vast market with a present gap expected to double by the year 2000 based on present production (see enclosed table). In addition to traditionnal oil seeds, crops such as sesame and peanuts, Egypt is successfully developing high yield new crops, such as sunflower and soja .

---

*1) **Source:** Nasser Military Academy 1987 .

Edible oil supply, demand and gap (based on import value of edible oil) [1]

Table 29.

Year	Population Per million	Consumption Rate GM / Day / Person	Consumption Rate in 000 Tons	Total Prod in 000 Tons	GAP in 000 Tons
1985	48	32	651	120	441
1990	55	36	723	150	573
1995	64	40	934	150	784
2000	73	45	1199	150	1049

Fish farming and fisheries activities

With 13.27 million feddans of available water facilities for fishing development, (sea, lakes, Nile) Egypt is still importing low priced frozen fish up to 100.000 tons in 85/86.
The government acknowledged this paradox as well as the comparative higher efficiency of fish in terms of protein and compared to meat production, and actively supports private sector in this field.

Among the main project opportunities are:
- fresh water fish farming.
- sea water fish farming in natural or artificial lagoons.
- fish feed mills.

The fish development areas and their respective potential are featured in the following table:

---

*1) **Source :** National Planning Institute .

Fish production sources [1]

Table 30.

Production Sources	Estimated Production in 1987 per Ton	Targeted Production for 1992 per Ton	Estimated Consumption till year 2000 per Ton
MEDITERRANEAN SEA	23 000	25 000	
RED SEA	22 000	35 000	8000
EL MANZALA LAKE	60 000	75000	
EL BOROLOS LAKE	15 000	17 000	
EDKO LAKE	7 200	9 000	120 000
MARIOUT LAKE	7 500	9 000	
KAROUN LAKE (FAYOUM)	2 000	2 500	2 500
WADY EL RAYAN LAKE	500	2 000	2 000
NASSER LAKE (ASWAN)	28 000	35 000	
EL BARDWIL LAKE	3 500	4 500	10 000
WEST DELTA	500	1 000	
DEPRESSIONS	600	1 000	
PORT FOUAD SALINES	25 000	38 000	50 000
NILE RIVER AND BRANCHES		35 000	60 000
COASTAL BREEDING AREAS		35 000	60 000
TOTAL	264 800	375 000	
ESTIMATED CONSUMPTION BY FISHERMEN	26 400	37 500	
GRAND TOTAL	**291 200**	**412 500**	

*1) **Sources :** Fish Wealth Authority and Ministry of Planning.

Meat Production

The enclosed 2 tables clearly highlight consistently increasing gap between supply and demand in Egypt over the past 5 years for each of the 3 main animal protein sources, meat, fish and poultry, and its expected increase over the coming decade.

Opportunities and economics of red and white meat production are well known.

A new and rapidly growing activity to Egypt is rabbit farming which offers high conversion rates, and rapid growth and feasibility for both small and large scale projects. Among the areas proposed are: rabbit farms, rabbit slaughter houses, meat and by-products processing.

Animal protein supply, demand and gap, In thousand tons from 1981/82 to 86/87 [1].

Table 31.

Year	Indicator	Meat	Poultry	Fish	Total
81/82	SUPPLY	362	175	155	692
	DEMAND	526	200	255	981
	GAP	(164)	(25)	(100)	(289)
82/83	SUPPLY	366	179	164	709
	DEMAND	548	208	275	1031
	GAP	(182)	(29)	(111)	(322)
83/84	SUPPLY	371	183	173	727
	DEMAND	569	216	296	1081
	GAP	(198)	(33)	(123)	(254)
84/85	SUPPLY	375	187	183	745
	DEMAND	588	224	319	1131
	GAP	(213)	(37)	(136)	(386)
85/86	SUPPLY	380	191	194	765
	DEMAND	609	232	344	1185
	GAP	(229)	(41)	(150)	(420)
86/87	SUPPLY	384	195	205	784
	DEMAND	628	241	371	1240
	GAP	(244)	(46)	(166)	(456)
AVERAGE GAP INCREASE	6	16	4	13	33

*1) Source : Ministry of Supply

Future forecast in Animal protein till 2000

The following table illustrates the serious gap forecast expected over the period 1988-2000, based on gap evolution during the past 5 years (1981/82 to 1986/87).

Animal protein production gap forecast over the period 1988 - 2000

Table 32.

Year	Meat	Poultry	Fish	Total
1988	1600	50	179	489
1989	276	54	192	522
1990	292	58	205	555
1991	308	62	218	588
1992	324	66	231	621
1993	340	70	244	654
1994	356	74	257	687
1885	372	78	270	720
1996	388	82	283	753
1997	404	86	296	786
1998	420	90	309	819
1999	436	94	322	852
2000	452	98	335	885

Source : Agricultural Investment office 1987 .

B) Development Industrial Commodities 1981/82 till 1985/86

Another good parameter of a market's potentiality and impact would be the industrial commodity supply demand and the relevant gaps.
This table illustrates the industrial products over the period of 5 years.

Quantitative Changes in Production of Main industrial products During 1981/82-1985/86 [1]. Table 33.

Product (unit) (THT =Thousand Tons)	81/82 Actual	82/83 Actual	83/84 Actual	84/85 Preliminar	85/86 Expected
Phosphate Fertilizers(ThT)	511	586	855	1001	1001
Caustic Soda (ThT)	45	47	51	48	51
Phosphate (ThT)	691	746	949	748	768
Sugar Cane (ThT)	676	697	657	748	750
Sugar Beet (ThT)	17	22	60	60	80
White Cheese (ThT)	161	173	182	181	190
Animal & Chicken Feed (ThT)	1611	1775	1867	2877	3010
Reinforced iron bars (ThT)	355	338	333	301	400
Soda Water (Mil. Bottles)	2194	2460	2811	3763	4046
Cigarettes (Billion)	36	40	44	48	51
Tires (000)	661	727	773	845	870
Passenger Cars (No.)	16273	23563	19033	19430	22150
Buses (No.)	705	783	762	754	1150
Trucks (No.)	2454	2759	3198	2950	4100
Washing Machines, Elect.(000)	312	339	356	318	355
Refrigerators, Electric. (000)	326	423	500	564	576
Electric Lamps (Million)	46	47	58	73	80
Cotton Weaving (ThT)	236	234	243	265	307
Wool Weaving (ThT)	10	13	16	17	20
Silk Weaving (ThT)	16	24	24	25	32
Blankets (Million Pcs.)	3	4	4	5	6
Ready Made Clothes	45	48	52	54	63
Cement (ThT)	3629	3793	4597	5231	7735
Glass, Flat (Tons)	21496	24784	21400	20971	26000
Bricks (Million Tons)	78	78	82	103	130
Bricks, Light (Million Tons)	100	110	135	163	200
Lime (ThT)	91	89	73	74	80
Bricks, Clay (ThT)	29	25	22	35	130
Asbestos Pipes Products (Tons)	57278	68987	80379	82826	85000
Pipes & Products Reinforced(Tons)	28926	30509	28113	28113	30274
Clay Products (Tons)	11117	11177	13124	14106	17112
Asbestos Sheets (Tons)	5558	35809	31034	34000	35200
Butagas hot water heaters (No.)	20006	24151	38692	36548	50000
Water Meters (000)	1119	133	147	274	300
Electric Meters (000)	381	384	285	480	500

Source : U.S. Embassy, 12/1986.

c) Major Industrial Gaps:

The major industrial gaps are illustrated in the following tables, basic source of information for which were acquired through a private communication.

i- Food Industries

Table 34.

Goods	Demand	Supply	Gap	Gap/ Demand %
1. Sugar	1590	1070	520	32.7
2. Edible Oil	650	300	350	53.5
3. Margarine	286	150	146	47.5
4. Fodder	4100	2350	1750	42.7
5. Tomato Paste	43	24	19	44.2
6. Frozen and Canned Vegetables & Beans	68	39	29	42.6
7. Juice, Syrup and Jam	140	97	43	30.0
8. Canned Fish	17	15	2	11.8
9. Pasteurized Milk	422	294	128	30.3
10. Cheese & Dairy products.	749	222	527	70.3
11. Glucose	64	58	6	9.3

ii - Electrical and Electronic Industries :

Table 35.

Goods	Unit	Demand	Supply	Gap	Gap/ Demabd %
Air Conditioning Sets.	(in 1000)	144.3	114.3	30	20.8
Incandescent lamps	Million	100	96	4	4
Dry Batteries	"	342	303	39	11.4
Fluorescent Lamps	"	19.6	4.1	15.4	78.6
T.V.Sets	(in 1000)	1284	1200	84	6.5

Source : U.S. Embassy Report 12/1986

iii) Textile Industries :

Table 36.

Goods	Unit	Demand	Supply	Gap	Gap/ Demand %
1. Cotton &Cotton blended spining	(1000 T.)	355	323	32	9.0
2. Wool Spinning for Fabrics	"	20.4	18.8	1.6	7.8
3. Linen Spinning	"	2.2	0.47	1.73	78.6
4. Jute Spinning	"	38	33.1	4.9	12.8
5. Continuous Nylon Filament	"	6.2	1.03	5.17	83.3
6. Rayon Fibres	"	5	4	1	20
7. Nylon Fibres	"	1	0.71	0.29	29
8. Wool Tops & Fibres	"	6.8	5.8	1.0	14.7
9. Hydrophilic Cotton	"	4.4	4.2	0.2	4.5
10. Terry Fabrics	"	3.84	2.90	0.94	24.4
11. Linen Fabrics	"	3.28	2.67	0.61	18.5
12. Jute Sacs	"	52.6	28.8	23.8	45.2
13. Sewing threads	"	4.20	3.94	0.26	6.1
14. Wool & Wool Blended Fabrics	(Million M.)	17.35	16.61	0.74	4.2
15. Upholstery & Velvet Fabrics	"	27.1	22.7	4.4	16.2
16. Knitted Fabrics	"	107.7	85.2	22.5	20.8
17. Raschel Curtains	"	2	1.6	0.4	20
18. Embroidery Fabrics	"	16.7	15.2	1.5	8.9
19. Dyeing & Finishing	"	1256.0	1130.0	126.0	10.0
20. Bed Covers	(1000 U.)	522.0	441.0	81.0	15.5
21. Ready made Garments	"	74900.0	39700.0	35200.0	46.9
22. Polyester Fibres	(1000 T.)	62	26	36	58
23. Knitted outwear	(1000 U.)	56587.0	49691.0	6896.0	12.2
24. Knitted underwear	(1000 Do.)	17519.0	14338.0	3181.0	18.2
25. Socks	"	4141.0	2981.0	1160.0	28

Source : U.S. Embassy Report 12/1986

iv) Building Materials and Refractories Industries :

Table 37.

Goods	Unit	Demand	Supply	Gap	Gap/ Demand %
1. Silica Refractories	(1000 T.)	1162	—	1162	100
2. Insulating Refractories	"	1918	—	1918	100
3. Special Refractories	"	7443	—	7443	100
4. Magnesium Refractories	"	40258	15000	25258	62.7
5. Clay Refractories	"	200400	168750	31650	15.7
6. Profleb Refractories	"	35291	—	35291	100
7. Mirrors Refractories	(1000 M^3)	648	600	48	7.4
8. Table Ware Glass	(1000 T.)	58.3	51.8	6.5	11.1
9. Safety Glass	(1000 M^2)	1338	1045	293	21.8
10. Glass Ampoules	(Million)	890	360	530	59.5

v) Engineering Industries :

Table 38.

Goods	Unit	Demand	Supply	Gap	Gap/ Demand %
1. Trailors & Semi Trailors .	(1000 U.)	5.4	3.8	1.6	29.6
2. Heavy Buses	"	731	600	131.0	17.9
3. Buses	"	5.5	4.5	1.0	18.7
4. Heavy Trucks	"	2.8	2.5	0.3	10.9
5. Light Trucks	"	42.7	16.6	26.1	61.1
6. Cars	"	110.6	40.0	70.6	63.8
7. Steam Boilers	"	564.0	152.0	412.0	73.8
8. Wood & Steel Nails	Tons	8252.0	2290.0	5962.0	72.2
9. Automatic Washing Machine	(1000 U.)	575.4	50.0	525.4	91.3
10. Deep Freezer	"	426.7	224.0	202.7	47.4
11. Stainless Steel Basins	"	914.1	634.3	279.8	30.6
12. Washing Machines	"	646.5	290.0	356.5	55.1
13. Semi Automatic Washing Machines	"	150.0	29.6	120.4	80.2
14. Baby Washing Machines	"	161.6	60.6	101.6	62.8
15. Cans	(1000 T.)	23.8	16.4	7.4	31.0
16. Metallic Caps	144 million	25.3	23.24	2.06	8.1
17. Hinges	(1000 Do)	7123.3	5656.8	1466.5	20.5
18. Locks	(1000 u.)	5332	4605.5	726.5	13.6
19. Medium Tension Electric Cables	Tons	87120	45970	41150	47.2
20. Wood Doors, windows and Furniture	cubic meters	705600	562086	143514	20.3

vi) Metallurgical Industries :

Table 39.

Goods	Demand	Supply	Gap	Gap/Demand %
Rods & Wires:				
• Reinforces Concrete				
<13 m. m.	1328	1107	221	16.6
>13 m. m.	1180	632	548	46.4
Sections:				
• Light & Medium	369	233	136	36.8
• Heavy	146	130	16	10.9
Flats:				
• Hot Strips	474	300	174	36.7
• Cold Strips	406	205	201	49.5
• Tin Plate	196	—	196	100
• Seamless Pipes	160	—	160	100

vii)Chemical Industries :

Table 40.

Goods	Demand	Supply	Gap	Gap/Demand %
1 . Nitrogen Fertilizers	5640	4662	978	1703
2 . Phosphate Fertilizers	1355	1170	180	13.2
3 . P.V.C. Granulles	130	80	50	38.4
4 . Plastic Sacs for Packing	34.5	33.7	0.8	2.3
5 . Soda Ash	129.9	106	23.9	18.4
6 . Aluminum Sulphate	82	75	7	8.5
7 . Sodium Hydroxide	182.4	166.6	15.8	8.6
8 . Corrugated Carton	134	109	25	18.6
9 . Carton	197	72	125	63.4
10. Duplex Carton	81	33	48	59.2
11. Wrapping Papers	202	54	148	73.2
12. Writing & Printing Paper	228	88	140	61.4
13. Paints	84.7	55	29.7	35.0
14. Tyres for Trucks (1000 / Tyres)	1463	600	863	28.9
15. Tyres for Passenger Cars (1000/Tyres)	2445	2020	425	17.3
16. Plastic Sacs	150	140	10	6.6
17. Synthetic Leather ($M./M^2$)	8	—	8	100
18. Plastic Zipper for Garments And Leather Products (M/meters)	23	16	7	30.4
19. Sprinkle & Dripping Irrigation Pipes and Accessories.	9000	4650	4350	48.3

Source : U.S. Embassy Report 12/1986

D) General view of Market Deficits

following table gives general view of the market situation over the period 1987 till 1984/85.

Gross Domestic Product at Current Prices L.E million

Table 41.

	1978	1979	1980/81	1981/82	1982/83	1983/84	1984/85
Commodity Sectors:	4869	6867	9571	10516	11905	13897	16344
Agriculture	2286	2530	3326	3743	4353	5157	6131
Industry & Mining	1319	1650	2144	2670	3147	3784	4577
Petroleum	626	1908	3105	2885	2936	3139	3389
Elect. & Pub. Util.	121	132	157	182	217	260	310
Construction	517	647	839	1036	1252	1557	1937
Distribution Sectors:	2233	3059	4175	5038	5961	7067	8590
Tranport & Comm.	395	586	768	859	1026	1206	1404
Suez Canal	294	406	543	630	671	695	823
Trade, Fin, & Ins.	1544	2067	2864	3549	4264	5166	6363
Service Sectors:	1919	2175	2806	3529	4145	5024	6011
Housing	262	287	321	373	421	529	661
Other Services	1657	1888	2485	3156	3724	4495	5350
GDP at Factor Cost	9021	12101	16552	19083	22011	25988	30945
Net Indirect taxes	774	604	768	1088	1248	1500	1682
GDP at Market Prices	9795	12705	17320	20171	23259	27488	32627
Consumption:	8190	10896	14882	17029	19305	24066	27685
Public	2012	2172	3294	4203	5483	6588	7628
Private	6178	8724	11588	12826	13822	17478	20057
Gross Investment:	3101	4173	5111	6147	7127	7948	8947
Public	2230	2847	3306	4200	4900	5404	6400
Private	455	916	1396	1747	2013	2379	2318
Charge in stocks	416	410	409	200	214	165	229
Export (X)	2130	3777	5780	6463	6748	7908	9588
Imports (M)	3626	6141	8453	9468	9921	12434	13593
Resource Gap (M-X)	1496	2364	2673	3005	3173	4526	4005

Source : World Bank figure based on Ministry Planning Data - 1985/86 figures N.A.

E) Prices as Inflation Indicators

It has been announced that the inflation rate in Egypt amounted to 25.5% on April 1987 based on the retail price index, however, the rate of inflation could be better, judged through the following tables based on General Consumer Price Index and other parameters.

Wholesale price index Numbers, Classified According to (S. A. C. E. A.) divisions (1965 / 1966 = 100)

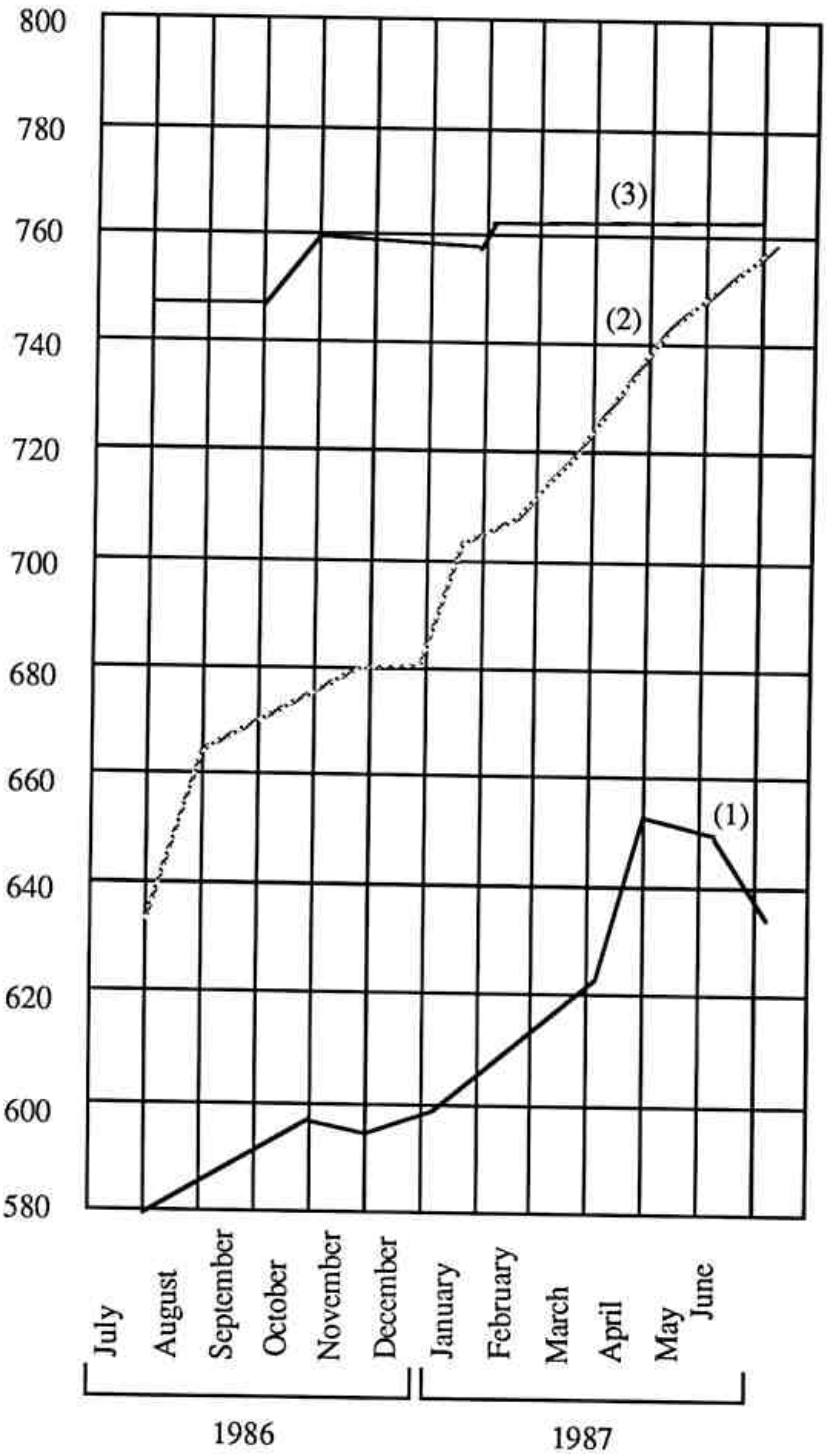
Table 42.

Divisions	June 1986	June 1987	May 1987
All items	**570.7**	**636.9**	**648.4**
Agriculture Crops	839.6	868.9	916.0
Poultry & Fish	861.4	993.3	977.4
Inedible Animal Products	541.6	576.2	576.2
Foodstuffs & Beverages	619.2	759.4	754.2
Tobacco & its Manufact	259.3	259.3	259.3
Yarn, Textile & underwear	354.3	432.4	432.4
Tanned Skins	415.8	512.8	512.8
Household Appliances	221.7	230.0	230.0
Petroleum & Fuel	414.7	486.8	486.8
Paper	632.0	730.8	730.8
Wood	579.6	679.1	679.1
Construction Materials	736.7	761.5	761.5
Medicines	327.1	342.8	342.8
Chemical Materials	257.4	270.2	270.2
Metals & their Manufactures	458.5	472.0	472.0
Machinery & implements	322.4	322.4	322.4
Transportation Equipments	481.5	491.7	491.7

Source : Central Agency for Public mobilization and statistics

Wholesale Price Index

Figure (9).



(1) General (2) Food and beverages index (3) Building material index

Source : Central agency for public mobilization and statistics

Wholesale Priced Index Numbers by end use (major groups) (1965/1966 = 100)

Table 43.

Major Groups	June 1986	June 1987	May 1987
All Items	**570.7**	**636.9**	**648.4**
Fuel	402.7	468.8	468.8
Raw materials	613.8	634.5	633.3
Intermediate goods	444.6	461.8	461.8
Non-Durable consumer goods	624.2	713.1	731.4
Durable consumer goods	312.4	318.2	318.2
Capital goods	382.8	394.2	394.2

Wholesale Price Index Numbers by stage of processing (Major groups) (1965/1966 = 100)

Table 44.

Major Groups	June 1986	June 1987	May 1987
All Items	**570.7**	**636.9**	**648.4**
Fuel	402.7	468.8	468.8
Cotton	617.9	617.9	617.9
Raw Materials	915.8	1016.9	1052.1
Semi-Finished Goods	380.6	387.7	387.7
Finished Goods	360.3	426.5	426.0

Source : Central Agency for Public Mobilization and Statistics.

General Consumer Price index All Urban Population August 1987 and percent charges from August 1986 & July 1987 (1966 / 1967)

Table 45.

Sections & Groups	% Changes		Indexes		
	July 1987	August 1986	August 1987	July 1987	August 1986
All Items	**1.6**	**20.5**	**800.5**	**788.0**	**664.3**
Food & Beverages	**2.2**	**24.5**	**1089.5**	**1066.1**	**874.8**
Cereals	0.0	100.0	1017.9	1017.4	508.5
Pulses	0.3	16.0	1423.7	1418.9	1227.7
Meats, Fish & Eggs	4.3	27.9	1280.4	1227.4	1001.1
Oils & Fats	0.0	51.2	229.6	229.6	151.9
Dairy Products	2.9	15.0	1045.4	1015.9	909.0
Vegetables, fresh & canned	16.3	-16.4	1033.5	888.8	1236.8
Fruits, fresh & dried	-8.9	-7.1	1972.2	2165.8	2122.9
Sugar & Sweets	10	39.8	435.1	430.9	311.2
Beverages	9.6	35.8	476.5	434.7	350.8
Housing	**0.0**	**2.9**	**129.8**	**129.8**	**126.1**
Rent	0.0	0.0	102.0	102.0	102.0
Fuel & Electricity	0.0	0.0	175.8	175.8	175.8
House cleaning materials	0.0	23.5	230.6	230.6	186.7
Furniture & Durables	**0.0**	**7.0**	**386.9**	**386.9**	**361.7**
Furniture & Furnishing	0.0	10.1	657.7	657.7	597.5
Other durables	0.0	0.9	205.1	205.1	203.3
Clothing	**0.0**	**3.1**	**650.6**	**650.6**	**630.8**
Transportation & comm.	**0.0**	**3.2**	**385.1**	**385.1**	**373.0**
Services	**0.0**	**14.1**	**965.6**	**965.6**	**846.5**
Medical care	0.0	20.0	444.0	444.0	370.0
Education & Recreation	0.0	19.0	544.8	544.8	457.7
Other services	0.0	14.6	1841.2	1841.2	1607.0
Personal expenses:	**0.0**	**34.6**	**448.3**	**448.3**	**333.0**
Cigarettes & Tobacco	0.0	28.5	377.4	377.4	293.7
Personal Care	0.0	50.0	743.7	743.7	494.2

Source : Central Agency for Public Mobilization and Statistics

F) The Export View

The Egyptian Exports sector review has been prepared in cooperation with the Export Development Bank of Egypt and the Egyptian Export Promotion Center, two most prominent export institutions in Egypt:.

Since the late 1950 s, the Egyptian economy has been characterized by an inward orientation with emphasis given to production for domestic consumption rather than exports. The liberalization measures since 1974 have not yet managed to shift this emphasis to any considerable degree. Moreover, the size of the import-bill, the relative simplicity of import substitution projects as compared to export-oriented projects and specially the attractiveness of a very large local market, with substantial profit margins have not been conducive to developing exports.

In real growth terms, Egyptian exports grew by an average of 10.5% over the period 1974-80 and 2.2% over the period 1980/81 to 86/87.
In 1985/86 non-oil commodity exports reached 1.4 USD billion, an increase of about 8% over the previous year. Oil exports reached the level of 4955 USD million (crude + refined product exports) in 1984/85 and is estimated to have reached 4348 USD million in 1985/86 (including foreign partners share). Services recorded for the year 1984/85 were 8.400 USD million and dropped to 7.900 USD million in 1985/86, (including workers remittances and unrequited capital transfer).

During 1985, Egypt's Foreign Trade Companies, in cooperation with the Ministry of Economy and Foreign Trade, have carried out countertrade deals with different countries with a total volume of 974.2 USD million for the Egyptian share. Agricultural products represented 33% and industrial products represented 67% of countertrade deals.

Prime Egyptian exports : relative weight of main Egyptian goods 1980/81 to 1985/86

Table 46.

(In Percentages)

Products	80/81	81/82	82/83	83/84	84/85	85/86
Agriculture						
Rice	1.6	0.5	0.2	0.4	0.2	0.1
Potatoes	0.8	1.0	1.1	1.1	0.6	0.7
Citrus	1.4	1.4	1.3	1.8	1.4	1.2
Others	2.1	1.8	2.2	2.8	2.0	1.7
TOTAL	**5.9**	**4.7**	**4.8**	**6.1**	**4.2**	**3.7**
Industrial Products						
Cotton/Ginned	8.2	7.4	8.2	11.2	10.2	9.6
Textile Products	8.0	7.1	5.9	7.5	8.6	8.9
Food Products	1.9	1.8	1.4	1.4	1.4	0.9
Chemicals minerals	1.2	1.5	1.7	2.7	2.6	2.0
Engineering&Metallurgical	1.9	2.8	1.9	3.0	2.8	2.3
Others	0.8	0.5	0.5	1.0	1.1	1.3
TOTAL	**22.0**	**21.1**	**19.6**	**26.8**	**26.7**	**25.0**
Oil & related products	69.1	69.2	69.3	62.8	65.0	64.4
Other products	3.0	5.0	6.3	4.3	4.0	6.5
TOTAL EXPORTS	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source : Central Agency for Public Mobilization and Statistics.

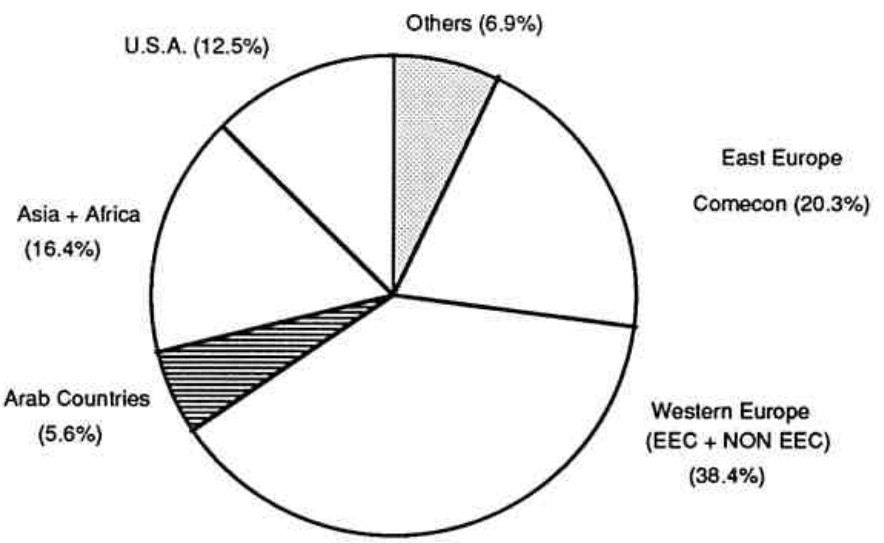
However, the second five year plan, (starting July 87) should witness Egyptian exports take-off. A higher competitiveness of the Egyptian products with the new exchange rates, series of export procedures simplifications, should enable to reach the plan ambitious target of 5.6% increase per year in export performance.

Such goal will require aggressive overseas marketing by trying to capitalize on existing markets while widening market shares in regions where Egypt can have a competitive edge. It is worth noting that Western Europe has become Egypt's main export market. With 38% whereas the USA (with 12.5%) and the whole of Africa and Asia (16.4%) are almost on comparable ranking.

Major potential lies in internationalizing the quality of Egyptian products on one hand, and tapping new markets such as the developing countries. In this respect, Egypt participates to the Inter-trade program among developing countries (America-Asia-Africa) launched by the U.N. International Trade Center.

Egyptian Exports Geographic Distribution 1985/88

Figure (10).



Source : Central Agency for Public Mobilization and Statisitics.

Agricultural Exports Potential

Egypt has uniquely favourable growing conditions: fertile soil, excellent climatic conditions, and above all experiences peasants. Moreover, Egypt's proximity to the Arab, African and European markets is also its advantage, In spite of these factors, agricultural export performance over the past decade has weakened for nearly every agricultural product. Studies have indicated that this was due to the rapid increase of domestic demand, a fixed crop area, problems of drainage, and the adverse effect to past price policies on the level and structure of crop incentives. Consequently there are now intense efforts to redress these unbalances by upgrading the agricultural infrastructure, strengthening institutional elements, and ensuring adequate financial incentives.

Egypt is traditionally a major exporter of cotton. However, over the period 81/82 to 85/86 cotton exports stagnated and in fact, in 85/86 totalled 289 million LE against 300 million LE in 1981/82.
Onion and garlic are minor field crops but have high export value. Their export is channelled through two public sector export organizations. However, during the last 5 year period, onion exports almost doubled reaching 30.000 tons in 85/86 against 15.000 in 81/82, whereas garlic due to non renewal of the basic seeds dropped by more than 1/2 in spite of huge overseas demand. Export of potatoes has decreased from 140.000 tons for the last several years to 110.000 tons in 85.86. Tomato exports are lower than they used to be in the 1980's.

The export of rice gradually decreased as domestic consumption increased, and from being a major exporter of rice, this staple only represents 0.1% of its global export revenue. With sugar, also, domestic supply has been unable to keep up with consumption. From being a net exporter of sugar in the early 1970's, Egypt by 1981 had to import 600.000

tons of sugar. Where fruit is concerned, citrus fruits and some special varieties of mangoes are exported. Water melons have a lucrative market in the Gulf and oranges currently comprise the bulk of all fruit exports.

However, tomorrow's picture is far from being as bleak as the past decade. Large numbers of private investors have recently developed farming projects, green houses, horticulture operations all geared to export markets and modern packing stations are being created. Unexploited opportunities of location, climate, yields and comparative advantage exist in many different fields of activity. Egyptians have a way of discovering the silver lining in the darkest cloud and here, this may be of crucial importance. For, by merely correcting the unbalances and making use of the advantages that Egypt already possesses, export performance can be immensely vitalized in a relatively short period of time.

Where agricultural exports are concerned, there is considerable potential for increases in agricultural yields through improved drainage and adoption of new technology and farm practices. Fruits and vegetables, beans, lentils, sugarcane, onions and garlic have significant export potential.

INDUSTRIAL EXPORT POTENTIAL

Here, as with agricultural products, Egypt has the geographic advantage in gaining easy access to markets in Europe, North Africa and the Middle East. Easy transportation access is of significant benefit in sea-and air-freight costs. The food industry is one of the most efficient industries in Egypt. Food products which are competitive in international terms include alcohol, biscuits, jams, soft drinks, as well as processed fruits and vegetables (which are primarily exported to the Arab countries).
However, although food products represented the highest share in Egypt's industrial production with 33% in 8687, it ranked low in export terms representing 0,9% of Egyptian exports in 85/86. Such contradiction highlights the large export potential of this industry.
The textile industry is the oldest industrial sector in the Egyptian economy and is still the single largest industrial sub sector. In the past decade partly due to external factors as well as to infrastructural and procedural constraints, the industry picked up with the creation of numerous private projects in both textile and clothing. raising it to 8.9% of the country's total export i.e ranking second after cotton in non-oil exports. In fact, the garments industry could account for more than 35% of export growth in the next five years or so.

The Egyptian exports Partners: geographical distribution and relative weight of overseas markets 1975 to 1986/87

Table 47.

Years	European Countries	Other European	Eastern European	U.S.A.	African & Asian	Arab Countries	Others	Total
1975	14.9	4.2	65.0	3.6	6.0	6.3	- (1)	100.0
1976	21.6	8.9	42.3	12.3	8.9	6.0	- (1)	100.0
1977	19.6	8.3	42.6	21.3	8.0	8.2	- (1)	100.0
1978	27.4	8.3	23.4	21.4	8.8	10.7	- (1)	100.0
1979	38.1	9.1	13.9	36.8	5.3	6.8	- (1)	100.0
1980	27.6	9.6	8.8	32.8	11.0	10.2	- (1)	100.0
1981/1982	39.0	6.9	8.6	20.1	16.6	5.3	3.5	100.0
1982/1983	38.8	3.2	11.8	19.2	17.8	5.4	3.8	100.0
1983/1984	34.5	5.7	14.6	20.9	16.3	4.9	3.1	100.0
1984/1985	39.1	2.8	16.1	16.3	16.2	5.3	4.2	100.0
1985/1986	35.7	2.7	20.3	12.5	16.4	5.6	6.9	100.0

---

(1) Included in U.S.A. share and Africa and Asia share for the said years.

Source : Central Agency for Public Mobilization and Statistics.

Similarly, there is justifiable hope that in the coming years a number of industrial products will have a high export value particularly after the upgrading of the infrastructure, advancement of know-how and management capabilities as well as ensuring adequate financial incentives.

In the food, beverage and tobacco manufacturing industries, producers are competitive at an international level and these sectors, together with the leather tanning industry, are worthy of expansion. The latter is particularly important since it produces an important input into higher level manufacturing of leather products. As for engineering products, there are a number of product groups which promise good export prospects. Fabricated metal products, consumer durables, industrial electrical products, and transport products (railway wagons, vehicle components, trams) all have good export potential to regional markets in the neighbouring African and Arab countries.

In addition, in the field of construction, engineering and consultancy services, the Middle East and Africa have considerable potential for Egyptian companies with contracting, maintenance and consultancy capabilities.

Non-traditional industries also show much promise and merit encouragement. In fact, one of the objectives of the new Five Year Plan is to broaden the base of the exports production sector by concentration on those industries which are distinguished by their competitiveness in world market. This includes cement, plaster, nitrogenous fertilizers, artisanal products, phosphate, ready-made garments, and furniture.

COUNTERTRADE: mirage or reality ?

Since 1973, Egypt has wavered between the liberal ideal of a money - based, multilateral free-trade system and the increasingly mercantile reality of barter based bilateral closed trade.

In a time of political reassessment, Egypt's economic indecision is not all that is to blame for this wavering, In the last 10 years' the context of world trade has changed dramatically. The free trader's culprit is countertrade - a catch - all term that includes bilateral forms of barter, counterpurchase, compensation and "offset" agreements - which some analysts say makes up as much as 20 percent of all world trade.

Today, with the declared intention of its sizable import market as leverage to induce the foreign partners to market its exports, Egypt is successfully making offset agreements (especially on big-ticket defense purchases), barter and counterpurchase "compensation" and buy-back accords called Equal Trade Exchange Agreements, all of which are aimed at increasing the exporting of Egyptian commodities and raw materials abroad. During 1985, Egypt signed 15 such agreements, with 14 countries for more than $1.9 billion (in total two-way trade).

In that bill, the Egyptian part represented agricultural products for 33% and industrial products for 67%.

Another seven agreements had been signed in 1986, and another 11 potential equal trade exchange agreements are in the works, including individual companies.

Under Nasser, numerous barter and "bilateral clearing agreements" existed between Egypt and East European economies. The difference now,

is that the Egyptian goods traded are no longer necessarily public sector goods, also, private sector commodities, handled through a public sector trading company or a public sector bank. This concept can be extended beyond government-to-government activity, as foreign companies are looking for new ways to finance their exports to Egypt For countertrade to help the Egyptian economy, Egypt must offer exports that are non-traditional. When Egypt countertrades cotton, aluminum ingots, rice and the like, the country is undercutting itself on the world market and losing out on direct foreign exchange revenue. Given the bargains in counter-trade bargaining, a foreign firm or government may take the counter-traded cotton, for instance, and turn it over to a switch trader at a loss. The buyer, in turn can sell it at below the world market price and still make a profit.

However, for some experts countertrade is a temporary expedient. The advantages are that it helps a country which is poor in marketing ability to sell its products abroad and it educates Egyptian producers about the realities of competitive foreign markets.

Countertrade is also a necessity in that it lets a country like Egypt continue to import production necessities during times of foreign exchange shortages. The disadvantages are that countertrade increases cost - since there is an intermediary between Egypt and its markets - and promotes protectionism in the country of the foreign partner.

Source: Private communication.

III) Description of the Product of the Case Study :

The product in question consists of mainly of a whole range of powder fire extinguishers, Halon hand units, and recently a new production of automatically operated Halon fixed units, meant for object protection purposes.

Being more specific, the range of production consists of:

1) Motor car powder fire extinguishers of 1-kg. capacity.
2) Van/Pick-Up powder fire extinguishers of 2-kg. capacity.
3) General purpose powder fire extinguishers of 3-kg. , 6-kg. , 9-kg. , 12-kg. capacities.
4) Industrial use mobile powder units of 50-kg. capacity.
5) Higher risk mobile industrial powder units of 100-kg. capacity.
6) General purpose Halon 1211 fire extinguishers of 2-kg. capacity.
7) Ditto but 6-kg. capacity.
8) General purpose Halon 1211 mobile units of 25-kg. capacity.
9) Object protection automatically operated Halon 1211 fixed units of 6-kg. and 12-kg. capacities.

The production complies with the German Standards DIN 14406 and the British Standards B . S . S . 3465, and the French Standards NFS 61 - 915, as well as the Egyptian Standards Nos. 734 and 1494.

a) Quality Vs. Price - A Hard Choice:

By the time the case-study project was in the start-up stage, some 15 years ago, the production available on the local market consisted mainly of 2 categories:

1) Low quality products of Eastern country origin, or locally manufactured at practically no technical standards. Apparantly, the price for such units was relatively very low.

2) Average and above average quality products of West European origin manufactured according to the relevant standard specifications, with probable deviations in view of absence of local Egyptian standards for the product to revert to the product to revert to. The price for such quality was relatively high.

It might be worthwhile mentioning that the market share among both qualities was 60% to 40% in favour of the lower quality.

The major question for the new industry before the startup, was to answer the big question; quality vs. price and which to take. The decision was that it would be a harder choice to let the price question alone dominate. irrespective of the quality. In such a case, an acceptance of price competition challenge would practically have no end downwards.

The decision was then made in favour of having the quality concept taking the lead.
Thus, the initial start-up product came out with high quality main features, that relatively exceeded the major European standards at that time by a range of 20 to 30%. This did afford several advantages for a new product to start with such as:

a) Favourable technical high-profile.
b) Justified high price easily argumented in quality terms.
c) The price asked for afforded meeting of the expensive investment costs of the new production, that never could be made available with a dumping priced policy.
d) There is a strategic theory giving advantage to an expensive quality product that not everybody could afford, over a cheap low quality product that nobody would seek to buy.

b) Technicalities and Standards:

Upon the project's start and in absence of home technical standard specifications, discussing technicalities of an Engineering product, that relatively had to be dealt with as a safety commodity to be used under emergency conditions, would be rather complicated.

The case-study had to rely on a main strategy based on practical live fire extinguishing demonstrations, for every tender exceeding the quantity of 20 extinguishers, during the first three years of its life. This rather fanatic policy led the case-study to get indulged in over 300 demonstrations, within a span of one year; i . e . , one demonstration every day. Apparently, this policy had its expensive costs, but resulted in establishing a vast popularity of the product and a solid recognition of quality among a considerable range of technically oriented customer circles.

Another result of this intensive activity, in the field of practical demonstrations, came the reflex of the Labour Administration, Ministry of Labour & Manpower, awarding the case-study its first prize cup for 1975, for its efforts endeavoured to increase safety and fire fighting consciousness on the National level.

It might be worthwhile mentioning that this form of recognition was awarded for the first time over a decade to a private Company for successful training activities on a National level.

The question of establishing local standardization for fire extinguishers, could not be finalized before 1976, through the Standards No. 734 governing all technicalities pertaining to dry chemical powder hand fire extinguishers.

The role the case-study shared in the finalization of these standards had qualified it to be assigned as a constant member in the committee of setting, amending and developing of all standard specifications to follow, related to fire fighting realms. Its name was also stated as expertee in all standard specifications issued, thereafter till today.[1]

As regards the technical evaluation of the Egyptian standard specifications established to govern the manufacture, sales and handling of fire extinguishers; one could confirm that its evaluation would be regarded as of a considerably unique level. That gave many advantages and positive functions influenced on the field.

It should be elementarily acknowledged, that a certain standard objective is to identify the minimum level of workmanship, function, efficiency and safety for a product, and thus, exceeding this level is entirely left to the manufacturer and the market conditions in view of the competition.
In this connection, the Egyptian standards governing the product in question had to review almost all major foreign standards and took into consideration all the advantages found most favourable.

*1) Standards No. 734, 1494, 185 and 251.
The Egyptian Organization for Standardization.

The following specifications were reviewed:

- The German Standards DIN 14406
- The U . S . Standards UL 299
- The British Standards BSS 3465
- The Swedish Standards S . M . S . 1192E
- The French Standards N . F . S . 61-915
- The Belgian Standards N . B . N . s21-011
- The Finnish Standards S . F . S . 2614E

IV) A Reading of Market Tendency and Relative Trends

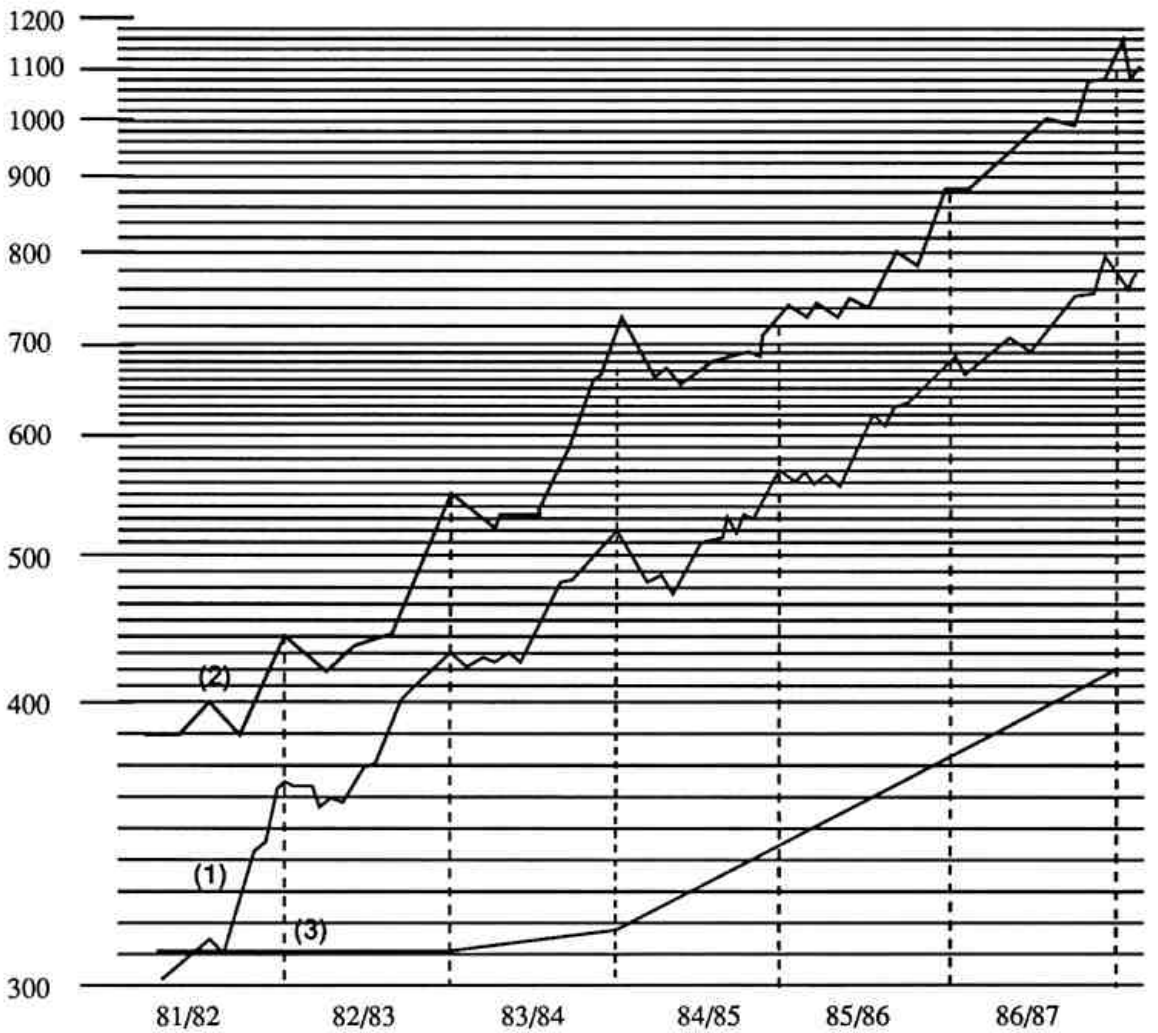
The graph to follow illustrates the consumer price index for Egypt Urban population in logarithmic scale for the period from 1981 / 82 to 1986 / 87 for the following indicators:

(1) All items.
(2) Food and Beverages.
(3) Average mean prices for Fire-Extinguishers. (Bavaria /Egypt)

Figure (11).

Consumer price index for Egypt - Urban Population
(1988/1987 = 100)

logarithmic Scale



(1) All items. (2) Food & Beverages. (3) Fire Extinguishers.

N.B. Fire Extinguisher prices indicated represpent those of Bavaria/Egypt

Analysis

The graph study signifies clearly that, on one hand, the trend of price increase took relatively, a parallel and steep rate of rise for both indicators (1) and (2) concerned for all items and food & beverages, that amounted to a rate of rise over the period of 256.25% for the first item and 294.8% for the latter.

On the other hand, the trend of price increase for the case study product took a less steep rate of rise, which amounted, over the period, a rate of 131.25% only.
This stresses out the fact that the case study project could rehabilitate the relatively high start up costs during the first period preceding the establishment, and make use of the rationalization plan within the period to follow, facing favourably the general trend of price increase.

It could also be observed that, while the price difference between the case study product and the imported competitive products of West European origin amounted unfavourably to 30 - 35% during 1973/ 74, it could reach an equal price range during 1985 /86.

The same relation improved during 1987 /88 to 10-15% in favour of the case study product, price-wise.

This situation could partially be supported by the higher inflation rates in the local market and reflects of home currency depreciation rates, compared to the external inflation and currency depreciation rates abroad, for the same period.

V) Traditional Marketing Problems, and Non-Traditional patterns of Solution.

a) Problem of Distributors Product Disloyality.

During the start-up period of the case-study, and as one of the marketing main objectives had to be assigned to distributors of various standards, the problem of product disloyality was repeatedly encountered.
This situation was mainly due to many reasons major of which were:

i) The nature of the product imposed that only specialized distributors to be in question, who apparently had different old competitive influences.
ii) The price difference unfavourably working against the case-study product formed a considerable temptation for the distributors to take the easier way selling the cheaper product.
iii) In certain cases the distributors could increase their profit margin selling the cheaper product at a higher price than its marketing actual value but still below the price of the case-study product.

Solution

The initiative taken to face this problem was the costly decision based on establishing a series of an own network sales channels, in the form of company's own branches.

It was elementary estimated that a branch would be able to pay off in 5 years from its establishment.

Amazingly, the nine branches established within 7 years along distance of 1100 km, with some 79 employees, were able to pay off and act as a crea-

tive asset after this short period of time.
A period of three years was considered an average for a branch payoff on the practical level.

Managerialy speaking, this solution proved to be the only possible way to sustain the company's fixed price policy among such a wide range span. Other nonprofit activities such as warranty services could only be delivered through an own establishment regime.
This solution finds support by which other scientific opinions do much emphasize the Industrial Channel Strategy.[1]
The main traditional objectives in industrial marketing on applying an own channels of distribution could be classified as follows:

a) Low Cost Operation

For the case-study specific example with its nine branches with staff intensity between 8 and 11 members, the cost related to turn-over achieved in the branch concerned varied between 12% and 16% for old established ones. It varied between 18% and 22% for recently established branches.

This rate of cost is relatively economical compared to distributors commission range which would not be less than 20% by any means.
Bearing in mind that other non-profit functions are also practised through the channel system, such as maintenance, feed back, . . . etc. , this makes the actual cost most economic.

*1) Webster, Friedrick E. , Jr "The Role of the Industrial Distribution in Marketing Strategy" Journal of Marketing 40, July (1976) pp 10-16

b) Control

It is also quite common to find industrial marketing managers desiring a high degree of control over their channels of distribution. This may come about because the manager feels the company's policies and strategies are best for its products and does not want individual channel components deciding otherwise. In other words, the manufacturer wishes to exercise considerable control of the channel of distribution! This objective often leads to direct channels, which may be the most expensive, but which are also the easiest to control. If middlemen are used by a manager with this channel objective, those middlemen had better be chosen on the basis of their willingness to be controlled by the manufacturer. Only as a last resort would the marketing manager in this case employ a recalcitrant middleman in the channel regardless of the latter's sales and service capabilities. If control is the basic objective of the marketing manager, it is imperative to use either a direct channel or another means where middleman can be controlled . If this not done, chances of achieving the objective will be reduced. On the other hand, it must be realized that this objective requires a company that is financially able to support it. Probably most industrial marketing managers would like to control their channels of distribution. but for many of them it is a financial impossibility.

c) Sales Effort

As has been stated on a number of occasions in this text, personal selling plays a great role in the industrial market. It also plays a great role in industrial channels, and many marketing managers have a high degree of sales effort as a basic channel objective. This has a number of effects on channels found in the industrial market. Some companies will sell directly because they are unable to find middlemen who possess the required sales ability. This often happens with very sophisticated technical products. In such cases, direct channels are not used by choice, but by necessi-

ty. In other instances where middlemen can be used, distributors and manufacturer's reps are selected for inclusion into a channel on the basis of their proven sales capabilities.

d) Service and Technical Assistance

As has also been developed, service and technical assistance are big factors in the industrial market, and this extends into the channel of distribution. For example, a marketing manager may use a direct channel and provide service facilities because of the inability to find middlemen with the capability or the desire to provide such service. On the other hand, the manager may choose middlemen, particularly industrial distributors, on the basis of their proven service facilities and personnel. In other instances, a marketing manager with this objective may be prohibited from using manufacturers' representatives in the channel because of the reluctance of the latter to provide such service or technical assistance.

e) Market Feedback

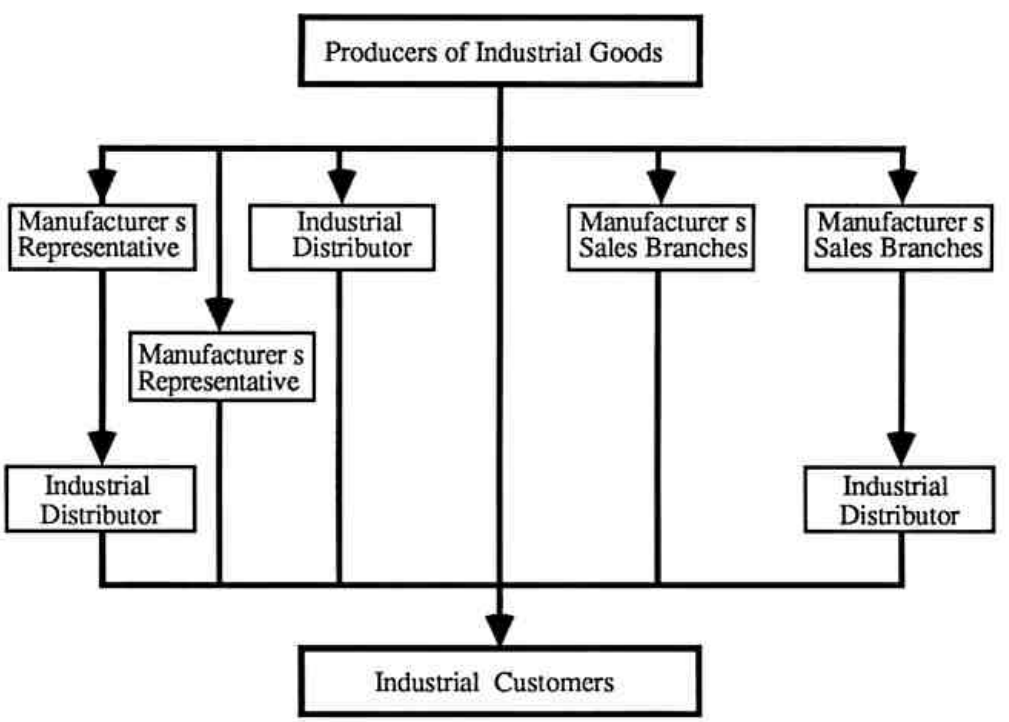
Some industrial marketing managers expect market feedback from their channels of distribution and make this a specific channel objective. When a company has such an objective, it may well lead to channel components being selected on the basis of their willingness to provide such feedback. For example, it would be unrealistic to expect manufacturers' reps or company sales people compensated on a straight commission basis to take time out to search out market information when they are being compensated on the basis of the sales they make.

f) Company Image

The image of the company is often very important to the industrial marketing manager, and creation and maintenance of that image often extends into channels of distribution. Customers form impressions of a manufacturer and its products through their dealings with that manufacturer or its middlemen. What this means is that manufacturers with such an objective must find middlemen whose images are consistent with theirs. This may mean that distributors and/or manufacturers' reps are chosen on that basis. And it can even be that a direct channel might be used because sufficient middlemen with the proper image cannot be located or enlisted by the manufacturer.

Distribution Channel in Industrial Market

Figure (12).



Source : Bureau of Business Research, College of Commerce and Administration, The Ohio State University, 1963

Shorter Channels of Distribution

The industrial market is characterized by shorter channels owing primarily to buyer expectations or preferences ,and to product characteristics. Industrial purchasing agents buying high-priced, complex products often do not want to deal with middlemen, preferring to buy from company representatives who have direct access to company headquarters and who can get immediate answers to their problems. In addition, it is often very difficult to find middlemen who possess the required technical and service capabilities to sell sophisticated products and/or services to the industrial buyers. On the basis of the dollar volume of industrial sales, it is estimated that about three-quarters of all industrial products are sold directly, with no independent middlemen involved.
Another way of saying this is that the higher the unit value of the product or service being marketed, the higher the probability of a direct channel. When middlemen are used by industrial marketing managers, there are rarely more than two or three layers as contrasted with the consumer market, where brokers may sell to wholesalers, who then sell to jobbers, who in turn, may sell to subjobbers, and so on.

Robert W. Haas

b) Problem of Facing New Dumping-Priced Competition

During 1975 till 1977 the case-study project enjoyed the advantage of import restriction of Fire Extinguishers. This afforded substantial marketing and price advantages.

Suddenly by end 1977 the import protection was removed and a new wave of low priced imported competition overwhelmed.
Getting this severe competition was a real problem to face.

Solution

The choices in question were:

i) To take the easy way of following down the market's trend and sell a higher quality product for a price of inferior quality and thus bear probable serious consequences.
ii) Take the initiative of defending the quality concept, and eventually offer more free of charge services and other advantages for the same fixed price.

The decision was taken in favour of the latter solution. prices were not decreased. A considerable action of free services was initiated at no additional cost.

A free one-year maintenance contract was awarded to every new customer, according to which he was paid 3 call-visits to inspect the extinguishers at sight.

Maintenance department had to be established in an initial capacity of 12 men and 4 equipped vans to deliver such services.

In other words, this decision had its very expensive initial cost which proved in the long run , to be one of the company's main achievements.
Later, a computerized back-up had to be relied on to deliver the proper service on the large scale developed very fast.

A computer driven reporting preceding every call / visit was mail-merged to state services and work delivered and report the state of the units on hand after each call.

For the years to follow a maintenance contract could be extended against a nominal fee.

One could say, that within this experience span of 10 years, the magnitude of customers stored in the computer exceeded 40.000 cases, and those subject to paid maintenance services exceed 17.000 cases.
The yearly revenue resulted from maintenance and services came up to 25% of the company's entire turnover for 1987.
It could be worth mentioning that without an own sales branches, such a central directed policy could never be made possible, on that relatively vast span of market size.

c) Problem of Irregular Availability of Products due to Long Distance Supply Line of Raw Materials

This negative phenomenon started to be more significant in view of the product program that grew much bigger and the considerable obligation of furnishing all 9 branches with all their needs short termed at all times, in absence of a reliable forecast of a marketing plan.
One should not over look the fact that 80% of the market size is directed to Governmental and public sector customers who purchase through general tenders, which-by turn- makes it almost impossible to work on a solid demand forecast plan.

Another side-effect was the long distance supply of raw materials and the prolonged procedures of importation formalities, that has caused a two-month time lag to be in question as an average for any import transaction.

Solution

The inevitable decision had to be made in favour of increasing the inventory for raw materials, which had to be worked out in access of the case-study's budgetted area. Thus, a bank's intermediate raw material security stores had to be seeked as an additional credit line.This solution afforded a much better rate of availability of goods at almost all time, and thus made available an expansion of prompt delivery upon receipt of order which gave a price advantage of 3-5% over the competition with a long term delivery.
The disadvantage was the cost of the solution in terms of credit and inventory costs.

d) "Export", .. - A Target Not Problem-Free

The export possibilities for the type product in question would make it practically limited to the neighbouring Arab and African markets.

Most of these markets do not have home standards for this product and thus a quality product will have to face the inferior quality cheaper type of competition.

Another obstacle was that the portion of imported share of raw material in the final product was subject to custom duty and a drawback system could not be regarded as a safe method.

The absence of payment insurance made it almost impossible to offer any payment facilities to these export market, which would have been a real support for the initial period at least.

Solution

The initial start for exploring this new domain of activity had to be rather scientific. Thus, an International support was seeked through an export expertise, who was made available through I . E . S . C . [1]
Classification and evaluation of candidates and export chances was then made easier.
A very useful recommendation was made possible of establishing small Free-Zone store in the Free-Zone of Port Said.

---

*1) Mr. Damon Stewart was assigned as an Export Expertese for 8 week mission in Cairo during 1986.

This has afforded the possibility of avoiding payment of unnecessary custom duties for products destinated for export purposes.

Apparently this solution has its high cost as well and is hoped to break-even itself by end 1988 and prove being feasible from 1990 onwards .

PRODUCT LIFE CYCLE

Product-planning Implications in the Life Cycle :

Figure (13) illustrates the typical conceptual product life cycle . The introductory stage is characterized by low sales volume as prospective buyers and buying influences are unaware or unfamiliar with the product. In this stage, the industrial marketing manager's primary task is to create awareness of the product. Net profits in this stage are usually low, if there are any, with most revenue being used to promote the new product. From a marketing management perspective, the important strategic variables would appear to be the product and its promotion, although channels and pricing can and do play a significant part. This is a crucial period for the product. Should it fail to gain acceptance in this stage, it will fail. Should it survive this stage, it will enter the growth stage. The manager's skill in testing, launching, and monitoring the progress of the new product is very important.

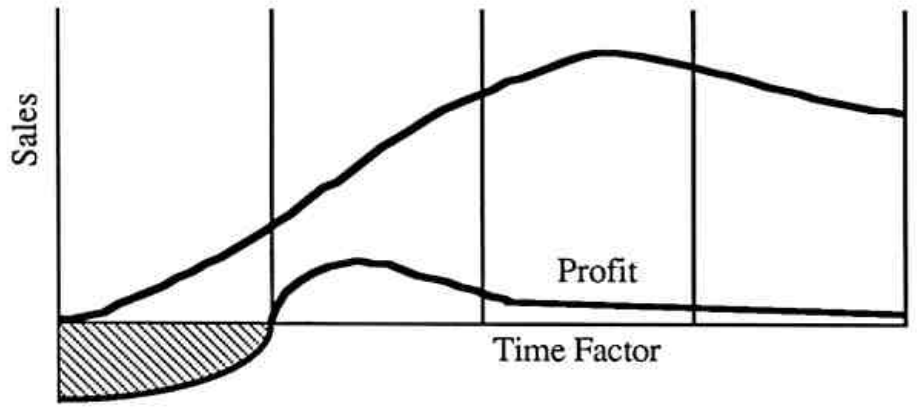
The growth stage is characterized by a rapid increase in demand for the product. The cumulative effects of the company's promotion and examples of industrial customers purchasing and using the product create a favourable image and stimulate more buyers and buying influences to consider the product. Often this increased demand encourages competition to enter the market, and the manager may

have to consider the differenciation of the product. With specifications this is not always easy to accomplish in the industrial market, but it can be done through improved product modifications and through selling and service features. With increased competition, such differenciation may be necessary to increase or maintain a market share. In this stage, there may also be strong competition for the services of industrial distributors and manufacturers' representatives if such middlemen are appropriate.

The maturity stage is characterized by the rate of sales increase beginning to decline. The early part of this stage finds relatively stable sales and declining unit costs of promotion. Thus, profits are often relatively high in this period. New customers at this point may be more deliberate and more price-conscious than new customers in the previous two stages. With sales volume stabilizing, less competitive suppliers may begin to pull out of the market. In the latter part of this stage, when sales volumes may show almost no increase, the market may be saturated. Without an expanding market to absorb productive capabilities and possibly to absorb build-up inventories, some suppliers may begin to cut prices to protect their market shares and to maintain profitable operations. Companies using a direct sales channel may switch to independent middlemen in an attempt to continue servicing existing customers and reduce costs at the same time.

Product Life Cycle

Figure (13).



Segment Analysis for Industrial Life Cycle

Table 48.

STAGE IN CYCLE	INTRODUCTION	RAPID GROWTH	MATURITY	DECLINE
Overall Marketing Strategy	To Create Awareness and Acceptance	Establish an Appreciable Market Share	Maintain Market Share in Face of Competition	Manage Costs and Maintain Profit
Product Strategy	Develop and Test Market Prototypes in Customer Plants	Plan Replacement for the Existing Product Demise	Introduce replacement Product into the Mraket	Drop the Old Product from Product Line
Product Design	Limited Number of Models to Gain Market Acceptance	Differentiate Product to Match Market Requirements	Maintain Competitive Edge Through Differentiation	Provide Only Basic Models for Remaining Customers
Promotion Strategy	Create Awareness and Provide Foundation for Sales Efforts	Creates a Preference Among Customers and Middlemen	Maintain Preference Among Customers and Middlemen	Use Minimum Efforts to Sustain Decreasing Demand
Channel Strategy	Get Product to New Customers for New Market Penetration	Control the Channel for the Optimum Market Impact	Maintain Control of the Channel	Reduce Distribution Costs yet Keep Customers
Pricing Strategy	Match Value of Product to Market Needs	Adjust Price as Competition Enters	Stabilize and Avoid Price Fluctuations	Move Stocks of Built-Up Inventories

INDUSTRIAL PROMOTION STRATEGY

In industrial promotion, there are sales managers, advertising managers, and sometimes sales promotion managers who head their own departments and report to the marketing manager in their own respective specialized areas. It is then the task of the marketing manager to integrate personal selling advertising and sales promotion into one total promotional package that is then further integrated into the total marketing strategy with product. Channel and pricing decisions, in view of this division of promotional efforts, no format for overall industrial promotional strategy will be developed. Instead, formats will be developed individually for sales, for advertising, and for sales promotion. This chapter will cover the personal selling area of promotion, whereas the following chapter will cover the areas of advertising and sales promotion in the industrial market.

DIFFERENCE BETWEEN INDUSTRIAL AND CONSUMER PROMOTIONAL STRATEGIES

It is in the area of promotion that industrial and consumer marketing practices differ sharply, even though the basic tasks may be the same. To understand these differences-and all of industrial promotion, for that matter-it is first helpful to understand the tasks involved in promotion in the industrial market. According to McGraw-Hill's Research Department, there are six basic steps or tasks to be accomplished in promotion. These are (1) making contact, (2) arousing interest, (3) creating preference, (4) marking specific proposals, (5) closing the order, and (6) keeping customers sold. This implies that the combined functions of personal selling, advertising, and sales promotion are to make initial contact with a prospective customer, arouse interest, create a preference for the firm's product or service over those offered by competitors; answer specific

questions; close the order, and , once sold, take care of that customer so that there is little reason to look elsewhere. Accomplishment of these tasks would indicate an effective promotional strategy, whereas the inability to do so would indicate a lack of effectiveness if the marketing manager had a competitive product and a clear understanding of market targets to be reached.

Keeping the McGraw-Hill tasks in mind, refer to Table 40. Some great differences can be observed between the relative importance of promotional mix components as seen by consumer and industrial marketing executives. Personal selling plays a much greater role in the industrial market, again with emphasis on the importance of personal contact with industrial buyers and buying influences. Mass media are used far less in the industrial market, and so are promotional branding and promotional packaging. And although the use of print media plays a significant role in industrial promotion, as it does in the consumer area, it is different: media normally being of the trade publication variety. What Table (49) actually shows is that industrial and consumer marketing managers differ in their assessments of which promotional components work best in achieving the McGraw-Hill Research Department's six basic tasks. For example, in the consumer market, it is very possible that via mass advertising and effective promotional packaging, a consumer goods manufacturer could bring the ultimate consumer through the six tasks or steps. For the manufacturer of sophisticated electronic products being sold to engineers, such a promotional approach would lead to marketing disaster. Stated briefly, consumer marketing promotional strategies differ from those found in the industrial market primarily because buyer expectations are different and product characteristics differ.
There are also other differences of importance. As stated, media differ in the two markets. Most of industrial advertising is in trade journals and direct mail media. In addition, industrial advertising or messages are

generally less emotional than those found in the consumer market. They are generally more factual and economic benefit-oriented, with emphasis often on derived demand. Sales promotion also differs, with the bulk of industrial sales promotion being in trade shows, catalogues , directories, and speciality advertising items.

RELATIVE IMPORTANCE OF THE ELEMENTS OF MARKETING COMMUNICATIONS

TABLE 49.

Sales Effort Activity	Producers of : Industrial Goods (%)	Consumer Durables (%)	Consumer Nondurables (%)
sales Management and Personal Selling	69.2	47.6	38.1
Broadcast Media Advertising	0.9	10.7	20.9
Printed Media Advertising	12.5	16.1	14.8
Special Promotional Activities	9.6	15.5	15.5
Branding and Promotional Packaging	4.5	9.5	9.8
Other	3.3	0.6	0.9
Total	100.0	100.0	100.0

Note :

Data are Based on the average point allocations of 336 industrial goods producers, 52 consumer durable goods manufacturers, and 88 consumer nondurable goods manufacturers.

Source : John G. Udell, Successful Marketing Strategies (Madison: Mimir Publishers, Inc. , 1972), P. 4

SALES-PROMOTION OF THE CASE-STUDY

The promotion policy of the case study has been based on a solid main strategy for years that may be briefed as follows :

- Own channel of distribution system
- Fixed price concept through all branches during same time.
- After sales service delivered to customers on site.
- Direct mail-merge computerized campaign with personal follow-up
- Application of catalogue and brochures on a large scale and a high quality.

Majority of this strategy finds a good back-up from the managerial point of view and reasonably high statistical support.
Among other resources, following article has been chosen to emphasize this point.

"In many industrial firms, little difference is made between advertising and sales promotion. Often the two areas are handled as one. There is a single budget out of which allocations to both areas are made, and one manager is responsible for both areas. In other companies, advertising and sales promotion are separate departments, each having its own department head who reports directly to the marketing manager. In this section, sales promotion shall be defined to those nonpersonal areas of promotion other than advertising. Table 50 illustrates those areas of sales promotion most common to the industrial market during the period from 1971 to 1977 . As can be seen, four areas account for almost 100 percent of what industrial firms spend in their sales promotion budgets. A discussion of each of these four areas may help to provide more insight into the use of sales promotion in the industrial promotional mix."

Catalogues

As Table 50 shows, industrial firms consistently spend about one half of their sales promotion budgets in catalogues. In terms of total advertising and sales promotion budgets, catalogues account for about 20 percent, and it is estimated that industrial firms in the United States spend in excess of $25 million per year in this particular area of promotion. Broadly defined, a catalogue is " complete or comprehensive printed information about a product".

SALES PROMOTION MEDIA IN THE INDUSTRIAL MARKET

TABLE 50.

	Percentage of Sales Promotion Budget Spent on Media							
Media	1971	1972	1973	1974	1975	1976	1977	seven Years Average
Catalogues	52.6	55.9	55.0	51.9	52.7	42.8	43.5	50.6
Trade Shows	23.7	21.8	22.5	26.2	24.8	40.3	37.9	28.2
Dealer and Distributor Materials	14.3	10.9	12.5	11.8	11.9	8.1	8.7	11.2
Publicity and Public Relations	9.4	11.4	10.0	10.1	10.6	8.7	9.9	10.0

Note :

1977 figures are based on Industrial Marketing projections. Data on years past 1977 not available as industrial Marketing no longer surveyed sales promotion budgets.

Source : Adapted from appropriate issues of Industrial Marketing.

PART THREE

ECONOMIC PROBLEMS AND PROPOSALS

PART THREE

ECONOMIC PROBLEMS AND PROPOSALS

INTRODUCTION:

This chapter will mainly deal with the macro side of the economic problems of Egypt , though the main topic and concern of the thesis was designated to handle various problems from the micro point of view of the case - study . However, it seams that the reflexes of one on the other is so intense , that an integration of the work necessitates a wider study .

It is no secret that the stagflation state, Egypt is undergoing lately, has reached such a degree to be considered the worst the Egyptian economy has seen in this century at all. Officials and local economists have been actively indulged in the description and analysis of this economic phenomenon and digging after its causes. Their inspeculations ranged as usual between over and under-estimation of the size of the problem.

As regards the causes of the stagflation, there seemed to be no conflicts among them, except in the sequence of order.

Regrettably, almost all the major inspeculations came to be strongly biased to the official and theoretical attitude based on the comparative study of cash-flow and financial resources of the official budgets. Thus, the outcome came to be a list of the major factors of deficiency in cashflow and financial resources. Blank of any mention, were the factors of influence on productivity and better utilization of human resources, as if productivity could not even come to be the last of factors to be put into consideration.

The STAGFLATION Problem

This chapter will, very briefly, introduce the stagflation problem in Egypt, mention the relevant major causes as presented by official economists. However, it will not handle it as a main objective, but rather as a background for discussing the financial and monetary policy and its influence on productivity and market stability.

Profile of the Economy

Egypt is classified as medium-sized "lower middle income" developing country, to use the World Bank's ranking of economies.
Ever since 1974, it has made vast strides in its transition from a highly centralized to an open door economy.

This shift in orientation was accompanied by a record rate of growth at an average of 9% throughout the decade ending 1984. Chief among those factors responsible for rapid growth were the migration of Egyptian labour to neighbouring oil-rich countries and the corresponding annual inflow of more than USD 2 billion in worker's remittances, the resumption of traffic in the enlarged Suez Canal, the discovery and development of new petroleum resources, the revitalisation of the tourist industry, and large inflows of foreign aid.

Starting in 1984/85, the overheated economy began to show signs of serious unbalance, with an unsustainable government budget deficit, glaring distortions in the structure of prices, inflationary tendencies leading to speculations, and an over-valued exchange rate making productive investments unprofitable.

Basic Economic Indicators

Table 51.

Per Capita GNP	USD 720, Annual Growth rate 4.3% (1965-1985)		
Population	50.5 million (end 1986), Annual Growth rate 2.8%		
Labour Force	13.7 million (end 1986), Annual Growth rate 2.5%		
	1986/87 Current prices	**Real Growth rates per Annum**	
	LE. million	1974/80	1980/81-1986/87
GDP	40 832	9.1%	6.8%
Investment	7 544	13.0%	3.8%
Exports	5 757	10.5%	2.2%
Imports	10 126	7.1%	5.4%
Out-put Crude Petroleum	MT 31 million (1980/81), MT 42.5 million (1986/87)		
Out-put Crude Natural Gas	MT 1.8 million (1980/81), MT 5 million (1986/87)		
Exchange rate	LE. 0.70 (Central Bank rate applicable to government transactions)		
(to the U.S.$)	LE. 2.20 (Floating commercial bank rate, July 3rd 1987)		
Inflation:	25.5% (April 87 - Retail price index)		
Foreign Debt (civilian)	USD 27.5 billion, Debt service ratio 35% (1985)		

Source : Central Agency for Public Mobilization and Statistics and Ministry of Planning

The government's long delay in introducing macro-economic reforms was partly the result of the spectacular growth in foreign exchange earnings at 25% per annum, a major part of which accrued directly to the Treasury.

It was only when oil prices crashed and brought about a sharp downturn in most of Egypt's dollar receipts that the magnitude of the economy's vulnerability to exogeneous market conditions was clearly felt. By 1985/86, Egypt had accumulated a foreign debt of close to USD 40 billion (including military debt) and payment arrears on this debt moved the government to seek IMF assistance.

In May 1986 the government laid out the main features of its economic reform program, designed so as to redress the balance in its budget and in the balance of payments. After extended negotiations with Egypt's Aid donors and creditors, agreement was reached in May of 1987 at the Paris Club over the re-scheduling of a major portion of Egypt's foreign debt. Earlier in the month, the IMF had approved the government's package of policy reforms encompassing the exchange rate and trade regimes, subsidy and budget outlays.

The Balance of Payments

Table 52.

Current Account (CA) — LE. million (current price)

	1981/82	82/83	83/84	84/85	85/86	86/87	Annual Growth	%Share	
	actual	actual	actual	actual	actual	prelimirm	%	81/82	86/87
Export of goods:	**3692**	**3906**	**4194**	**4331**	**3801**	**2863**	**- 5.0**	**48**	**28**
Agriculture	455	429	528	436	412	452	- 0.1	6	4
Manufacture	396	394	535	558	507	853	17.0	5	8
Petroleum and Prod.	1915	1859	1797	1844	1665	741	- 17.0	25	7
Pet. Partner share	927	1223	1294	1493	1218	817	- 2.5	12	8
Service Receipts :	4011	5228	5892	5751	5462	7450	13.1	52	72
Shipping and Ins.	405	463	476	498	493	750	13.2	5	7
Suez Canal	636	670	682	634	720	820	5.2	8	8
Tourism	326	252	283	340	266	365	2.3	4	4
Workers Remitts.	1731	2632	3268	2907	2472	3200	13.1	23	31
Current transfs.	270	256	259	426	543	605	17.5	4	6
Other receipts	642	954	968	952	968	1710	22.6	8	17
Total CA receipts	**7703**	**9134**	**1006**	**10082**	**9263**	**10313**	**3.1**	**100**	**100**
Import of Good :	**6569**	**6383**	**7349**	**7496**	**6816**	**7655**	**3.1**	**69**	**62**
Consumer	2143	1954	2344	2228	2076	2023	- 1.1	23	16
Intermediate	2569	2560	2876	3099	2923	3262	4.9	27	26
Capital	1857	1869	2129	2169	1817	2370	5.0	12	11
Service payment:	**2965**	**3504**	**3794**	**3888**	**4022**	**4724**	**9.9**	**31**	**38**
Shipping and Ins.	130	125	174	172	231	339	19.9	1	2
Tourism	198	248	216	210	124	130	- 8.0	2	1
Gov. Exp.	191	181	195	224	207	160	- 3.0	2	1
Pet. Partner share	927	1223	1294	1493	1218	817	- 2.5	10	7
Interest Payms.	641	783	825	802	932	1000	9.3	7	8
Profit transfs.	166	141	104	112	104	172	0.8	2	1
Other Payment	710	802	983	972	1204	2103	24.0	8	17
Total CA Payments:	9534	9887	11143	11384	10838	12379	5.4	100	100
Trade Balance	- 2877	- 2477	- 3195	- 3165	- 3014	- 4792			
Service balance	1046	1723	2098	1863	1440	2726			
CA balance	- 1831	- 754	- 1089	- 1302	1574	- 2066			

Source Central Bank of Egypt for years up to 1984/85. Ministy of planning for 1985/86 and 1986/87.

Balancing the Budget

The current 1987/88 budget projects a cut in the budget deficit from LE. 5.5 billion to L.E. 4.9 billion, with spending forecast at L.E. 23 billion compared with revenues of L.E. 18.2 billion. The budget deficit will thus decline from 15.3% in 1984/85 and 12.3% in 1985/86 to 11% in 1987/88. Deficit financing is also expected to have less of an inflationary impact because of a reduction in the government's resort to borrowing from the banking sector.

The government's monetary policy has become increasingly contractionary in an effort to curb inflationary pressures. In the first six months of 1987, banks were instructed by the Central Bank to limit the growth of credit to 2.5% Although the consumer price index recorded a significant increase in 1985/86 and 1986/87 at around 19% per year, this has been the result of the government's price adjustment policies rather than demand related pressures. These price increases are in the nature of once and for all adjustments which should gradually eliminate the source of major unbalances in the domestic economy.

Three essential messages stand out clearly from Egypt's current five year plan which started in July 1987 :

a- Heavy reliance on private sector initiatives.
b- Pronounced shift towards productive as opposed to service sectors.
c- Slow - down in economic growth to regain equilibrium between domestic resource mobilization and resource allocation.

Sources : Central Bank of Egypt, IMF , Ministry of Economy, Ministry of Finance

The Five Year Plan for 1987/88 to 1991/92

In comparison with the first five-year plan 1981/82, the second plan's objective is for a more modest increase in GDP at 5.8% per annum, a welcome slowdown after a decade of accelerated growth which was heavily based on external borrowing and on the unbalanced growth of petroleum and service activities at the expense of the main commodity sectors, manufacturing industry and agriculture.

The achievements of the past five year plan are concentrated in the country's infrastructure and public utilities, an essential foundation for the rapid growth of the commodity sectors which is now projected over the next five years.

The capacity for electricity generation has in fact doubled, railway transport capacity has increased by 36% for freight and 63% for passengers. Storage capacity has risen by 55%, in line with the expansion of port facilities, and telecommunications have also received enormous investment resources over the last five year plan with an increase of 166% in telephone lines.

Source : Ministry of Planning : Five year plans for 1982/83 to1986/87 and 1987/88 to 1991/92

First and second five year plans

Table 53.

	1982/83-1986/8	1987/88-1991/92
Total Investments	**LE 35.5 billion**	**LE 46.5 billion**
Public sector Contribution	77 %	61 %
Private sector Contribution	23 %	39 %
	100 %	100 %
Public sector Investment Cocentrated in :		
Mining and manufacturing	26 %	21 %
Transport, Comm, Storage	22 %	18 %
Electricity	11 %	17 %
Infrastructure	11 %	14 %
Social Services	10 %	13 %
Agriculture and Irrigation	10 %	8 %
Petroleum	5 %	4 %
Other	5 %	5 %
	100 %	100 %
Private Sector Investment Concentrated in:		
Housing	53 %	37 %
Manufacturing	22 %	36 %
Agriculture	10 %	15 %
Contracting	5 %	3 %
Transport and Storage	3 %	8 %
Other	7 %	1 %
	100 %	100 %

Source: Ministry of Planning : Five year plans for 1982/83 to 1986/87 and 1987/88 to 1991/92

THE MAJOR CAUSES FOR THE STAGFLATION , ACCORDING TO OFFICIAL ECONOMISTS , COULD BE CLASSIFIED AS FOLLOWS :

i) The Considerable Shrinkage in Oil Revenues :

It is an International worldwide problem that oil prices collapsed drastically within a span of months from over $40 a barrel down to $15 a barrel and continued falling down to $5 a barrel[1] .
Egypt's five - year development plan (1982/83 - 1986/87) projected an annual growth of 8.3% in commodity services and an average growth rate of 13.2% p.a.

This involved an increase in crude oil production from 32.9 million tons in 1982 to some 50 million tons in 1986/87. The increase in aggregate value of the end products was computed to be LE 3.209, 1 million.[2]

It is worthwhile mentioning in this connection that the limited quantities of export oil in question are almost equal to the local consumption in Egypt.
The average exports of crude oil amounted to 14.6 million tons against a domestic consumption of refined oil of 16.5 million tons in 1982, increased to 18.3 million tons crude oil exports against 22 million tons domestic consumption.[3]

---

*1) Dr. Soliman , Abdel Aziz
Al Ahram Iktissadi No. 912, July 7 , 1986 , page 16
*2) Egyptian British Trade , December 1985 , page 40
*3) Egyptian British Trade , December 1983 , page 19-20

Putting into consideration that the domestic oil prices, instead of following down - move of prices, to the contrary , went up , as for instance , the fuel benzine has been increased by 100% over the span of 18 months.[3]
Putting into consideration that the basic price lived the period of $32/ barrel , one should come to the conclusion that the deficiency was rather of a limited significance due to the considerable increase of prices on the domestic oil products consumption.

1985 : fuel oil for most users increased from LE. 7.50 per ton to LE. 32 per ton . Gasoline increased from 15 piasters per liter to 20 piasters per liter for regular , and for premium gasoline prices were increased twice from 16 to 25 piasters per liter. Electricity tariffs have been raised since April 1982. Overall , however , energy prices probably still average less than 30 percent of world market levels[1].

Crude Oil : Crude oil exports of Egypt were stated to be USD 2770 millions for 1984/85 , and USD 2.106 millions for 1985/86.
On the other hand imports (CIF) started to be USD 11 .850 millions for 1984/85 and USD 11.150 for 1985/86.
This stresses out the afore-mentioned opinion that retreat in oil exports revenue that amounted to USD 670 millions could be encountered by the shrinkage of imports achieved in 1985/86 against that of 1984/85 which recorded a difference of USD 700 , - millions[2].

*1) Economic Trends Report , American Embassy , Cairo, June 1986 ,page 22.
*2) Economic Trends Report , American Embassy , Cairo, June 1986 ,page 26

2) Remarkable Shrinkage in Tourism Revenues :

It is apparent that touristic activities in Egypt have been subject to remarkable shrinkage, probably for safety reasons. [1]
The official reports indicate that touristic revenues related in percentage to the total revenues, are constantly on a decrease as follows : [2]

during 1975 - 1978 they ranged 12.4 - 15.9 %
during 1979 - 1982 they ranged 6.8 - 7.9 %
during 1983 - 1985 they ranged 5.3 - 6.6 %

However, a closer look into the figures would show that, though the percentage of touristic revenues related to total revenues is going down, the amounts of touristic revenues in value are going up, as per the following table : [3]

Table 54.

DEVELOPMENT OF TOURISTIC REVENUES 1975 - 1985

Period	Value Mio. LE	Development percentage	Percentage to total
1975	128.8	—	12.4
1976	180.6	40.2	12.9
1977	281.9	56.1	15.9
1978	271.3	-(3.8)	12.8
1979/80	460.6	—	7.9
1980/81	429.9	7.0	7.5
1981/82	425.1	-(13.8)	6.8
1982/83	455.6	—	5.8
1983/84	464.5	2.0	5.3
1984/85	556.3	19.8	6.6

*1) Dr, Soliman, Abdel Aziz, Al Ahram Iktissadi No. 912, July 7 , 1986 , page 17
*2) Senate Assembly Report 1986
*3) Rida Hilal, Al Ahram Iktissadi No. 909, June 16 , 1986 , page 32

In this connection , it might be interesting to make the comment that the results achieved might considerably differ according to the measures used. On one hand , the official measure considered the touristic revenues for 1985 to be one of the deficiency factors causing the stagflation. On the other hand , if such revenues were evaluated in net worth and related to the rate of development , one should consider the value of LE 556.3 million and the growth rate of 19.8% quite satisfactory , which actually is the highest rate since 1978.

It should also be subject to careful study and reconsideration , that the prevailing regulations compel foreigners to exchange certain amounts of currency upon entering the country , and to settle certain expenses; such as hotel bills and travel tickets in hard currencies.[1] such regulations apparently would not work in favour of tourism in the long run.

The picture in 1987 continued being on the step upward trend. In the first 7 months of 1987, a remarkable leap with 1,159,000 tourists was witnessed, against 734,000 during a corresponding period in 1986 , which represents an increase of 106% in number of nights spent over last years, and a 36% in number of tourists.

Tourists spent USD 850 million , while tourist nights amounted to 8.5 million.
One of the major objectives now is to prolong the stay of tourists in Egypt from an average touristic nights of 6 to 10 nights.

*1) Ministerial Decree law No.28 , year 1982

3) Decrease of the Rate in Private Sector Investments :

According to the data made available by the General Authority for Foreign Investment and Free zones , the rate of investments within the period 1981/1985 has shown a decrease by one third over the former five years.[1]

Certain expertise were biased to an opinion related to the so-called "imitation attitude" of the Egyptian investor , which linked most of them more to imitation than to innovation in choosing the nature of activity for their projects.[2]

This opinion , though of official source, lacks all logical support.

First : It is hard to sell an assumption that investors, on a majority scale do start projects at a lack of business background or insufficient experience.

Second : The relatively vast Egyptian market of over 50 mio. inhabitant span has always been common with shortage of commodity. If the before mentioned opinion were realistic , it should have been backed up with an over- competition in certain fields, resulting in an excess of supply not meeting relevant demand , which, of course,would have led to a dumping price phenomenon.

Such a phenomenon has never been traced at any time in the Egyptian market.

---

*1) Dr. Mohie El Gharib Deputy Chairman , Investment Authority
Al Ahram Iktissadi , No.916, Aug. 4, 1986

*2) Fathalla Refaat , Chairman Parl. Comm.
Al Ahram Iktissadi , No. 912, July 7 , 1986

It might be worthwhile in this context to honour more attention to complaints and claims of the investors, who have on their turn , a good argument as expressed through the Investor Association :

a) The controversial interpretation of the investment law clauses among different authorities , such as Customs and Taxation Department , has resulted in serious deletion of major privileges and abolition of advantages awarded to investors , which were supposed to be secured by this law. [1]

b) withdrawal of certain protection rights supposed to be secured by this law against mortgage and blockage unless by courtial judgement.[2]

c) The fluctuating instructions of the Banking Controlling Organization dictated substantial decrease in banks financial credit ceilings, which resulted in a complete stall of several projects that had experienced a remarkable degree of success before.[3]

This , among other reasons, have paved the way for a good deal of investment projects in process of official approvals to refrain from proceeding into execution stages.

---

*1) Investment Law , Article 15

*2) Investment Law, Article 7
Projects may not be nationalized or confiscated. " The assets of such projects cannot be seized, blocked,confiscated or sequestrated except by judicial procedures "

*3) Central Bank of Egypt Decree

4) Decrease in the Rate of Public Sector Investment :

It is a fact that the structure of the Egyptian economy has - up till now - given the leading role to the Public Sector due to its substantial size. However, inflexible regulations of unnecessarily strict nature were lately issued , apparently lacking a sound economic background, which have prepared for a steep and fast deterioration of the Public Sector situation.[1]

Among those regulations of a specially negative effect ,came the following :

a) Limitation of Public Sector to start any new investment but the renewal or overhaul of aforehand machinery , even if good possibilities with own resources existed.

b) Restriction of Public Sector to dispose of any assets of property of its belongings without prior approval of the " policies Committee " [2]

This has led , of course , to a severe limitation of considerable financial resources for a wide range of the public Sector , bringing it even closer to bankruptcy than ever before, irrespective of its enormous property such as shares, real estate and equipment, which would be liable, if disposed of , to bring such revenues sufficient enough to afford self-financing of all its needs of investment .

---

*1) Dr.Soliman , Abdel Aziz
Al Ahram Iktissadi No.912, July 7 , 1986, page 18

*2) The policies Committee is a Ministerial Committee consisting of Ministers liable to approve strategic matters.

Net worth of the public Sector amounts to LE. 30 billion , among which is LE. 5 billion , locked in stored stock, LE.8 billion locked in under-operation projects, and LE. 2 billion locked in joint venture shares.[1]

The Public Sector :[2]

The public sector plays a major role in Egypt's economy. Expenditures in the government's operating and investment budgets are over 60 percent of gross domestic product. Even then , the current expenditures of public-sector companies are included only to the extent direct operating subsidies are required. Public employees number about 4.5 million , about 35 percent of the labor force estimated at 13 million (another 2 to 3 million Egyptians are thought to be employed abroad).

Public employment includes over 3 million workers directly employed by the Ministries and economic Authorities (such as the suez Canal Authority), about **1** million industrial workers in civilian and defense-related public-sector companies, and nearly 500,000 active members of the armed forces. The latter are broken down by service as follows:

- Army	340,000
- Navy	20,000
- Air Force	27,000
- Air Defense	85,000

*1) Dr. El-Salmy , Ali (former Minister of Planning)
Al Ahram Iktissadi No.910, June 23, 1986, page 7

*2) Economic Trends Report, American Embassy, Cairo
June 1986, page 13.

5) Shrinkage of External Aids:[1]

It is apparent that external aids play an important role, affording additional funds not being a part of the government resources. Such funds would be utilized to cover deficiencies of the cash-flow balance, in the first line.

Unfortunately, the utilization of the aid funds has been designated, up till now, to this limited application that turned in most cases into consumption or intermediate commodities, and in the best cases into technical or utilities facilities. It is hoped for that this application of a rather limited value, could be replaced by another of a more investive nature, liable to encourage private investment on a larger scale, and initiate better utilization of human resources in agricultural or industrial activities.

This task, if accomplished, would be a great achievement aiming not only at better utilization of manpower and turning greater masses of inhabitants into productive elements, but also exceeding this to the important self-financed state of investment to be attained.

It should by no means be counted on, that external aid should remain as a lasting and eternal situation.

The Aid programs

On May 1st 1987, the IMF gave its formal approval to Egypt's reform program with an initial stand-by loan of USD 325 million which could eventually rise to USD 1 billion.

---

*1) Dr. Soliman, Ali
Al Ahram Iktissadi No. 912, July 7, 1986, page 18.

This has paved the way for the rescheduling by the Paris Club of most of Egypt's USD 12 billion of government guaranteed debt and spread it over 10 years.

World Bank loans are also being negotiated on a subsector basis for agriculture, industry and energy and could reach up to USD 900 million. The European Community has decided to increase the size of its aid flow to Egypt to USD 519 million over the next five years, an increase of 63% over the previous five year Protocol. In addition, soft loans worth USD 286 million will be made available to Egypt by the European Investment Bank over the next years, up from USD 171 million in the previous five years. [1]

Aid flows from the USA have been consistently high since the mid 1970 s at USD 1 billion every year in civilian aid and another USD 1 billion in military aid. The USA has in recent years turned all of the newly agreed proportion being paid out in cash rather than program assistance.

Improved relations with the Soviet Union have led to the rescheduling of all of the USD 3 billions worth of Egypt's military debt. Interest payments have been waived and the rescheduling in over 25 years including a grace period of 6 years. The USA is also expected to respond positively to Egypt's request for a reduction in the interest payment and reschedu ling of USD 4.5 billion in military debt.

The stepping up of foreign assistance and rescheduling of foreign debt to Egypt have gone a long way in restoring confidence among international creditors and suppliers.

---

*1) Economic Trends Report, American Embassy, Cairo, 1987.

But more important than Egypt's capacity to meet its short and medium term debt obligations, is the government's committment to set the country's own house in order. The far reaching implications of the economic reform program can be seen by examining its main features.

6) Deterioration of Trust in the Economic System:

The business sector has been subject to a severe shock upon the issuing of the so-called "5th January 1985 Economic Regulations". These regulations were aiming at a limitation of demand of dollars by strictly regulating import activities. Thus all imports, including those belonging to the investment projects which by law were exempted from following the regular import procedures,[1] had to go through the Import Regulation Committee, whose main task was to cut down import demands, irrespective of the urgent needs of the applicants, causing through this an uncontrollable negative resonance.

In early 1985 the government failed to gain free external transfers amounting up to USD 3000 million of Egyptians working abroad, and thus failed to fulfill its undertakings for financing the public and private imports once approved by the "Import Regulating Committee". In the meantime, this important source of external foreign cash-flow comprising the external incoming transfers that used to transact through brokers and private channels to fulfill the demand for private and partially public sector importation, has stopped completely.
This together with certain exaggerated procedures in customs evaluations and the taxation field have worked as major reasons for the business sector's loss of trust in the Government.[2]

---

*1) Investment Law No. 43, Article 15, 1974.
*2) Dr. Soliman, Ali, Al Ahram Iktissadi No. 912, July 7, 1986, page 19.

The result, opposite to Government expectations, was that the Egyptian pound value experienced an over 40% deterioration within a few months.[1]

Remittances by the more than 3 million Egyptians working abroad were up to 4 billion USD during 1982/1983, and down by about 250 million USD in F . Y . 1984/1985.
Preliminary indications are for a decline during the rest of the decade.[2]

7) Financial and Monetary Policy:

The financial and monetary policy could be considered as one of the major factors that led directly to the present magnified stagflation state.[3] Handling it as such, would be the main objective of the rest of this part of the thesis.

*1) Decrease in Egyptian pound against USD amounted to 50. &% within the period April 85 to April 86, Al Ahram Iktissadi No. 901, April 21, 1986, page 9.
*2) Economic Trends Report, American Embassy, Cairo June 1986, page 10.
*3) Mr. Mustafa Zaki, Chairman of Cairo Chamber of Commerce
Al Ahram Iktissadi No. 909, July 7, 1986, page 20.

The Financial Monetary Policy and the Stagflation in Egypt.

Since early 1985 a series of unfavourable financial regulations were taken. apparently lacking sufficient study and consideration, that should be held responsible by all measures for the economic deterioration experienced lately, which exceeded all expectations even among the pessimistic wings.

These regulations were initially taken in favour of the Egyptian Pound value and to improve the trade balance, however, resulted in just the opposite and in extreme intensity.

Such regulations started by dumping down the trade activity based on importation through the strict barrier of Import Regulating Committee.
This policy included several banking regulations, starting by prohibiting banks to finance importation of a list of commodities such as motor cars, electrical appliances, etc. even at a full value coverage from the importer's side,[1] and edging by specifying credit ceilings that may not be exceeded by banks under any conditions.[2]

Other limitations have also been applied specifying a deposit margin ranging between 25% and 100% of the L/Cs value to be deposited with the Central Bank for a certain period of time as an additional financial burden to both bank and customer.[3]
Last but not least, of such peculiar sort of regulations, banks got new instructions prohibiting any credits in local currency based on any form of foreign currency securities whatsoever,including Governmental Dollar

---

Central Bank of Egypt Decree
*1) Instruction Circular No. 254/1985
*2) Instruction Circular No. 15/1980
*3) Instruction Circular No. 244/1985

shares,which were previously announced acceptable as securities for credits up to 90% of value.[1]

In other words, foreign currency deposits and Letters of Guarantee had to be, all of a sudden, not acceptable and not good enough for local currency credits. Valid credits based on such securities were notified cancellation upon validity due date.

This wave of restrictive banking regulations came up to over 500 Decrees within the period of 4 years' time. The offshore and foreign investment-banks that have lately opened in Egypt following president Sadat's Open Door Policy have come up to 99 registered banks and branches.[2]

Unfortunately, the picture is likely to change now, Chase Manhatten Bank is offering its share of 49% (comprising the foreign investment) in Chase National Bank for sale. On the other hand, other banks such as British Midland and Royal Canada Banks in addition to the Swiss banks, Credit Swiss and Credit Lyonnais are following the same process.[3]
Bank of America and Citibank branches in Egypt are reducing their staff.

Much imagination would be needed to predict the magnitude of frustration and instability brought about through such unprecedented actions, and it is rather hard to give an exact idea, acceptable by all parties, of the economic damages and side effects resulting from these very actions, but in a trial, various measures may be inspeculated :

---

*1) Central Bank of Egypt Decree Instruction Circular No. 291/1986
*2) Dr. Higazi, Abdel Aziz Former Prime Minister Al Ahram Iktissadi No. 910, June 23, 1986, page 15
*3) Fadl Gamal, Al Ahram Iktissadi No. 912, July 7, 1986, page 20.

First Measure:

THE RATE OF EGYPTIAN POUND DEVALUATION AGAINST USD

It is needless to say that such acts were aiming in the first line at the improvement of the Egyptian Pound value, however, opposite results were attained.

For the sake of proper comparison, three periods of time will be put under consideration:

a) First Period, May 1980 - August 1982

Table 55.

Months No	Rate at Period Beginning	Rate at period End	period's Change Rate	Average Change Month
28	0 .74	1 . 07	44 . 6%	1 . 6%

These readings represent the natural rate of change long before any regulation acts were thought of.[1]

b) Second Period, September 1982 - March 1985

i - September 1982 - September 1984

*1) Al Ahram Iktissadi No. 901, April 21, 1986, page 9

Table 56.

Months No	Rate at Period Beginning	Rate at period End	period's Rate of	Average Monthly
25	1 . 07	1 . 24	15 . 9%	0 . 6%

ii- October 1984 - March 1985

Table 57.

Months No	Rate at Period Beginning	Rate at period End	period's Rate of Change	Average Monthly Change
6	1 . 24	1 . 40	12 . 9%	2 . 2%

iii- The Entire period Evaluation

Table 58.

Months No	Rate at Period Beginning	Rate at period End	period's Rate of Change	Average Monthly Change
31	1 . 07	1 . 40	30 . 1%	1%

These readings represent the natural rate of change just before the regulation acts were initiated.[1]

*1) Al Ahram Iktissadi No. 901, April 21, 1986, page 9

c) Third period, April 1985 - April 1986 [1]

Table 59.

Months No.	Rate at Period Beginning	Rate at period End	period's Rate of Change	Average Monthly Change
13	1 . 40	2 . 11	50 . 7%	3 . 9%

This measure is quite indicative as it stresses out several facts:

1) For 28 months, namely from May 1980 till August 1982, the monthly average rise of Dollar/Pound rate did not exceed 1 . 6%.
2) For the next 31 months, namely from September 1982 till March 1985, i . e . , just before the application of the new regulations, the monthly average growth of Dollar/Pound rate improved coming down by 1% per month.

3) Contrary to all expectations meant by these regulations, the monthly average rate recorded a drastic rise of 3.9 % per month for the 13 months following the application of such regulations, bringing just the opposite result.

4) The funds involved during this period of 13 months amounted to USD 1400 million.[1]

*1) Hilal Rida, Al Ahram Iktissadi No. 909, June 16, 1986, page 31

Second Measure: Capital Markets [1]

Egyptian capital markets are today only a shadow of their former size. The Cairo Stock Exchange, which was sixth largest in the world before World War II, effectively ceased to exist during the Nasser era. Today the exchange trades Egyptian Government Bonds in both LE and Dollars, and stocks in LE, Dollars, and Sterling Pounds. Total Trading volume in terms of market value has been as follows in recent years :

Cairo Stock Exchange activity 1982/83 - 1984/85

Table 60.

	82/83	83/84	84/85
Government Bonds			
LE (000)	0	315	1,105
Dollars (000)	2,314	950	422
Stocks			
LE (000)	8,015	24,656	27,716
Dollars (000)	10,013	21,292	47,246
Sterling (000)	29	2	2

The GOE through the capital Market Authority has been encouraging the development of a capital market in Cairo. While trading on the exchange has been growing, total volumes are still very small. Capital for new equity joint ventures is usually raised through private placements by Investment Banks. Sales of such shares are also often arranged by private placements although the transfers may be recorded on the exchange. The most active shares on the exchange are currently the equivalent of penny stocks in Islamic companies and banks.

*1) Economic Trends Report, American Embassy. Cairo June 1986, page 16.

Egyptian laws in the field of auditing, with regard to holding securities, and transfer of funds abroad, are not as favourable as they might be to encourage the development of an important capital market. Additionally, overall confidence in the economy at this point is probably not conducive to the growth of a capital market of International dimensions.

Third Measure: The Protest and Bankruptcy Cases

The protest and bankruptcy statistics could be used as a practical indication of a certain market's actual condition. Following date were released by the Egyptian Chamber of Commerce during the period of the study, i . e . 1983-1985, thus they could be considered as a most adequate measure.[1]

a) During 1983

Table 61.

- Protest cases amounted to	: 253119 cases
- Bankruptcy cases amounted to	: 63279 cases
- Percentage of bankruptcy/ protests	: 24 percent
- Amounts involved	: 170.1 million pounds

b) During 1984

Table 62.

- Protest cases amounted	: 260301 cases
- Bankruptcy cases amounted	: 65075 cases
- Percentage of bankruptcy/protests	: 25 percent
- Amounts involved	: 194, 4 million pounds

*1) Mostafa Zaki; Chairman of Chamber of Commerce, Al Ahram Iktissadi No. 912,July 7, 1986, page 20-23

c) During 1985

Table 63.

- protest cases amounted	: 466063 cases
- Bankruptcy cases amounted	: 233032 cases
- Percentage of bankruptcy/protests	: 50 percent
- Amounts involved	: 705 . 8 Million Pounds

Interesting data were obtained from comparing between first and second halves of 1985:

1) First half 1985[1]

Table 64.

- Protest cases amounted	: 149524 cases
- Bankruptcy cases amounted	: 74612 cases
- Percentage bankruptcy/protests	: 49 . 9 percent
- Amounts involved	: 352 . 9 Million Pounds

2) Second half 1985[1]

Table 65.

- Protest cases amounted	: 316539 cases
- Bankruptcy cases amounted	: 157953 cases
- Percentage bankruptcy/protests	: 49 . 9 percent
- Amounts involved	: 352 . 9 Million Pounds

This measure is quite self-explicit, as the statistics concerning protests and bankruptcy have always been regarded as a good barometer for a market's actual condition.

*1) Egyptian Chamber of Commerce Report, 1985.

Studying the above mentioned data would lead to the following conclusions:

One could consider both years 1983 and 1984 as standard samples, as they fulfilled most logical expectations.

The protest cases have slightly increased during 1984 over 1983; i . e . within 2 . 75 percent. The rate of bankruptcy/protests increased by 1 percent, i . e . from 24 percent to 25 percent.

As for 1985, the year such regulations were put into application, most amazing results were obtained, disqualifying it from being a standard sample, statistically speaking.

The protest cases have jumped up to 466063 cases, recording an increase of 79 percent in 1985 over that of 1984.
The cases of bankruptcy amounted to 50 percent in 1985 and a relative increase of (100 %).
As for the amount of funds involved in protests and bankruptcy during the year 1985, they reached a record of 705 . 8 Million Pounds, i . e ., exceeding by 3 . 63 times those recorded in the year before.

Having a closer look into this unlucky year of 1985 to comparing between both its halves, following results were obtained:

1) During the first half of 1985, 149524 protest cases were recorded, constituting 32 percent of the entire cases of the year. The funds involved amounted to 352. 9 Million Pounds.

2) During the second half of 1985, 157953 cases were recorded, constituting 68 percent of the entire cases of the year.
The values involved amounted to exactly the same as in the first half of the year.

3) This means that during two equal periods of 6 months within the same year, more than double the number of traders failed to fulfill their obligations regarding the same amount of funds.

Amazingly, this result is almost identical for protest and bankruptcy cases, bringing following rate of rise between 1st and 2nd half of 1985:

Protests amounted	1 : 2 . 117
Bankruptcy amounted	1 : 2 . 1169

The Business Sector in Crisis

Since the open door policy was established in 1974, the private sector's share in industrial output has grown from just over twenty percent to one third. The private sector generates over 60 percent of GDP when the agricultural and service sectors are added in. Foreign and domestic manufacturers have been spurred on by Laws 43 and 159.[1]
Thus, the business sector should be regarded most productive, not only for its own behalf and welfare, but also as a main source of taxes and customs duties for the Government.

This most important sector comprising industrial and trade activities, had to face drastic troubles whether through the strict regulations and other causes leading to stagflation, or through the side effects resulting from it.

---

*1) Economic Trends Report, American Embassy, Cairo, June 1986, page 4.

In other words, the business sector had to suffer twice in this respect, once through import regulating bottlenecks , shrinkage of afore-hand credit resources , facing sudden banking obligations through cancelling of securities, and once again having to face the shrinkage and recession effected through the stagflation.

The consequences were indicated significantly by the drastic and alarming rise in the rate of bankruptcy that broke out during 1985 and exceeded the rate of the previous year by 358 percent.[1]

All expectations indicate that the situation is liable to more deterioration with an escalating rate during 1986.

In a recent interview with Dr. Aziz Sidki, former Minister of Industry (1957-1965), who was in charge, during President Nasser's regime, of the "Industrialization Motion" which was of public sector nature, he answered to the question of his evaluation of the future for the industry in Egypt by saying:

> *"The economic situation is critical and there is a state of retreat in the industrial development. A strategic planning is needed putting into consideration the available possibilities."*

---

*1) Mr. Zaki, Mustafa Chairman of Chamber of Commerce,
Al Ahram Iktissadi No. 912, July 7, 1986, page 20-23.

He replied to another question about the losses the public sector is undergoing , by saying:

> *"The public sector does not make losses. It should be understood that there is a social price and an economic price, and it is the responsibility of the Government to offer a social price which is an advantage in itself. "* [1]

Contrary to this opinion came that of Eng. Mohamed Abdel Wahab, present Minister of Industry, he said:

> *"We are refraining from any investment in the industrial public sector at the moment to avoid deficits, and the only solution in my opinion for initiating industrial development would be relying on the private capital. Our five-year plan (1987-1999) is considering private sharing by 50 percent of entire investments. If these shares were not to be made available , the industrial development will be very limited , I am afraid."* [2]

---

*1) Rida Hilal, Al Ahram Iktissadi No. 903, May 5, 1986, page 16-17

*2) Rida Hilal, Al Ahram Iktissadi No. 903, May 5, 1986, page 17

PROBLEMS AND PATTERNS APPLIED AND THEIR COST

It seems that the business sector will have to live the next stage with three major limitations:

1) Commodity Classification

This prevails for a list of commodities and raw materials that would be declared prohibited for importation by the Import Controlling Committee.

a) The trading sector will have to either deal with a local substitute irrespective of the quality differences, or change its nature of activity. Of course, activities with experience and know-how background will be very costly to change.

b) The industrial sector relying on raw materials subject to limitation will face more difficulties and an inadequate substitute will probably be on cost of quality.

2) Bank Credit Limits

These limiting regulations, whether working on the increase of interest rates, prolongation of procedures, or shrinkage of credit ceilings and securities, will lead to one end which is the increase of cost and decrease of turnover and productivity.

a) The trading sector will of course charge the additional overheads further to the consumer, adding more unfavourable conditions to the present stagnation state.

b) The industrial sector will apparently suffer more as the increase in cost will result in a decrease of productivity leading last end to the serious problem of unemployment.

> *"The depreciation under inflexible exchange rate would permanently rocket up domestic wage rate, and force on the macro authorities a dilemma of a higher price level or higher unemployment."* [1]

3) Escalation of US-Dollar rate

One may consider both of the afore-mentioned problems to be a rather calculated-risk nature, in addition to the fact of being controllable, they could at any time be revoked, either partially or completely.

The inevitable problem of unlimited destructive nature is actually the escalating rise of foreign currencies rate under the present financial system and the inconvertible basic currency.

This negative aggregate shock [2] stood as a major reason behind the vast wave of bankruptcies that broke out during 1985, which was directly linked to the monthly average rise of 3.9 percent in the dollar exchange rate over a period of 13 months.

---

*1) Thomas Willett and Matthias Wolf, The Vicious Circle Debate Kyklos, 2/1983 Basel, page 239

*2) Henry C. Wallich; Joanna A. Gray
Stabilization policy and Vicious and Virtuous Circles op. cit. page 52

Boundaries of the problem

In spite of the fact that the problem of continuous rise in foreign currency rates against a relevant devaluation of the basic local currency has always been there, this drastic rate has never been reached before. Its enormous side effects extended negatively on both trade and industry alike, thought in a different mode of damage.

a) The Trade Sector

This sector, relying on banking facilities, was subjected to the economic illusion of selling the goods and by the time advances are payment due to the bank, considerable losses are achieved.[1]

> *"This type of price-wage exchange rate interaction described in the Vicious Circle Literature is most likely to occur in a situation of excessive monetary expansion."*

This problem would be stressed out for major importers whose system is to distribute considerable masses of commodity among hundreds of wholesalers and retailers against deferred payment drafts payable over an extended time that could come to one year.

Another example is the case of government-based tenders whereby one has to quote in advance and extended time of delivery of up to 24 months would be in question, as in case of power-station components and ship-building activities..... etc.

*1) John F.O. Bilson,
The Vicious Circle Hypnosis Op. cit. page 21

Such cases were unfortunately subject to bankruptcy in one shot, while luckier cases had to face liquidity consumption problems.

Other cases which were of a better economic orientation with such a problem, applied a new pattern of asking for an advance credit for the full value in basic currency from their bank to convert a full coverage in foreign currency for this specific transaction, and thus eliminate currency risk.
This attitude, though having its higher cost, can afford security to this specific transaction, but does not extend it to the next one. In other words, it might be very common that the outcome of one transaction would not be sufficient to finance the next similar transaction in view of the relevant changes of exchange rates, and thus liquidity consumption would be the trend.

b) The Industrial Sector

This sector has a more complicated aspect due to its nature of continuity of production flow and marketing that makes it quite impossible to shift into individual batch cost-accounting and exceed it to a further individual batch marketing policy. The inevitable result would be the vicious circle of liquidity consumption leading last end to more serious consequences.[1]

*1) Analysis of Macrostabilization problems and disturbances affecting inflation-unemployment by Wallich and Gray
Stabilization policy and Vicious and Virtuous Circles Op. cit. page 50-52 .

Floating of the Egyptian Pound

This question has been subject to extended debates among the various wings of local economists, and it seems that no final decision has been reached.

The main argument speaking against the floating of the Egyptian pound represents the fear of an exaggerated demand for foreign currencies to take place, resulting in a considerable devaluation of the basic currency. Among the major supporters of this opinion comes Mr. Ali Negm, Governor of the Central Bank of Egypt. Such sudden devaluation would be apt to cause an uncontrollable price increase in the domestic market.[1]

The opinions speaking for the floating of the Egyptian pound pay less attention to the devaluation problem, bringing the argument to the point that the present prevailing banking regulations allow transfers of foreign currencies without any restrictions. All foreign currencies are also free for deposits in local banks, and the situation can be regarded as of sufficient stability, safe from any unexpected fluctuations. Thus, such fears of uncontrollable devaluation would be considered as unnecessary fears according to the former opinion.

1987 brought again new regulation . On one hand , the rate of conversion became very close to the floated rate . On the other hand , brought restri ction to foreign currency transfers including L/C 's subject to one - year deposit period prior to transfer of the fund in question.
This add another burden to the process and also unnecessary cost.

---

*1) Various statements given by Mr. Negm expressing his disapproval of the floating of the Egyptian pound
- Al Ahram Iktissadi No. 901, April 21, 1986, page 16
- Al Ahram Iktissadi No. 916, August 4, 1986, page 19

PERSONAL COMMUNICATION: Thomas Ransom, Vice President, Bank of America, Cairo.

Held on July 1986:

1) The Question of Floating Possibilities of the Egyptian Currency:

Mr. Ransom expressed the opinion that he is basically for it, however, certain regulations will have to be put into consideration. The major side effect would be the social cost of it, i.e., the liability of decrease in the standard of living, which will affect the layman. An over-leverage would be also expected.

Mr. Ransom added that the Egyptian Government should be prepared for two things before deciding upon the currency floating:

a) The loss of the cheaper resource of hard currency made available through the obligatory transfers of tourists, businessmen and export revenues, and thus, find a more costly substitute.
b) The absorb of the superficial increase on the deficit side of balances, due to the increase of cost for foreign currency.

2) The Question of Banking System Policy :

Mr. Ransom stressed out that 3 major regulations have to be regarded as most important in order to enable the banking system to function with full efficiency :

a) Unifying the banking system so that banks may share the same advantages, irrespective of the identity of their nature; whether being public sector banks, special decree banks, offshore banks, joint-venture or even private individuals' banks.

b) Issuance of Governmental debt instruments.
This system, once established, in markettable amounts, would help on one hand; to eliminate the consequences of bad social savings habits, and on the other hand would initiate an enormous real estate financial mechanism which the country is lacking.

c) A floating monetary system should necessarily allow in the same time both; a floating interest rates and a floating paying rates, including adjustments as well.

3) The question of the Economic Structure :

Mr. Ransom commented that the country should set free its economic regulations from any political influence. An example of this is the contradiction between the market dynamic capacities and the control of ownership restricted through :

- The public Sector for commercial and industrial activities.
- Agricultural land ownership limitation. (In 1954 a law was established specifying an upper limit of 100 feddans per family including minors). The excess was nationalized and re-distributed in shares of 5 feddans among abject peasants.

4) The Question of Economic Reform:

Mr. Ransom is of the opinion that a well organized 5-year plan is most needed. Such a plan should not overlook the productive sectors, such as; farmers who should be given the right of free market trading of their products. According to the present agricultural system, farmers are restricted to plant certain crops in accordance with the Governmental Agricultural plan, and the harvest will have to be handed to the Agricultural Cooperative Community at a price fixed by the Government. The transportation of crops from one province to another, on a private basis, is also restricted. This results in an official and black market for every agricultural commodity.

Advantages of Changing into Floating System

It is apparent that the floating system will allow several advantages working at the end for avoiding a good deal of the exchange risks which have been subjected to operating under fixed-rate conditions.

First of all, the floating system will make it available to use the appreciation and depreciation rates affording a good scope of forecasting.

One of the major risks of rates fluctuations on putting prices ahead in advance can be eliminated through forwarding actions. Hedging deals would also be available for securing exchange risks of multiple currencies and transactions at a reasonable cost.

In many cases, insurance is accepted against fluctuations of exchange rates by keeping a certain fixed rate for a certain amount and time against a reasonable premium.

Fourth Measure :

Foreign Debts

This measure has not been approached by any of the official Economists, which a state does not correspond at all with its significance.

Civilian medium-and long-term foreign debt reached **$15.7 billion** in FY 1982/83, **$16.5 billion** in FY 83/84, **$16.5 billion** in 84/85, and perhaps **18 billion** by end of FY 85/86. Egypt's short-term debt is in between **5-6 billion**. private non-government guaranteed foreign debt is probably about **$6 billion**. Military debt is about an additional **$8-9 billion** (this does not include Soviet military debt).

This total foreign debt would probably be about $37 billion. Debt service takes 27 percent of current earnings (FY 85/86). When servicing upward of **$8 billion** in military debt is added, the debt service absorbs 35 percent of Egypt's current earnings. (IMF estimates of debt services for F.Y. 85 and F.Y. 86 are **$3.7 billion**). A major portion of the medium and long-term civilian debt is concessional foreign assistance from the U.S., Germany, Japan and the World Bank. Short-term and military debt is at commercial terms.[1]

*1) Economic Trends Report, American Embassy, Cairo June 1986, page 22

The distribution of such external debts renders every Egyptian of the 50 million inhabitants indebted by US dollars 740.--.

From the forthgoing figures, one can only assume that such foreign debts would be liable to a continuous growth over the years, as far as the expenditure utilization of such are linked to the improvement of the Governmental deficit side.

In order to avoid having the foreign debts being a constant and lasting situation, the nature of expenditure has to be changed directing it towards productive activities, objectives of which are the utilization of the enormous human resources and manpower available.

CONCLUSION AND RECOMMENDATIONS

It is a common fact that man and his welfare is the final goal for every development and any research work, thus it is hoped for that this work will help in giving more understanding to problems that may show classical in appearance, but could still have a different nature. Consequently, the approach in handling would have necessarily to be different .

The case study referred at as a main example throughout the thesis played a very good role as a live sample undergoing everyday business climatic and environmental conditions and reacting with all their variables and parameters.

It is believed that this work serves best in offering a form of integrated idea about the impulse and reflex of all three major activities ,dealt with, on one another i.e. INDUSTRY , MARKETING , and ECONOMY.

As far as the economic aspect is concerned, and in view of the various parameters of research speculated throughout this thesis, one could affirm that though certain shortages in financial resources and revenues do exist, however, sufficiency and even surplus in human resources was observed.

Most of the efforts spent by researchers within this area proceeded with the preassigned objective of acting on encouraging the former and suppressing the latter, i.e., acting favourably for the increase of revenues and unfavourably for the population growth . In other words, most of these efforts were targetted on the expenditure area and hardly on the production .Scarcely, any remarkable work was traced aiming at implementing the latter to serve the former.

A most direct reflex to be exploited should have been how to employ and utilize the rich existing human resources in attaining favourable results in financial and revenue terms.

Thus, PRODUCTIVITY is the NOMINATION of the entire problem.

In order to face the deficiencies , samples of which have been thoroughly reviewed in the forthgoing parts, a more intact infrastructure should, by all means be thought of , having the human resources as a main tool for solving the economic problem . In doing this, every achievement in productivity terms will lead to both economic development and human development as well .

If we consider the industrial activity, proper organization should always start with a solid apprenticeship system . In most industrial countries , it has been witnessed that apprenticeship qualification was successfully utilized as a pre-requisite for establishing any private technical activity such as job-shops .

In application of same procedure in Egypt, apprenticeship should be established in a wide scale all over the country in systematic programs, planned in accordance with its industrial future forecast .

Apprenticeship qualification must be taken as the main pre-requisite for starting any technical private activity .

It is apparent that international external aid packages offered could play a more useful role if they were directed to the support of productivity rather than simply being consumed on . A most adequate utilization of the external aid resources is the field of apprenticeship planning ,

establishment , teacher training , follow-up and practical guidance services to be extended to the qualified apprenticese . Such should be distributed among the industrial cities and industrial communities and should be given an access to subsidized machinery and equipment, or subject to sufficient financial facilities . One could, furthermore, link the amount of technical staff employed with the amount of technical facilities made available for each job-shop to be established .

Parallel to this, one could push forward the agricultural activity in a similar way. Agricultural apprenticeship should be thought of as a prerequisite for getting access to property of reclaimed lands, implements and machinery as well . The amount of agricultural staff employed could be linked to the amount of agricultural facilities made available to such private activities .

Fishing activity, for instance , could be organized in a similar way, starting with apprenticeship and ending up with fishing equipment and utilities, linking such with the amount of staff employed.

This concept could be generalized for almost every other field of activity , which has to do with technical or organizational activity , to be supported by the country in order to increase productivity as a national target.

It is needless to stress out the fact that any aid donor would very much appreciate better utilization of the support extended, turning it into productive gears rather than into consumption .

It should not be overlooked that the aid facilities must not be relied upon as a lasting resort .

On the technical level, industrial development plan should have a back-up of technical standards. Thus, the Egyptian Organization for Standardization should be allowed a leading role . International support would definitely be needed to over-bridge the time lapse .

Standardization of almost every technical product should practically take over and be accepted as such . In order to do this , the role of the Industrial Control Administration should be magnified .

On the countertrade level, there seems to be a lot that can still be done to give support to the productive sector . There is a good deal of components and semi-fabricated technical parts that can be countertraded, and a lot more that could be manufactured in accordance with the specifications of industrial countries or organizations, but there is a link that seems to be missing ..... Is it because countertrade is mainly dealt with by the hands of either politicians or traders, that industrial components and semi-fabricated technical products have poor chances ?

Probably a part of the international Aid programs designated for Egypt, should give more attention to technical countertrading , i.e. , accepting locally manufactured technical elements and components, including the development for not yet existing ones, against the delivery of raw materials, know-how and development facilities .

As for the business sector, the role of which should not be disregarded at all ; there seems to be a lot of regulations that have to be established in support. The influence of such regulations will positively extend to the entire economy.

At certain stages, the problems and patterns of the case study were stressed on , an approach which was deliberately meant.

Among these regulations, the following could be regarded as most adequate for a first priority :

- Floating of the Egyptian Pound .
- Allowing banks a free hand in making their own policies.
- Issuance of governmental debt instruments .
- Encouraging banks to establish real estate financial mechanism .
- Release of credit ceilings to be decided according to the policy of each bank .
- Release of restrictions set on dealing and possessing of foreign funds including transfers .
- Allowing import possibility by lease .

The work, on the whole, emphasizes the influence of the individual cases on the entire structure, and on the other side , assures that an application of a proper economic policy would lead to an economic renaissance long waited for , leaving its landmarks on one of the developing countries , seeking its industrial identity , the only industrial handicap of which was that it did not undergo the stage of industrial revolution during the past century .

Last but not least, it is hoped for that this research work has sufficiently speculated all various major aspects having to do with

INDUSTRIAL AND ECONOMIC PATTERNS APPLIED IN EGYPT

and that the approach and treatment of the subject which deliberately had to reciprocate back and forth between micro and macro parameters, in search of the boundaries and causes of the problem , would qualify this work to be regarded as an added value in this field .

LIST OF TABLES

		Page
Table 1 :	Egyptian Industrial Production 86/87	9
Table 2 :	Projects Approved 1974/87	15
Table 3 :	Project Operation 1974/87	16
Table 4 :	Level of Implementation of Low 43 Projects	16
Table 5 :	Origin of Invested Capital	17
Table 6 :	Capital Development 1973/1986 in LE.	18
Table 7 :	Development of Technical Facilities 31/5/1974 31/12/1986	19
Table 8 :	Development of Manpower 1981 Until 1985	20
Table 9 :	Development of Wages and Salaries 1981 Until 1985	20
Table 10:	Development of Industrial Productivity 1981 Until 1985	21
Table 11:	Development of Adm. / Sales Productivity 1981 Until 1985	21
Table 12:	Development of Revenue per one LE. , Wage / Salary 1981 - 85	21
Table 13:	Structural Transformation and Growth	23
Table 14:	Social Indicators	24
Table 15:	List of Rules and Abbreviations	47
Table16(a) :	Percentage Difference in Unflushed and Flushed Data for Average Tardiness	51
Table 16(b):	Ditto but for RMS Tardiness	51
Table 17:	**Shop Performance for Uniform Service Time:**	
Table 17(a):	70% Shop Utilization	54

LIST OF TABLES (contd.)

Page

Table 17(b):
77% Shop Utilization 54
Table 17(c):
85% Shop Utilization 54

Table 18: **Slop Performance for Uniform Service Time :**
Table 18(a):
70% Shop Utilization 55
Table 18(b):
77% Shop Utilization 55
Table 18(c):
85% Shop Utilization 55
Table 19: Shop Performance for Uniform Service Time :
Table19(a):
70% Shop Utilization 56
Table19(b):
77% Shop Utilization 56
Table19(c):
85% Shop Utilization 56
Table 20(a):
Average Tardiness Paired 59
Table 20(a):
RMS Tardiness Paired Comparisons 59
Table 21: Average Tardiness Overall Ranking 60
Table 23: Average Tardiness - Ranking by Shop Load 60
Table 24: Average Tardiness Overall Ranking 60
Table 25: RMS Tardiness Performance Ranking 61
Table 26: RMS Tardiness Ranking - Normal & Uniform
Service Times for Shop Loads of 77% and 85% 61

LIST OF TABLES (contd.)

		Page
Table 27:	Shop Load	61
Table 28:	Egyptian Food Diet Compared to Balance Food Died and Ratios	74
Table 29:	Edible Oil Supply Demand and Gap	75
Table 30:	Fish Production Sources	46
Table 31:	Animal Protein Supply / Demand Gap	78
Table 32:	Animal Protein Production Gap Forecast over the Period 1988 - 2000	79
Table 33:	Quantitative Changes in Production of Main Industrial Products During 1981/82-1985/86	80
Table 34:	Major Industrial Gaps-Food Industries	81
Table 35:	Ditto but Electrical & Electronic Industries	81
Table 36:	Textile Industries	82
Table 37:	Building Materials & Refractories Industries	83
Table 38:	Engineering Industries	83
Table 39:	Metallurgical Industries	84
Table 40:	Chemical Industries	84
Table 41:	Gross Domestic Product at Current Prices L.E. Million	85
Table 42:	Wholesale Price Index Numbers Classified According to (S.A.C.E.A.) 1965/1966 -100	86
Table 43:	Wholesale Priced Index Numbers by end use (major groups) (1965/1966 = 100)	88
Table 44:	Wholesale price Index Numbers by Stage of Processing (Major Groups) (1965/1966 = 100)	88
Table 45:	General Consumer Price Index All Urban Population August 1987 & Percent Charges from August 1986 & July 1987	89

LIST OF TABLES (contd.)

		Page
Table 46:	Prime Egyptian Exports : Relative Weight of Main Egyptian Goods 1980/81 to 1985/86	91
Table 47:	Geographical Distribution & Relative Weight of Overseas Markets 1975 to 1986/87	96
Table 48:	Segment Analysis for Industrial Life Cycle	119
Table 49:	Relative Importance of the Elements of Marketing Communications	122
Table 50:	Sales Promotion Media in the Industrial Market	124
Table 51:	Basic Economic Indicators	127
Table 52:	The Balance of Payments	129
Table 53:	First and Second Five Year Plans	132
Table 54:	Development of Touristic Revenues 1975 - 1985	135

Tables re the Rate of Egyptian Pound Devaluation Against USD Considering Three Different Periods :

Table 55:	First Period : May 1980-August 1982	147
Table 56:	Second Period : September 1982 - March 1985	148
Table 57:	October 1984 - March 1985	148
Table 58:	The Entire Period Evaluation	148
Table 59:	Third Period April 1985 - April 1986	149
Table 60:	Cairo Stock Exchange Activity 1982/83 - 1984/85	150
Table 61:	The Protest & Bankruptcy Cases During 1983	151
Table 62:	Ditto but During 1984	152
Table 63:	Ditto but During 1985	152
Table 64:	Ditto but During 1st half of 1985	152
Table 65:	Ditto but During 2nd half of 1985	152

LIST OF FIGURES

		Page
Figure 1 :	Organizational Structure of the Production Plant	29
Figure 2 :	Unified - Target Incentive Chart	33
Figure 3 :	Production Scheduling	37
Figure 4 :	Illustration of Variable Order Quantity and Average Inventory - Order 600	38
Figure 5 :	Ditto but - Order 100	38
Figure 6 :	Lead Time Chart	40
Figure 7 :	Diagram of the Shop Configuration	49
Figure 8 :	Random Block	52
Figure 9 :	Flowchart Illustration for two Production Plants and 9 Distribution Branches	67
Figure 10:	Egyptian Exports Geographic Distribution 1985 / 88	92
Figure 11:	Consumer Price Index for Egypt - Urban Population	105
Figure 12:	Distribution Channel in Industrial Market	111
Figure 13:	Product Life Cycle	119

BIBLIOGRAPHY,

PART ONE:

1. Apple, J.M. , *Plant Layout and Material Handling*, third ed. , Roland New york, 1977.

2. Apple, J.M. , *Material Handling System Design*, Wiley Interscience, New York, 1972.

3. Boutros-Ghali, Y. Taylor, L. , *"Basic Needs Macroeconomics: Is it manageable in case of Egypt"* ,Journal of Policy Modeling, Vol.2, No.3, Sept. 1980, p.409-436.

4. Conway, Richard W. , *"Priority Dispatching and Job Lateness in a Job Shop"*, Journal of Industrial Engineering, Vol. 16, No.4, July-August 1965.

5. Conway, Richard W. , *"Priority Dispatching and Work In - Process Inventory in a Job Shop"* Journal of Industrial Engineering, Vol.16, No. 2, March-April 1965.

6. Dar-El, E. and Clother, R. : *"Assembly Line Sequencing for Model Mix "*, International Journal of Production Research", Vol. 13 No. 5, 1975.

7. Davis, L.E. , : *"Pacing Effects on Manned Assembly Lines"*, International Journal of Production Research, vol. 4, No. 3, 1966.

8. Nevins, A.J. : *"Assembly Line Balancing Using Best Bod Search"*, Management Science, vol. 18, No. 9, 1972.

BIBLIOGRAPHY,

PART ONE (contd.):

9. O'Brian, J.P. ," *Attitude of Employee and Employer, Key to Producivity Improvement, AIIE Processings*", 1982 Conference, May 23-27, 1982.

10. Panwalker, S.S. , Wafik, Iskander, *"A Survey of Scheduling Rules"*, Operations Research, vol. 25, No. 1, 1977.

11. Rochette, R. , *"A Statistical Analysis of a Job Shop Scheduling Problem"*, Unpublished ph.D Dissertation, University of Massachussetts 1975.

12. Sadowski, R.P. and Jacobson, R.E. , *"Scheduling Algorithms for Unbalanced Production Line"*: An Analysis and Comparison" AIIE Transactions, vol. 10, No. 1, March 1978.

13. Sims, E.R. , Jr. , *Planning and Managing Materials Flow*, Industrial Education Institute, Boston, 1968.

14. Solberg, J.J. and Stecke, E.K. , *"Some Results from Scheduling Theory Pertinent to Computerized Manufacturing Systems"*, Research Report , Purdue University, 1976.

15. Walpole, R.E. and Mayers, R.H. , *"Probability and Statistics for Engineers and Scientists"* The McMillan co. , New York, 1968.

16. Wild, R. , *Mass-Production Management*, Wiley, New York, 1972.

BIBLIOGRAPHY,

PART TWO :

17. Choffray , Jean - Marie and Lilien , Gary L., *" Assessing Response to Industrial Marketing Strategy "*, Journal of Marketing, 42 (April 1978)

18. Choffray , Jean - Marie and Lilien , Gary L., *Market Planning for New Industrial Products*. New Yourk Wiley, 1980

19. Cravens, David W. *" Marketing Strategy Positioning "*, Business Horizons 28, (Decmber 1975)

20. De Kluyver, Cornelis A. , *" Innovation and Industrial Products Life Cycles "* , California Management Review 20 (Fall 1977)

21. Farris, Paul W. and Puzzell , Robert D. : *Relationships Between Changes in Industrial Advertising and Promotion Expenditures and changes in Market Share*. Cambridge, Mass. : Marketing Science Institute , Dec. 1976.

22. Gorey , E. Raymond, *Industrial Marketing*. Engelwood Cliffs, N.J. : Prantice-Hall 1976.

23. Haas, Robert W. ; *Industrial Marketing Management* , Kent Publishing Co. , Second ed. , 1982

24. Kolgraf, Ron , and Miller , Gregory W. *" South / North : Markets in Transition "* , Industrial Distribution 70 (January 1980)

BIBLIOGRAPHY,

PART TWO (contd.):

25. Ljungren , Roy , G. : " *Building More Business With Industrial Direct Mail Advertising* " , Industrial Marketing Management 5 (1976)

26. McDermott, Dennis R. , and Schweitzer , Charles N. , " *Product Vs. Customer Focus in Industrial Selling* " . Industrial Marketing Management 9 (1980).

27. Michman, Roland D. , " *Trends Affecting Industrial Distributors* ", Industrial Marketing Management 9 (1980)

28. Perreault, William D. , Jr., and Russ , Fredrick A., " *Physical Distribution Service in industrial Purchase Decisions* ", Jounral of Marketing 40 (April 1976)

29. Risley , George, *Modern Industrial Marketing* , New York : McGraw - Hill , 1972

30. Smackay , Bruce M. " *A Profit Emphasis for Improving Sales Force Productivity* ", Industrial Marketing Management 6 (1977)

31. Teresko, John ," *Bridging the Gap Between Trade Shows and Sales* ", Industry Week 198 (Jnuary 9, 1978)

32. Wasson , Chester R. , " *The Importance of the Product Life Cycle to the Industrial Marketer* " Industrial Marketing Management , 5 (1976)

BIBLIOGRAPHY,

PART TWO (contd.):

33. Wester Frederick E. Jr., *Industrial Marketing Strategy*. New York : Wiley 1979.

34. Wester Frederick E. Jr., *" The Role of Industrial's Agent in Industrial Distribution"* Industrial Marketing Management 8 (1979)

35. Yelle , Louis E. , *" Industrial Life Cycle and Learning Curves : Interaction of Marketing and Production "* . Industrial Marketing Management 9 (1980)

BIBLIOGRAPHY.

PART THREE :

36. Abdel-Malek, T; Kramer, G.; Teck, A
"Focus international currency. Three articles on the impact of the present floating system on the behaviour of the business firm".
Columbia Journal of World Business, New York No.3, fall 1976.

37. Agmon, T.; Arad,R. *Currency-related risk and risk premium in the world's currency market"*
European Economic Review, Amsterdam, No.3, August, 1983.

38. Alieber, R.Z. *" The Firm under pegged and Floating exchange Rates"*
Scandinavian Journal of Economics, Vol. 78, No.2, 1976.

39. Bradshaw, R.C. *"Foreign Exchange Operations of US Banks"*
International Finance discussion No.69, Nov. 1975.

40. Brodsky, D.A.*"Exchange rate changes and the measure of export instability"*
Oxford Bulletin of Economics and Statistics,
Oxford, No.3, August, 1983.

41. Brown, B. *"Monet heard and soft of the international currency markets"* U.K., London, McMillan, 1979.

42. Burt, J.; Kaen, F.R.; Booth, G.G
" Foreign exchange market efficiency under flexible exchange rate"
Journal of Finance, Worsceter, No.4 Sept., 1977.

BIBLIOGRAPHY,

PART THREE (contd.):

43. Chase Manhattan, F.X.: *"Inside View of the Foreign Exchange Market"* New York, 1976.

44. Christou, R. *"Contractual and foreign currencies"*
International contract Law and Finance Review, Lausanne, No.6 August 1981.

45. Crawford, M. *"Currencies in a floating World"*
E.I.U. Special Report, No. 35 London,
The Economist Intelligence

46. Denizel, J. *"Le 'Serpant' monetaire restera Vulnerable"*
Le Monde, 24th February 1976.

47. Dornbusch, R. *" Expectations and the Exchange Rate Dynamics"*
Journal of political Economy, Dec. 1976.

48. Dornbusch, R. *" The Theory of Flexible Exchange Rate Regimes and Macroeconomic policy"*
Scandinavian Journal of Economics Vol.78,No.2.

49. Duerr, M.G. *"Protecting corporate assets under Floating Currencies"*
Conference Board Report, No.674-1975
USA, New York is DN O-8237-0108

50. Einzig, P.; *"A Dynamic Theory of Forward Exchange"*
London, MacMillan & Co., 1976

BIBLIOGRAPHY,

PART THREE (contd.):

51. Einzig, P.; *A Textbook of Foreign Exchange*
London, MacMillan & Co., 1970

52. Einzig, P. *" The Euro Dollar System 5th ed."*
New York,St. Martins press 1973.

53. Giddy, I.H.; Makin, J.H.; Frenkel, J.A.
"The Foreign Exchange Markets"
Columbia Journal of World Business No.4, Winter 1979.

54. Junge, G. *" Trends and random walks of real Exchange rates"*
Weltwirtschaftliches Archiv , Tuebingen Nr. 3, 1985.

55. Kenyon, P.H.A. *"Currency Exposure Management"*
Long range planning, London, No.3, June 1980.

56. Lall, S. *"What does it really mean-The Forward Exchange Market"* Finance and Development, Sept. 1967

57. Lietaer, B.A. *"Managing Risks in Foreign Exchange"*
Harward Business Review, March-April 1970

58. Mckenzie, G.; *The monetary Theory of Int. Trade*
United Kingdom London, McMillan 1974 ISBN 333-12707-2

59. Mckinnon,. R.I. *"Currency substitution and instability in the World Dollar Standard"*
American Economic Review, Nashville, No.3, 1982.

BIBLIOGRAPHY,

PART THREE (contd.):

60. Obstfeld, M.; *"Balance-of-payments crises and devaluation"* Journal of money, credit and banking, Ohio May 1984.

61. Obstfeld, M.; *"Floating Exchange Rates; experience and prospects"* Brookings papers on economic activity, Washington No.2, 1985.

62. Prindl, A.R.; *Foreign Exchange Risk* London, John Wiley & Sons, 1976

63. Rodriguez, R.M. *"Management of Foreign Exchange risk in U.S. Multinationals"* , Loan Management Review, Cambridge, Spring 1978.

64. Stoll ,H.R. *"An Empire Study of Forward Exchange market under Fixed and Flexible Exchange Rate Systems"* Canadian Journal of Economics, February 1968.

65. Waters, R. *"Eight ways to a void foreign currency losses"* Accountant, London, May 24, 1984

66. Willett,T,d.; Wolf. M. *"The Vicious Circle debate; some conceptual distinctions"* Kyklos; Internationale Zeitschrift fuer sozialwissenschaften, Basel Nr.2, 1983.