THE PHARMACEUTICAL INDUSTRY IN KENYA

BY

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This research paper is my original work and has not been presented for a degree in another University.

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This research paper has been submitted for examination with our approval as University Supervisors.

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ABBREVIATIONS USED

LDCs	- Less Developed Countries
MDCs	- More Developed Countries
MNCs	- Multinational Corporations
UNIDO	- United Nations Industrial Development Organisation
UNCTAD	- United Nations Conference on Trade and Development
UNCTC	- United Nations Centre on Transnatiqnal Corporations
SGS	- General Superitendence Co.
PMA	- Pharmaceutical Manufacturers Association
FDA	- Food and Drug Association
R&D	- Research and Development
EPHARMECOR	- Ethiopian Pharmaceutical and Medical Supplies Corporation
O-T-C	- Over The Counter
KAM	- Kenya Association of Manufacturers
CMS	- Central Medical Stores
ERP	- Effective Rate of Protection
SITC	- Standard Industrial Trade Classification

ABSTRACT

Kenya's Pharmaceutical sector has grown significantly since 1936. Most of the manufacturing units were established in the 1970's. Currently, the sector is dominated by foreign firms.

This study investigates various issues that have proven significant in the development of the Pharmaceutical sector in other Less Developed Countries (LDCs). These issues relate to technology transfer, capacity utilisation, transfer pricing, use of generic and brandnames, bulk purchasing, and protection of local manufacturers.

This study demonstrates that, whereas the rate of capacit utilisation is only 21%, the local manufacturers are not protected by the tariff structure, when competing against imports.

Through restrictive technology transfers, Kenya has lost a lot of foreign exchange. In addition, many pharmaceutical raw materials and finished drugs imported into Kenya are highly overpriced, especially by Multi-national Corporations (MNCs). This raises the strong suspicion that some MNCs could be involved in transfer pricing.

Also, the investigation reveals wide price differences between generic and branded drugs distributed in Kenya. Thus, the consumers who buy drugs under brandnames are burdened.

CHAPTER ONE

1.0 INTRODUCTION

Men search for a longer and happier life, but diseases remain part of their existence. In the Less Developed Countries (LDCs), communicable diseases are among the major causes of infant mortality rates.[1] To prevent and cure diseases, nations need to provide adequate but cheap drugs to their population.

According to studies by UNIDO, most LDCs have limited or no manufacturing facilities and are therefore dependent on imported pharmaceuticals.[2] To escape dependence, they are currently starting or expanding the manufacture of pharmaceutical products in their own countries. In the process, they encounter difficulties such as: a) unfavourable terms of technology commercialisation and transfer, b) inability to shop carefully for cheaper raw materials and finished drugs, c) inability to fully utilise their productive capacities, and d) competition by importers of finished pharmaceutical products.

This study shows that these problems exist in the pharmaceutical industry in Kenya. To accelerate development of the industry, Kenya should: a) encourage better utilisation of local resources b) strengthen bargaining regarding technology importation c) encourage the use of generic names and bulk purchasing to cut costs for consumers and d) provide adequate protection for local manufacturers against imports.

Whether or not such ideas can be put into practice depends on government policy and on the reaction of the investors, especially the foreign ones who control a large share of investment in this sector.

1.1 GOALS OF THE STUDY

1. a. To study the factors influencing acquisition of technology in the pharmaceutical industry in Kenya;

   b. To reveal the economic implications of the technology used in this industry.

2. To examine the planned versus actual capacity utilisation rates in the Kenyan pharmaceutical industry; the reasons for these utilisation rates, and the governmental policy needed to improve capacity utilisation in the pharmaceutical industry.

3. To examine the problem of transfer pricing in the Kenyan Pharmaceutical industry.

4. To examine the use of generic and brand names.

5. To examine the potential benefits from bulk purchasing in this industry.

6. To investigate the protection of local manufacturers against imports.

1.2 IMPORTANCE OF THE STUDY

The demand for pharmaceutical products in LDCs is increasing. For instance, according to WHO's projections, LDCs will require 5-10 times more vaccines by 1990 than they did in mid-1970's.[3] To meet this demand, LDCs like Kenya should quickly embark on studies to reveal the problems affecting their pharmaceutical industry.

In Kenya, drug shortages in medical institutions are experienced simultaneously with idle capacity in the pharmaceutical industry. This study investigates the extent and causes of excess capacity and how to improve the utilisation of the existing resources.

Whilst the country should increase the production of pharmaceutical products with the existing plant and equipment, the country cannot afford to ignore the issue of technology choice and use. This concern is further expressed in the Kenyan development plans (1979-83,[4] 1984-88[5]). Kenya depends on imported technology and therefore, strong guidelines are needed to regulate technology acquisition. In view of this, the study evaluates the restrictions contained in the contracts related to the acquisition of foreign technology in the production of pharmaceuticals in Kenya.

Transfer pricing has denied many LDCs a substantial share of benefits arising from foreign investment. The Kenyan government, as yet, does not have any policy to monitor the existence and/or impact of transfer pricing in the industrial sector. This study investigates its existence in the Kenya pharmaceutical industry and provides economically viable solutions.

Lastly, this study is part of a much larger effort by the University of Nairobi's Industrial Research Project (IRP) to re-assess industrial strategies in the country. The study provides data for comparison with other industries in the project. Equally, the data obtained could be useful for future research and policy making.

1.3 ORGANISATION OF THE STUDY

The remainder of the paper is organized as follows:

Chapter two represents an extensive review of literature from abroad and in Kenya to help identify the main issues for investigation. The chapter begins by giving an overview of the global pharmaceutical industry before discussing the position of the LDCs in the set up.

The chapter ends by focusing on specific issues which have proven significant in the development of the pharmaceutical industry in other LDCs. These are:

i) Technology commercialisation and transfer.

ii) Extent and causes of idle capacity.

iii) Transfer pricing in the pharmaceutical industry.

iv) Use of generic and brand name in drugs purchase.

v) Bulk purchasing.

Chapter 3 describes the Kenyan pharmaceutical industry and market. The items included in describing the industry are:

i) Establishment, Ownership, and manufacturing activities of the firm.

ii) Type and source of raw materials.

iii) Exports and Imports.

iv) Quality Control.

v) Internal market structure.

The chapter ends by examining employment and market shares of the firms in the Kenyan pharmaceutical industry.

In chapter 4 we present the survey data and empirical results. The methodology and data limitations are considered before examining the hypotheses. The main issues to be investigated have proven significant in other LDCs and have not been investigated in Kenya yet.

Chapter 5 provides the conclusions and policy recommendations pertaining to the research objectives. These are discussed in light of each hypothesis.

CHAPTER TWO

LITERATURE REVIEW

This chapter surveys the literature on the development of the pharmaceutical industry in LDCs. After defining the pharmaceutical industry, the chapter proceeds to examine the global operations and the position of LDCs in pharmaceutical production. Next, the chapter focuses on the measurement, extent and causes of excess capacity, the market for and characteristics of technology commercialization and transfer, forms and impacts of transfer pricing, use of generic and brand names in the pharmaceutical sector and bulk purchasing in LDCs.

2.1 DEFINITION OF THE PHARMACEUTICAL INDUSTRY

The pharmaceutical industry is a formulation industry that dosages and packages medicaments ready for use by patients and doctors.[1] It takes the therapeutically active agents supplied by the pharmochemical industry and dosages them into tablets, injectables, syrups, drops and other preparations. The final formulation contains one or more active substances together with flavouring agents, stabilizers and other excipients.

In accordance with the United Nations Standard International Trade Classification (SITC) pharmaceutical products are classified under Code No. 541. These include items such

as: alkaloids, antibiotics eg. penicillin; streptomycin; tryocidine, bacterial products; sera and vaccines, vitamins and provitamins, glands and other therapeutic organs, bandages (pharmaceutical), absorbent cotton wading white. This study concentrates on products for humans but excludes the last two categories.

2.2 AN OVERVIEW OF THE WORLDWIDE PHARMACEUTICAL INDUSTRY

Before 1939, the pharmaceutical industry was considered as a commodity business. Companies manufactured and sold nearly all ingredients needed to compound doctor's prescriptions. There was little research and slow therapeutic advance. The discovery of new "wonder drugs" after the Second World War marked the emergence of the modern pharmaceutical industry.[2] Afterwards, this industry grew to be research intensive and specialised on products which are protected by patents and expensive promotion. This has made the industry one of the most profitable, ranking first or second among all industries in the world since mid-1950's.[3]

For the development of a strong pharmaceutical sector, a country requires 1) an established basic chemical industry 2) sufficient finance to train research personnel and for research programs 3) strong technological base to provide the necessary equipments and machines 4) state control to ensure the quality and safety of the pharmaceutical products

and lastly a good consumer market to purchase the products.

Currently, the pharmaceutical industry in the world is dominated by a few MNCs. There are more than 10,000 companies in the world producing a wide range of pharmaceutical products (ethical drugs, nutritional products, veterinary products etc.). Of these manufacturers, only one hundred are significant. They produce about 90% of the global pharmaceutical output valued at US$ 72b in late 1970's.[4]

The leading 50 companies in terms of pharmaceutical sales, profitability and research intensity are MNCs mostly from U.S.A., U.K. and Federal Republic of Germany. According to James, most of these MNCs entered the field from technologically related industries or started as pharmaceutical supply houses.[5]

Table 2.1 provides a list of the top 15 pharmaceutical companies according to their pharmaceutical sales volume in 1984.

Table 2.1: THE TOP 15 PHARMACEUTICAL COMPANIES (1983-1984)

RANK		COMPANY	DOMICILE	PHARMACEUTICAL SALES ($M.)[2] (1984)	PHARMACEUTICAL % TOTAL SALES
1984	1983				
1	1	HOECHST-ROUSSE	FRG	2552.7	17.5
2	2	BAYER	FRG	2430.4	16.6
3	3	MERCK & CO.	USA	2422.0	74.6
4	4	AMERICAN HOME PRODUCTS	USA	2333.2	48.0
5	5	CIBA-GEIGY	SWI	2108.7	30.0
6	6	PFIZER	USA	1866.0	49.8
7	7	ELI-LILLY	USA	1645.8	54.3
8	12	ABBOTT LABS.	USA	1599.0	54.6
9	10	BRISTOL MYERS	USA	1505.0	38.4
10	8	HOFFMAN-LA-ROCHE	SWI	1497.0	41.8
11	11	SMITH KLINE	USA	1463.7	51.6
12	9	SANDOZ	SWI	1450.4	46.5
13	14	WARNER-LAMBERT	USA	1405.0	45.2
14	16	UPJOHN	USA	1326.0	66.8
15	13	TAKEDA	JPN	1297.4	58.0

1. Figures are for the year ended 31/12/83, with the exception of Takeda, March 31, 1984.

2. $ conversion are based on an average annual exchange rate 1983.

Source: PMA Newsletter, March 11, 1984, p. 4.

Table 2.1 shows that the top 15 positions in the world pharmaceutical market are dominated by nine USA MNCs, MNCs have extended their operations in foreign markets mostly to the LDCs. Their participation in those countries include: 1) selling active ingredients used in the formulations by local industry 2) distribution and high promotion of finished drugs 3) direct manufacture of pharmaceutical products through their subsdiaries or license agreements with the local manufacturers and 4) intensive R & D in the foreign market.

This participation has significantly contributed towards the MNC's sales and profitability. In 1978, 40% of global sales of ethical products for the U.S. based drug companies came from overseas sales. In addition, foreign sales accounted for about 50% of their total profits in 1974.[6] In most cases these MNC make higher profits in the LDCs when compared to locally owned companies with less foreign participation.[7]

2.3 THE POSITION OF THE THIRD WORLD IN PHARMACEUTICAL PRODUCTION

In late 1970's, the LDCs produced only 11% of the total value of pharmaceutical products in the world (Asia 5.6%, Latin America 5.2%, and Africa 0.5%) as opposed to 70% from the developed market economies. Over two-thirds of the third world production came from India, Brazil, Mexico, Argentina,

Egypt and the Republic of Korea[8].

Table 2.2 shows that very few LDCs manufacture many intermediates required for a pharmaceutical industry. The rest are completely dependent on More Developed Countries (MDCs) for the supply of finished drugs, intermediates (raw materials, equipment and packaging material). About 40-60% of intermediates used in LDCs come from United States, Great Britain, Switzerland, France and Federal Republic of Germany.[9]

The countries that have started local formulations have another problem associated with technology. MNCs have established their own technology in the LDCs. This has had adverse effects in these countries. The production processes, designs and plants are mostly based on imported raw materials which limits the use of local imports.

The development of the pharmaceutical industry in the third world varies between countries and is further explained in five stages (see table 2.2).

Table 2.2: Levels of Development of the Pharmaceutical Industry in Third World Countries, 1979

Stage of Pharmaceutical Production	Africa	Latin America	Asia	Middle East
Group 1 Countries that have no manufacturing facilities and are therefore dependent upon imported pharmaceuticals in their finished form. In many of these countries there are insufficient trained personnel, limited public health services, and poor distribution channels.	Burundi Central African Republic Chad Lesotho Rwanda Sierra Leone Somalia Swaziland Togo Uganda Zambia	Honduras	Bhutan Mongolia	Yemen
Group 2 Countries that have started to repack formulated drugs and process bulk drugs into dosage forms.	Ivory Coast Kenya Madagascar Senegal Sudan Tanzania	Bolivia Costa Rica El Salvador Guatemala Haiti Trinidad & Tobago	Afghanistan Burma Malaysia Nepal Sri Lanka Vietnam	Jordan

Table 2.2 Cont.

Stage of Pharmaceutical Production	Africa	Latin America	Asia	Middle East
Group 3 Countries that process a broad range of bulk drugs into dosage forms and manufacture some simple bulk drugs from Intermediates.	Algeria Chana Morocco Nigeria Tunisia	Colombia Ecuador Peru	Bangladesh Indonesia Philippines Singapore Thailand	Iran Irag Syria
Group 4 Countries that produce a broad range of bulk drugs from intermediates and manufacture some intermediates using locally produced chemicals.		Chile Venezuela	Pakistan Republic of Korea Turkey	
Group 5 Countries that manufacture most of the intermediate required for the pharmaceutical industry and undertake local research on the development of products and manufacturing processes	Egypt	Argentina Brazil Mexico	India	

Source: UNIDO, "The steps involved in establishing a Pharmaceutical Industry in Developing Countries." Vienna: UNIDO. (ID/WG.267/3). 1978, p. 3.

IMS World Publications Ltd. "Health, Pharmaceutical and Development Indicators World-wide: A Statistical Survey". London: IMSworld Publications Ltd. 1979

as cited in Gereffi, G., op.cit., pp. 184-5.

(see Table 2.2) The pharmaceutical industry in the third world, especially Africa, is still in the first two stages of development characterised by dependency on finished pharmaceutical products. Only five countries, three of which are in Latin America have reached stage five.

Inspite of low development, studies of the pharmaceutical industry in many LDCs elicit significant issues which merit attention. These are capacity utilisation, technology transfer and commercialization, transfer pricing, use of brand and generic names, and bulk purchasing. These issues are discussed in more detail in the next section.

2.4 CAPACITY UTILISATION

This section begins by defining capacity, before examining various measures extent and causes of idle capacity in selected LDCs.

DEFINING CAPACITY

The term capacity is generally viewed from two perspectives, namely technical or Economic. Klein[10] defines technical capacity as the maximum physical output produced per unit of time with a given fixed stock of capacity facilities. By contrast, economic capacity does not necessarily refer to maximum output. It considers costs and limitations imposed by different sectors of the economy. For

an individual firm, Klein[11] defines capacity as the output level which can be produced at the minimum of the average cost given the existing plant and equipment, techniques and factor prices.

MEASUREMENT OF CAPACITY UTILIZATION

Various measures of capacity utilisation have been advanced by many economists. Each has merits and limitations. This section reviews five methods. The McGraw-Hill measure; Wharton School Econometric Unit; National Industrial Conference Board; the Federal Reserve approach (production function) and the weighted average time-based method.

The McGraw-Hill Measure[12]

In 1947, the McGraw-Hill department of Economics used cross-sectional data obtained from an industrial survey to come up with a measure of capacity. The survey which used a questionnaire, compared: 1) actual production for previous years 2) actual time operated to the hours the firms preferred to operate. The individual findings were later aggregated at the industrial level by using employment weights.

Limitations

Despite its useful contributions, the method has been

attacked due to its inability to define "capacity" and "physical volume" adequately. According to A. Philliphs, the McGraw-Hill measure could suffer from four sources of bias. These include (1) inclusion of changes in capacity resulting from mergers and consolidations- (2) occurence of errors due to incorrect industrial classification (3) inability to account for bankruptcies of firms and retirement of facilities and (4) bias caused by an over-weighting of the replies by large firms.

Wharton School Econometric Unit[13]

This method involves plotting quarterly output figures constructed from three-month averages against time and peaks for inspection. Each peak is defined as capacity and a straight line joining intervening peaks represents the capacity during the respective period.

Limitations

Major criticisms to this this method have been advanced by among others A. Philliphs;[14] G. Perry;[15] G. Briscoe; P. O'Brien and D. Smyth;[16] and K. Hilton[17]. These are summarised by N. Phan-Thuy[18] as:

> "(1) Peaks may not represent the same level of utilisation in each cycle and capacity may not follow a straight line between peaks;

2) the Wharton process implies that capacities increase smoothly between two peaks, without regard to the increase in labour and capital availability;

3) there is a possibility that peaks in output represent different levels of utilisation. In the aggregate index this can arise from two sources: first the changing strength of peaks in individual countries; second, the changing degree of synchronisation;

4) the method is unable to distinguish any difference in the intensity of utilisation at different peaks in an industry's output;

5) there is a problem with industries whose output series show a declining trend, for them the rules for selection of peaks and interpolation between them are liable to generate distinctly implausible results;

6) the Wharton method treats capacity output as a single function of time and does not relate output to inputs."

The National Industrial Conference Board[19]

This measure uses the balance sheets and any other income statement to collect data on fixed capital. This data is later deflated, after which capital/output ratios

of the firms are calculated. Using a base year the highest reciprocal capital-output ratio is assumed to be the full capacity utilisation index, from which all other ratios can be calculated. The lowest capital-output ratio is taken to indicate the highest capacity utilisation.

The major principal objection to the method is that it does not estimate capacity directly.

Production function Approach[20]

The production function approach involves the estimation of cost or production function by sector. The point of minimum average cost is usually taken to represent full capacity output in a competitive environment. For each sector, actual output is defined by the conventional production function relationship:

$$X_t = A e^{rt} L_{et}^{\alpha} K_{Ut}^{\beta} V_t$$

where: X_t = Actual Output at time t.

L_{et} = Man hours employed at time t.

K_{ut} = Real capital utilized at time t.

e^{rt} = Proxy for technical change.

V_t = Disturbance at time t.

full capacity output is defined as:

$$X_{ct} = \hat{A} e^{\hat{r}t} L_t^{\hat{\alpha}} K_t^{\hat{\beta}}$$

The problem with the method is usually related to the errors obtained when estimating X_{ct}; such errors are caused by 1) measurement error L_t and K_t 2) mis-specification of the equation or 3) biased parameter estimates of X_t. As a result it may be difficult to get an accurate measure of actual output for various reasons.

Weighted Average Time-based Measure

In Kenya, P. Coughlin measured capacity utilisation in the Kenyan foundries and metal engineering workshops using a time based measure.[21] The method uses a questionnaire to obtain information on (1) working time (2) level of actual and theoretical production and (3) slackness in the use of labour and capital during the respective period. With this information, the weighted average capacity utilisation with slack variable (U_1) and without slack variable (U_2) is calculated using the formula below:

$$U_1 = \left[\frac{1}{\sum_{i=1}^{n}\sum_{s=1} L_{is}}\right] \times \sum_{i=1}^{n} \left[\frac{\left(\sum_{s=1} L_{is}\right) \times \left(\sum_{s=1} \frac{L_{is} H_{is}}{L_{is}^{*}}\right)}{120}\right]$$

$$U_2 = \left[\frac{1}{\sum_{i=1}^{n}\sum_{s=1} L_{is}}\right] \times \sum_{i=1}^{n}\left[\frac{\left(\sum_{s=1} L_{is}\right) \times \left(\sum_{s=1} \frac{L_{is} H_{is}}{L_{is}^*}\right)}{(1+A_i) \times 120}\right]$$

where: U_1 = Weighted average utilisation rate (without slack)

U_2 = Weighted average utilisation rate (with a slack)

s = 1, 2, ... number of shifts per day

i = 1, 2, ... number of firms interviewed

L_{is} = Labourers in plant "i" during shift "s"

L_{is}^* = Number of the labourers on the biggest shift in plant i.

H_{is} = Average hours worked per week at plant "i" during shift s.

A_i = A measure of slack during the current shift. It shows additional work that could be realized without additional work hours, employees or plant and equipment.

Limitations

(i) The measure relies on data from those interviewed, such information might be inaccurate, subjective or based on mere approximations.

(ii) The measure is only good for calculating the rate of capacity utilisation at a point in time. To overcome this, various points in time should be observed.

iii) In cases where the slack is omitted, the capacity utilisation may be overstated.

iv) The approach also overlooks the cost and profit implications of increased production.

THE EXTENT OF CAPACITY UTILISATION IN SELECTED LDCs

LDCs stress the economic importance of better utilisation of industrial capacity as a factor of accelerating industrial development. By contrast, LDCs rarely use more than 60% of their productive industrial capacity[22]. A survey of many LDCs reveal the existence of massive underutilisation of productive resources coupled with low employment and output growth rates. This section explores the issue by examining the rate of capacity utilisation in selected LDCs in Africa, Latin America and Asia.

M.V. Raghavachari's study[23] on the excess capacity and production potential in selected industries in India, revealed that the degree of underutilisation of industrial capacity increased considerably in late 1960's. The overall rate of capacity utilisation was about 75% based on one shift. The chemical industries and the metal and engineering industries had the lowest capacity utilisation rates of 53.8% and 67.7% respectively.

In Pakistan (1965-66), G.C. Winston[24], estimated the capacity utilisation for the whole manufacturing sector to be 64% and 33% based on the existing shift and desirable shift basis ($2\frac{1}{2}$ shifts) respectively.

L. Currie's[25] study on Latin American countries show that most equipment is not in operation more than 10-15% of the time. Most firms operate only one shift and the working days in a year are not more than 220 days. This situation was seen by many economists to be responsible for the slow and uneven economic development in Latin America.[26]

Studies in Israel[27], Malaysia[28], Columbia[29], and Philippines[30] indicate an average capacity utilisation (unweighted) of 35%, 50%, 36%, and 42% respectively.

In Tanzania, S.M. Wangwe, estimated the capacity utilisation at 35% for the capital goods sector and 50-60% for the manufacturing sector.[31]

In Kenya, the existing surveys on idle capacity reveal massive underutilisation. These studies have been done by (1) P. Coughlin for the Kenyan foundries (23%)[32] and metal engineering workshops (34%)[33] (2) H. Mwangi for plastics (53%)[34] and I.L.O. for the entire Kenyan manufacturing firms (34%)[35].

Although the measurements of capacity utilisation in the above countries differ, the general conclusion is that there is usually enormous underutilisation of scarce and productive resources in LDCs. Firms cannot produce as much as they would like with the existing investment. This leads to slow growth and stagnation of the industrial sector in many LDCs. To curb this, many countries have launched studies to examine the factors responsible for the idle capacity. Some of the major factors are reviewed in the next section.

2.5 CAUSES OF CAPACITY UNDERUTILISATION IN LDCs

An investigation of the causes of excess capacity is a step towards devising adequate policies aimed at fuller utilisation of plant and equipment in any nation. This section examines the major factors generally attributed to the massive underutilisation of productive resources in LDCs.

Studies on the causes of capacity underutilisation in LDCs have been done by among others (1) A. Baily for Kenya (1974)[36] (2) S.M. Wangwe for Tanzania (1977)[37] (3) R.K. Koti for India (1967/68)[38] (4) "Brazilian Institute of Economics" for Brazil (1968)[39] (5) M.S. Brodersohn for Argentina (1971)[40].

In all the surveys, entrepreneurs were asked to rank, in order of importance, the causes hindering the attainment of maximum production. These factors were first weighted before obtaining a cross sectional analysis.

The major causes identified, which are typical of other LDCs can be grouped into the following categories:

(A) Supply Bottlenecks

These include restrictions in the supply of intermediate inputs and capital goods. This often shows up in form of:

i) Infrastructural problems (shortage of electricity, water and technical services);

ii) restrictions on the provision of imported and domestic raw material;

iii) inadequate provision of imported equipment and machinery.

(B) Demand Limitations

The demand limitations includes the deficiency and/or seasonal demand for products manufactured. This is prevalent in various ways, first, it may be serious, implying that the production capacity is far in excess of what the present economy can absorb or some industries might have the policy of keeping reserve capacity to meet future or sudden demand.

Other limitations include :

i) Restrictions in monetary and credit facilities.

ii) Restrictions resulting from inappropriate taxation and tariff policy.

Whereas most of the enterpreneurs interviewed in the above studies ranked demand limitations as a major factor, this may not always be the case. According to a study done by M. Kabaj[41], long run underutilisation is often associated with problems regarding the government's industrial policy especially its investment policy. These are summarised by M. Kabaj as:-[42]

> (1) Lack of feasibility studies and/or over-estimation of demand; (2) Lack of concepts of optimum capacity utilisation, reliance on a single shift basis and so-called "normal practice" of capacity utilisation during the period of plan designing; (3) Lack of long-term co-ordination of investment policy; lack of information about the degree of capacity utilisation in existing plants; licensing policy; (4) Existence of an oligopolistic situation.

Brazil serves as an example of a country where much excess capacity was built due to improper planning strategies in the early 1960's. The government's restriction on imports (1951-64) was not coupled with policies to control investment in local productive capacity. The entrepreneurs rushed into heavy investments without proper

projection or pre-feasibility study. The industrial sector finally ended up with much idle capacity.[43]

Israel's experience reveals cases where excess capacity can even create further excess capacity due to an improper Government Policy on long-term investment. M. Merhav's study[44] of selected industries in Israel (1969) indicates that excess capacity which exists in an oligopolistic structure can be worsened through new investments. For example, generous government policies, attracted additional investments and increased the productive capacity as new investors came into production. This increased the rate of excess capacity.

After considering the nature extent and causes of excess capacity in LDCs, the next sections examines the issue of technology commercialisation and transfer.

2.6 TECHNOLOGY

The technological gap between the LDCs and MDCs is one of the critical problems in industrial development. LDCs rely on imported technology for the development of their industries. The contractual terms for the acquisition of technology financially burden the LDCs and deny them a substantial share of benefits from foreign investment.

Each country should therefore lay down its technology policy and plan, which would help it to procure, produce and supply vitally needed drugs at reasonable prices and reduce technological dependence and to better use of its resources. This section looks at the experiences of LDCs in regard to commercialization and transfer of technology.

From the economic perspective, "technology has a special market with particular structure and properties, mechanisms that settle prices and quantities, rules of exchange and market impurities. The general principle of market price based on relative scarcities and the definition of the market performance (number and size of buyers and sellers, relative bargaining power, degree of available information etc) govern also the market for technology commercialization given its own particular characteristics."[45]

According to Vaitsos[46], the present market structure of technology in relation to LDCs, approaches the characteristics of bilateral oligopoly. Bargaining appears to be the determining mechanism for prices and "quantities" of technology exchanged. The reasons for such a market structure are related to a) the intrinsic properties of technology as a traded economic entity, b) the concentration of contractually sold technology in relatively few firms and c) the limited initiative on the part of LDCs to look for

alternative sources of technology.

In bargaining, LDCs should have comprehensive information to strengthen their negotiation strategy. This should include the conditions that they are likely to accept or reject. By contrast, this is not always the case. Most LDCs are confronted with structural weaknesses. They lack institutions to intervene in the negotiations. Furthermore, the contracts regarding technology commercialisation are usually treated as "confidential" and "secret" documents. This limits the data for both intra-and inter-country comparisons.

The experiences in regard to technology commercialization is similar among LDCs. Their inability to adequately evaluate technology contracts subjects them to accept unfavourable terms and conditions in bargaining. Studies of the Phillipines[47] and the Andean Countries (Bolivia, Colombia, Chile, Ecuador, Peru).[48] show the most common restrictions. These include:-

i) Registering payments for technology for periods longer than actual learning period and absorption of new technology.

ii) Registering high royalty payments especially in countries lacking state control.

iii) Registering restrictive clauses, especially in regard to the purchase of intermediate inputs, exports, distribution and marketing of the products.

The above terms and conditions have had negative impacts on the development of LDCs. These include excessive payments for royalties, technical fees, management, consultancy fees etc. The undesirable terms and conditions also render LDCs to be dependent on parent licensors for the supply of intermediate inputs.

From this experience, India,[49] Latin America[50] and Andean countries[51] have strengthened their screening capacity for acquiring imported technology. In all cases, the policies aim at (1) discouraging restrictive practices (2) lowering or abolishing royalty payments (3) limiting the duration of licence and (4) unpackaging the technology.

Only 20% of the LDCs control the acquisition of imported technology. The rest should learn from this experience. It is the purpose of the study to investigate this issue in the case of the Kenyan pharmaceutical industry.

2.7 TRANSFER PRICING

Transfer pricing[52] is common with intra-firm trade

though unrelated concerns may also collude to transfer funds across boundaries. In Lall's terms[53], the problem has remained a curious blind spot in the rapidly growing academic literature on transnational corporations and its effects on trade and development.

The task of checking transfer pricing is complex and requires specialised knowledge over a broad range of commodities. Any discussion on transfer pricing has to assume that there exists a yardstick by which the price can be measured inorder to determine whether the goods and services are either overpriced or underpriced.

Many subsidiaries of MNCs are dependent on their parent companies for the supply (or approval of the source) of raw materials and technology they use. For these, they are required to make payments such as management, technical and trade mark fees, royalties, contributions to parent overheads, buying commissions etc. These payments can be quite high. Moreover such dependence facilitates transfer pricing through collusion between the mother company and the subsidiary.

When a local subsidiary buys raw materials from the parent company or any approved agent, the practice of paying large buying commissions is common. This is sometimes

calculated as a percentage of all imports or sales and it can be sizeable in relation to book profits. As one Kenyan subsidiary noted it could easily form the main returns to some mother companies.[54] Langdon came across an extreme case where the commissions to the parent company were as high as 80-90% of local capital employed, compared to after-tax profits of 3% of capital employed.[55]

Studies of the drug industry in various countries show MNCs making huge profits at the home base by raising prices for materials supplied and services rendered to subsidiary companies. For example, findings in 1973 by the Monopolies Commission investigating transfer pricing on Roche products (chlordiazepoxide and Diazepam) in U.K. show that profits from transfer pricing accounted for 76% of the total profits in 1966-72, and came to over six times the amount of declared profits.[56]

In 1968, the Columbian Government estimated the weighted average of over-pricing for various pharmaceutical products to be between 87%and 155%. For some industrial products it was as high as 3000%.[57] These results were based on the formula down:

Overpricing was defined as $\frac{Pc - Pw}{Pw} \times 100$

where Pc = Cif Price (home port)

Pw = Cif Price (from cheapest source)

The investigators took the average of available quotations rather than the lowest one and allowed for transportation costs and a 20% margin error.

In 1980, another study in Columbia revealed MNCs charging higher prices on various pharmaceutical products. The MNCs sold chlordiazepoxide (Librium) for $ 1250 per kg., but the same substance could be obtained from other sources for $ 18.9 per kg. and MNCs sold Diazepam (Valium) for $ 2500 per kg., but it could be obtained at $ 30 per kg. from other sources. Nitrazepam (mogadon) was sold by the MNCs at $ 2088 per kg. but it could be secured at $ 108 per kg. from other sources.[58]

In early 1970's[59], in Argentina, Diazepam was imported at a price 1500% higher than the cheapest source.

In Mexico, the average rate of over-pricing for five steroid hormone imports (progesterone, prednisone, prednisolone, estradiol and hydrocortisone) ranged from 160% to about 2900%[60] compared to the cheapest source. For further details, see table (2.3).

Table 2.3

Overpricing of Imports in the Mexican Steroid Hormone Industry, 1974

Product	Country of Origin	Kilograms	Pesos	Unit Price	Rate of Overpricing[a] (percentage)	Amount of Overpricing[b] (pesos)
Progesterone	Federal Republic of Germany	2	1,032	516	-[c]	0
	France	35	67,745	1,936	375	49,685
	Spain	5	32,060	6,412	1,243	29,480
	Nethelands	37	1,078,620	29,152	5,650	1,059,528
Total		79	1,179,457	14,930	2,893	1,138,693
Prednisone	Italy	3	6,026	2,009	-[c]	0
	France	137	1,037,565	7,573	377	762,332
	Brzil	10	102,660	10,266	511	82,570
	Netherlands	20	350,365	17,518	872	310,185
Total		170	1,496,616	8,804	438.	1,155,087
Prednisolone	United Kingdom	5	31,250	6,250	-[c]	0
	Panama	29	292,750	10,095	162	111,500
	France	21	246,150	11,721	188	114,900
	Federal Republic of Germany	11	171,725	15,611	250	102,975

Table 2.3: Cont.

Product	Country of Origin	Kilograms	Pesos	Unit Price	Rate of Overpricing[a] (percentage	Amount of Overpricing[b] (pesos)
	Italy	6	118,063	19,677	315	80,563
	Netherlands	23	620,223	.26,966	431	476,473
Total		95	1,480,161	15,581	249	886,411
Estradiol	France	5	56,999	11,400	-[c]	0
	Federal Republic of Germany	10	309,466	30,947	271	195,466
Total		15	366,465	24,431	214	195,466
Hydrocortisone	Netherlands	5	35,919	7,184	-[c]	0
	Federal Republic of Germany	7	68,330	9,761	136	18,042
	Bermuda	9	601,020	66,780	930	536,364
	Switzerland	13	1,006,355	77,412	1,078	912,963
Total		34	1,711,624	50,342	701	1,467,369

[a]The rate of overpricing is based on a minimum price at which a selected steroid hormone product was imported into Mexico in 1974. Any excess over this minimum price is considered to be an overprice. To reduce the possibility of bias from low discount prices for bulk purchases, the selected minimum (or reference) price for each product is derived from import totals whose volume is always lower than that of any of the other import sources used in the comparison.

[b]The amount of overpricing is calculated by multiplying the minimum unit price by the number of kilograms received from each importing country and then subtracting this result from each country's actual import total pesos.

[c]The unit price from this import source is the minimum, or reference, price.

Source: Mexico, secretaria de Industria y Comercio, Direccion General de Estadistica, 1975, Annuario estadistico del commercio exterior. Mexico, D.F. pp. 166-168 as cited in Gereffi, G., op. cit. pp. 148-9.

In Brazil, the Government's inquiry revealed cases of overpricing ranging between 500% to 1000% compared to arm's length prices.[62]

In Kenya, the ILO noted cases where parent inputs imported by subsidiaries were being priced at 20-30% higher than they could fetch on the open markets.[63]

Survey evidence by Langdon showed that until recently, a subsidiary of a large textile firm purchased all inputs from the parent company at a price much higher than competitive prices.[64] Soft drink subsidiaries reported considerable parent profits on the sale of imported concentrates. Three pharmaceutical firms reported that they (or their head offices) had considered using transfer pricing but had rejected the option for the moment. The subsidiaries surveyed purchased an average of 23% of imports from their affliate boards.

Another study by Kaplinsky[65] reveals that, Kenya has lost about Ksh 130m through invoice manipulation on just five commodities (see Table 2.4) between 1976-78.

Table 2.4: Estimated Annual Foreign exchange loss for Selected Commodities 1976-78

Year		Kshs.
1976	Canned Pineapples (under invoicing of 25%)	34,897,940
1976	Wattle (under invoicing of 17%)	4,328,780
1976	Steel (over invoicing of 5.9%)	32,494,580
1976	Tea	26,000,000
1978	Commodity "x"	26,000,000
		124,331,300

Source: Kaplinsky, R., "Report on Foreign Exchange Leakages with particular reference to Transfer Pricing", UNIDO consultancy report, June 1978, p. 18.

Moreover, due to lower government tax on services than on profits, some firms declare a loss in Kenya whereas the parent firm obtains remittances through service payments[66].

The above studies show that there appears to be a much potential for transfer pricing in Kenya.

Kenya attempts to control invoice manipulation through [illegible] Superintendence Co. (SGS), Central Bank and Customs and Excise department (valuation dept).[67] The performance of

these institutions, especially the SGS, has not been very impressive. For example, between 1972-77, Kenya paid SGS, Kshs. 138.9m but savings arising from their activities amounted to only Ksh. 40m[68]. Vaitsos and Golemis conclude that the present system of monitoring transfer pricing has been described as re-inforcing a condition of continued dependence on foreign expertise through the SGS contract. The major deficiency of the system has been identified as inability to develop a local base of expertise and administrative capabilities to carry out the monitoring functions.[69]

When practiced, transfer pricing denies the developing countries substantial benefits from foreign investments. The use of transfer pricing means that the net gains in the country are less and the losses more than they would otherwise have been. The loss caused by transfer pricing may be borne by 1) the Government through loss of taxes 2) local shareholders through loss of legitimate share of profits 3) trade unions, if it deprives them of higher wages 4) consumers, through high prices. In the long run, the problem deprives the economy the benefits of forgone investment and may distort the pattern of investment or worsen the existing distortions. If the low levels of declared profits deters perspective local competition then transfer pricing also perpetuates the economy's dependence on foreigners.

With the present institutional structure of MNCs, high corporate taxes, and increasing local state or private shareholding in the Kenyan subsidiaries, the problem of transfer pricing could exist in the Kenyan pharmaceutical industry. Hence an investigation should be carried out and careful regulations should be imposed to monitor its impacts so as to increase the net social benefits from the pharmaceutical industry.

2.8 USE OF BRAND AND GENERIC NAMES IN THE PHARMACEUTICAL INDUSTRY

Generic names as applied to pharmaceuticals refers to the common chemical name (established or non proprietary name) by which a drug is known as an isolated substance or a drug product irrespective of its manufacturer.[70] A brand name refers to any word, name, symbol or device or any combination thereof adopted and used by a manufacturer or merchant to identify his goods and distinguish them from those manufactured or sold by others.[71] It is the manufacturer's chosen name for his product.

The debate on the use of brand and generic names in the pharmaceutical industry has brought much controversy in the medical profession all over the world. The advocates of the use of generic names contend that substantial savings

could result for consumers if drugs were prescribed using generic names. Other observers argue that generic names do not automatically assure economy.

Whereas more than 40% of all trademarks used in the world relate to the pharmaceutical and associated goods,[72] the use of generic prescriptions is increasing in importance. According to an estimate by Hemant Shah, a drug-industry specialist; .by 1987, 25% of all prescriptions in the world will be filled with generic drugs compared to 15% in 1983.[73] This has been estimated by the Food and Drug Association (FDA) to yield about US $ 1 billion in savings to the consumers over the next 12 years.[74]

The observers favouring brand-names argue that a manufacturer should be able to identify his products and distinguish them from those manufactured or sold by others since they consider anonymity to be an advantage for the manufacturers whose production is of poor quality. This is believed to ensure that the manufacturers are given credit for whatever reputation for reliability they have developed, encouraging greater research and development. On the other hand, there is little R & D in LDCs. Also the use of brand names has been attacked for involving large expenditures on sales promotions leading to escalating prices for drugs. A price survey carried at an Eckerd Drug

store in Atlanta revealed that generic named drugs were much cheaper as shown below:[75]

Brand Name	Generic Name	Use
Achromycin v. $ 9.79 /250 mg.	Tetracyline $ 5.59	Antibiotic
Erythrocin $20.95 /25 mg.	Erythromycin $ 15.29	Antibiotic
Dimetapp $ 23.99	Brompheniramine $ 8.55	Antihistamine
Librium $ 21.95 /10 mg.	Chlordiazepoxide $ 6.75	Tranquilizer
Mellaril $ 19.29 /10 mg.	Thioridazine $ 14.79	Tranquilizer
Lasix $ 15.59 /40 mg.	Furosemide $ 9.85	Diuretic
Hygroton $ 29.29 /50 mg.	Chlorthalidone $ 11.55	Diuretic
Isordil $ 13.39 /10 mg.	Isosorbide $ 5.89	Anti-anginal
Persantine $ 17.45 /25 mg.	Dipyridamole $ 7.35	Anti-anginal
Elavil $ 16.99 /25 mg.	Amitriptyline $ 8.55 /25 mg.	Antidepressant

In addition, the use of brand names has also been seen as a key obstacle to the preparation of national drug lists. The use of brand names create undesirable monopoly or market power making entry into the industry difficult especially when the consumers have developed brand royalty towards some products. This can contribute to stagnation of the pharmaceutical industry in the developing countries.

With the above shortcomings, generic names are seen as a solution towards achieving economy. The use of generic names require no sales promotion or royalty payments, hence such expenditures are not incurred by the manufacturers resulting into lower production costs of the drugs, and lower foreign exchange costs. It also limits the market power enjoyed by the pharmaceutical enterprises especially the MNCs by removing entry barriers prevalent in the use of trademarks. This intensifies competition and hopefully reduces drug prices as the same product will be available from various sources.

Several studies on the use of generic and brand names reveal substantial savings from the former. One of the earliest studies undertaken by the State of Rhode Island (USA) in 1960 concluded that the state could save upto 2% on the total drug bill.[76] Another survey conducted by Atlanta to investigate "why the country paid upto forty times as much as New York for the same drug" revealed the use of brand names as the main reason.[77] In Cuba where trademarks were abolished in 1960, savings ranging between 23-69% were realized on various drugs[78].

In light of the benefits derived from the use of generic terminology, various countries are opting to encourage its use by either abandoning or reducing the use

of trademarks. In Florida, for example, druggists are required to tell the consumers how much they will save by using generic products.[79] Besides, several insurance companies in U.S. (Aetna, Metropolitan, Prudential, Blue Cross/Blue shield) have notified policy holders that they will be reimbursed for 100% of the cost of generic drugs, but only 80% of the price of brand-name pills.[80]

2.9 BULK PURCHASING

A centralised bulk procurement system for pharmaceutical products, with many sources of supply through open international tenders, has many economic advantages, as has been proven in many countries. This section examines the experiences of certain LDCs in this connection.

The establishment of a centralised purchasing agency in the procurement of pharmaceutical products using generic names strengthens bargaining power. Since the agency deals with a large volume of purchases, it could have better market and product information through worldwide shopping. The agency could obtain large discounts and better procurement conditions. In addition, centralised purchasing could

limit the practice of paying large buying commissions and overpricing of intermediate inputs by MNCs subsidiaries.

Ethiopia has realized substantial savings on some drugs through bulk purchasing using generic names. This is demonstrated by wide differentials between prices paid by, Ethiopian Pharmaceutical and Medical Supplies Corporation (EPHARMECOR), and by private importers. Table 2.5a and 2.5b gives details on comparison of prices for selected drugs in 1979 and 1980.

Table 2.5a

Comparative f.o.b. price per unit paid by EPHARMECOR and by a private importer (1979)

(Equivalent in birr)

Products and dosage form	EPHARMECOR Supplier	EPHARMECOR Price	Private importer Supplier	Private importer Price
Ampicillin 500 mg cap.	EPHARM	0.14	TEVA	0.22
Chloropropamide 250 mg tab.	Pfizer	1.40	Pfizer	1.85
Erythromycin 250 mg cap	Upjohn	0.04	Pfizer	0.35
Phenylbutazone 200 mg tab.	EPHARM	0.06	Ciba-Geigy	0.28
Reserpine 0.1 mg tab.	Pharmchemi	0.08	Ciba-Geigy	1.40
Tetracycline 60 ml syrup	Medichemi	1.30	Pfizer	3.74

Source: UNCTAD "Technology and Development Perspectives of the Pharmaceutical Sector in Ethiopia", UNCTAD/TT/58, United Nations Publication, Geneva, 1984. P.11.

Table 2.5b

Comparative c. and f. values[a/] of drugs imported by EPHARMECOR and by the private sector (1980)

		EPHARMECOR	Private Sector
1.	Pentrexyl 250 mg inj.	$US 0.23/vial	$US 0.68/vial
2.	Pentrexyl 500 mg inj.	$US 0.26/vial	$US 0.91/vial
3.	Avafortan 2 ml 50 amps.	DM 14.35/50	DM 23.06/50
4.	Avafortan 1,000 tab.	DM 22.70	DM 36.00
5.	Librax 1,000 tab.	DM 70.60	SwF 91.80
6.	Bactrim, adult 500 tab.	SwF 94.50	SwF 114.25
7.	Bactrim syrup 50 ml	SwF 2.40	SwF 4.10
8.	Insulin Novo regular	$US 1.35	$US 1.57
9.	Insulin Novo PXI	$US 1.40	$US 1.59
10.	Anugesil cream 12s	£0.56	£0.66
11.	Anusol Supp. 12s	£0.51	£0.47
12.	Milk of Magnesia 1,000 tab.	$US 6.00	$US 5.00
13.	Eurax 50 ml lotion, 10 per cent	SwF 4.15	SwF 4.20
14.	Eurax 20 g 10 per cent cream	SwF 2.15	SwF 2.15
15.	Lomotil 500 tab.	£6.50	£22.91 (f.o.b.)
16.	Aldactone 500 tab.	£14.00	£40.71

Source: UNCTAD/TT/58, Ibid. P. 11.

a/ Shipment is by air in all cases.

Other studies by UNCTAD show that, through bulk purchasing, Guyana, Sri-Lanka and Cuba save about 30-40% on the total drug cost.[81] Other countries which have adopted centralised purchasing include Tanzania, India, Algeria, Zambia, Iraq, Guinea, Chad, Egypt, Brazil, Sri-Lanka, Uganda and the South Pacific countries.[82]

Some neighbouring countries have had experience pooling their drug purchases so as to achieve economies of scale. These include (i) the former Central American common market (2) the former Andean group and (3) the Caribbean centre for pharmaceuticals.[83]

The commonwealth regional Health secretariat, for East, Central and Southern Africa based in Arusha, set up a scheme in 1977 to investigate the possibility for the regional purchase of drugs.[84] The countries included are Kenya, Lesotho, Malawi, Mauritious, Sychelles, Botswana, Tanzania, Zambia, Zimbabwe, Swaziland and Uganda. The possible benefits noted from the scheme are summarised below:

i) An organised market intelligence,

ii) Easier management of quality control,

iii) Benefits of economics in regard to volume of purchases,

iv) Easier control of unhealthy practices,

v) Purchase of raw materials at low prices for all manufacturers,

vi) Easier adoption of generic names to build the country's health services program and essential drugs.

Another investigation on the possible savings through bulk purchasing using generic names reveal substantial savings.[85] The method used here was based on a study by Mr. Mathenge (Chief Pharmacist in Kenya, 1977). He collected data from three pharmaceutical companies in Kenya regarding the discounts from bulk purchasing on seven pharmaceutical products (See Appendix 1, Table IVa). After this, he investigated the reductions in prices if the companies increased their purchases from one million to 100 million units. The results are shown below:

Discounts for large quantities

Units	Discounts
1m	0%
5m	2%
10m	4%
50m	6%
100m	8%

These results were used to determine possible savings on various pharmaceutical products (see Appendix 1). The analysis show savings of about 3.9% on most items. Inspite of the savings, the method adopted here ignored reductions in costs through shopping around and avoidance of transfer pricing. If these were considered then the savings would be higher.

In 1982, the Commonwealth Regional Health Secretariat for East, Central and Southern Africa identified more commonly used drugs which could form a basis for bulk purchasing in the region. These are:[86]

	Quantity(m)	Total value (1982) (US $m)
Chloroquine 250 mg	350m	3.4m
Codeine Co.	200	2.0
Ferrous Sulphate Co.	250	0.75
Sulphadimidine 100 mg.	140	0.70
Ampicillin 250 mg.	12	0.84
Paracetamol	125	0.625
Aspirin 300 mg.	300	0.45
Chloramphenical Maleate	33	0.66
Chloramphemical 250 mg.	28	0.56
Piperazine phosphate	18	0.54
Tetracyline 250 mg.	36	0.54

Inspite of the benefits discussed above, the success of bulk purchasing crucially depends on effective co-operation, among the countries concerned. The success of bulk purchasing will also depend on the reliability of foreign exchange allocations made for this purpose by each country.

CHAPTER THREE

A DESCRIPTION OF THE PHARMACEUTICAL INDUSTRY IN KENYA

The Pharmaceutical Industry in Kenya is dominated by foreign firms both for imported and locally manufactured preparations. This chapter starts by examining the structure of the industry: establishment, ownership, and manufacturing activities of the firms. Next, the chapter looks at imports, exports, the internal market structure for pharmaceutical products. Lastly, the chapter examines employment and market shares of the firms.

3.1 Establishment and Ownership of firms

Kenya's pharmaceutical industry is still young and has twenty five manufacturers all located in Nairobi (see appendix 2A). From the survey, all the firms entered the industry as importers and/or distributors of imported finished drugs before going into manufacturing.

Table 3.1 shows the establishment of the pharmaceutical firms in Kenya between 1936 and 1985. Didy Pharmaceutical Company was the first to be registered in 1936. By 1960, there were two additional manufacturers, Sterling Products and Boots. Nine manufacturers came into

production in the 1970's bringing the total number to seventeen. These included four local manufacturers, three subsidiaries of MNCs and two under joint ventures with India and Yugoslavia. Late entries include Novelty Manufacturing (1982), Pharmaceutical Products (1981), and Regal Pharmaceuticals (1981). Inspite of the rapid growth of the number of firms in the industry, two have already closed down or turned to wholesaling. Reasons given for their exit include high competition, inadequate quality control equipments, inadequate finance and disagreement among the directors.

Table 3.1

Establishment of Pharmaceutical Firms in Kenya: 1936-85*

Year	Entries	Exit	Total
Before 1950	2	-	2
1950 - 59	1	-	3
1960 - 69	4	-	7
1970 - 79	9	-	16
1980 - 85	3	2	17

Source: Extracted from appendix 2 which was obtained through Field Surveys by the author.

*Only for the firms visited by the author.

Table 3.2

Formulations and Productive Capacities in the Kenyan Pharmaceutical Industry, 1985

FIRM	FORMULATIONS					
	SYRUP ('000 Litres)	TABLETS (Millions)	OINTMENTS ('000 Kgs)	CAPSULES (Millions)	INJECTABLES (Millions)	INFUSIONS ('000 Litres)
1	50	130	5	48	0.7	-
2	300	1150	63	120	22	-
3	2000	500	8	50	10	-
4	148	120	12	24	-	-
5	80	310	15	64	-	-
6	15	760	48	80	-	-
7	358	55	40	0.19	-	-
8	1200	200	25	22	-	-
9	44	18	15	-	-	-
10	200	400	60	-	-	-
11	200	300	45	-	-	-
12	256	-	10.8	-	-	-
13	300	1155	-	-	-	-
14	210	-	0.9	-	-	-
15	300	-	-	-	-	-
16	5	-	-	-	-	-
17	-	120	-	-	-	-
18	-	-	-	-	-	500
19	-	-	-	-	-	150
TOTAL	5661	5268	347	388	32.7	650

Source: Own Survey

During the survey, entrepreneurs were also asked who owns the registered firms. Their responses indicate that, ten are local manufacturers wholly owned by Kenyan Asians, thirteen by subsidiaries of MNCs and two are joint ventures. Of the joint ventures, one is Dawa Pharmaceuticals, between the governments of Kenya and Yugoslavia. The other is Kensara between private partners in Kenya and Sarabhai of India.

Inspite of the government's effort to encourage africanisation in the industrial sector, this data reveals the non-existence of Africans in the manufacture of pharmaceuticals. Dr. Muriuki was the only African who was once engaged in the manufacture of pharmaceutical products in Kenya by mid-1970's. He was a partner in Cosmos Ltd. but due to a disagreement in 1979, he shifted to E.T. Monks & Co. Ltd., former affiliate of Cosmos.

3.2 Manufacturing activities

Local production accounts for about 25% of the total consumption of pharmaceutical products in Kenya.[1] Not all the registered firms are manufacturers. Some are simply regional distribution organisations. According to statistics by the Ministry of Health, there are 152 registered and

licensed retail chemists, and 122 registered and licensed wholesale dealers operating in Kenya. Forty-three (43%) of the retailers and 80% of the wholesalers are located in Nairobi (for more details see appendix 2B).

The majority of the existing manufacturers concentrate on over-the-counter (O-T-C) products, especially fast moving lines such as aspirin, multi-vitamins, paracetamol. Most preparations are non-sterile products (syrup, suspensions, lotions, liniments, tablets, capsules, ointments etc.) which do not require strict and expensive conditions of sterility and quality control. Tables 3.2 and 3.3 summarises the products manufactured by the pharmaceutical industry in Kenya. Only two firms (Dawa and Mac's) are currently manufacturing sterile products (vials and injectables). However, during the survey, Cosmos and Laboratory and Allieds were planning to commence the production of sterile products in late 1985.

The production of intravenous infusion solutions is done in Kenyatta National Hospital (Sterile preparation unit) and Infusions Kenya Ltd. The former supplies government's medical institutions while the latter concentrates on sales to missionary and private hospitals.

Table 3.2 categorises the formulations and productive capacity in the Kenyan pharmaceutical industry. The table was derived by asking entrepreneurs their major manufacturing processes and potential productive capacities. The process technology used in the manufacture of pharmaceutical products is similar across the industry. Appendix 3 is provided to acquaint the reader with the various manufacturing processes in the pharmaceutical industry.

Table 3.3

Products Manufactured by the Pharmaceutical Industry in Kenya

Firm	Products Manufactured
Chemafric	Ethical pharmaceutical products: antibiotics, antimalarials, vitamins and minerals, ointments analgesics, antirheumatics and veterinary products
Cosmos	Human and veterinary pharmaceuticals
Dawa	Sterile and non-sterile pharmaceutical products: antimicrobials, diuretics, anthelmintics diuretics, analgesics, corticosteroids, tranquilizers and vitamin preparations.
Didy	Over-the-Counter (O-T-C) medicinals, cosmetics and sale of pharmaceutical raw materials.
Elys	Pharmaceuticals: tablets, syrups, and capsules.

Table 3.3 Cont.

Firm	Products Manufactured
Infusions (K) Ltd.	Infusion solutions for intravenous application by medical profession.
Lab. & Allieds	Pharmaceuticals and drugs: antibiotics analgesics, anti-protozoa, tranquilizer.
Mac's	Pharmaceutical and aerosol products
Manhar Bros	Pharmaceutical chemists (more of a wholesaling function).
Nicholas Kiwi	Pharmaceuticals and cosmetics
Novelty	Pharmaceutical and medical products (syrups only)
P.A.C.	Pharmaceutical preparations: analgesics, cough syrups antibiotics, antimalarials anthelmintics, multivitamins antiscabies, antidiarrhoeals, antifungals.
Regal	Pharmaceuticals: antibacterials, anti-malarials analgescs, antitussives.
Sterling	Pharmaceuticals: analgesics: anthelmintics; antimalarials; gastric ailments, toiletaries and Industrial products.
Wellcome	Veterinary preparations, household insecticides; industrial and public health disinfectant and human pharmaceutical products.
Pharmaceutical Products	Pharmaceuticals (syrup).

Table 3.3 Cont.

Boots	Pharmaceutical preparations, cosmetics and veterinary products.
Glaxo	Pharmaceutical preparations mostly Glaxo group of ethical items.

Source: Own Survey

Notes: Chemafric(Kensara) stopped production in March 1985.

Veterinary drugs

The pharmaceutical industry in Kenya is also engaged in veterinary preparations. This is currently done by five firms: Cosmos, Mac's, Wellcome, Boots and Dawa (See Table 3.3). Since veterinary preparations require the same equipment as used in the production of pharmaceuticals, many firms in the industry are planning to introduce these preparations to improve capacity utilisation.

3.3 Type and Source of Raw Materials

Imports

The production of pharmaceuticals require a broad range of packing and raw materials. Nearly 75% of the value

of raw materials for pharmaceuticals are currently imported.[2] Trade data shows that about 95% of these originate from U.K., W. Germany, and Switzerland[3]. The medicinal and pharmaceutical products imported by Kenya include both raw materials and finished drugs. These products fall under the following categories:

SITC Code No.	Item
541.00	Provitamins and vitamins
541.300	Antibiotics (penicillins, streptomycin, tetracyclines etc).
541.400	Alkaloids
541.500	Hormones (insulin, adrenal, hormones etc.)
541.600	Glycosides, organo-therapeutics, antisera and bacterial vaccines, toxins, microbial cultures, etc.
541.700	Medicaments with antibiotics, hormones; or alkaloids, infusion solutions.

Between 1975 and 1983, the value of medicinal and pharmaceutical products imported by Kenya rose from Kshs. 150 m.to Kshs. 390m, an increase of 160%. On the other hand, the percentage of Kenya's imports which were for the pharmaceutical industry fluctuated between 1.6% to 2.2% in the same period. For further details see Table 3.4.

Table 3.4

Imports of Medicinal and Pharmaceutical Products, 1975-83

Year	Quantity ('000 Kgs.)	Value Ksh. (m)	Percentage of Total Imports by Pharmaceutical Industry
1975	25	150	2.1%
1976	26	130	1.7%
1977	33	200	1.9%
1978	49	260	2.0%
1979	n/a	220	1.8%
1980	4972	320	1.6%
1981	2512	350	1.9%
1982	3905	370	2.0%
1983	2191	390	2.2%

n/a Not Available

Source: Kenya, Annual Trade Reports (1975 to 1983), op.cit.

Due to the rising trend in pharmaceutical imports, the government is encouraging the use of local inputs and manufactured goods to save foreign exchange. The measures adopted to discourage imports include registration of drugs, limiting foreign exchange allocation, and charging high customs duties on products which can be obtained locally.

Inspite of these efforts aimed at discouraging imports, many finished drugs especially antibiotics, which can be produced locally are still imported. In the 1983/84, Kenya Association of Manufacturers' (KAM) budget proposal, various brand items, which are produced locally and should not be imported, were identified. These include:

Asafen granules	Milk of Magnesia
Beserol granules	Miranol C2M
Camyofin	Vicks Inhaler Medication
Clioquinol	Vicks vaporoub Medication
CVC medicated ointments (vicks)	Zinc oxide
Ergot granules	Analgin

Despite the association's request to restrict imports of the above items, these drugs continue to be imported. In a second case, a foreign based firm is currently importing the following finished drugs: Emdopa (methyldopa B.P.), Indicin (Indomethacin B.P.) and Sulphadimidine B.P. However, a local firm manufacturing similar products using imported raw materials alleges that it would not be granted a license to import the same finished drugs because of its capacity to manufacture locally. Elsewhere, the author documented that in 1979, the same firm applied for licenses to import drugs for the Ministry of Health

long before the tenders had been adjudicated. This means that the firm was certain of getting the tender, and strongly suggests corruption in the administration and/or Central Tender Board[4]. Infact, they did get the tender later.

Furthermore, many injections are being imported while the injections departments in Dawa, and Mac's pharmaceuticals are running well below their full capacities.

Local Inputs

According to the entrepreneurs interviewed, 70-75% of packing and raw materials used by the Kenyan pharmaceutical industry are imported. This leaves only 25-30% inputs to be purchased locally. The local inputs are mostly packaging materials, flavours, sugar, alcohol, maize starch, and glass bottles.

The use of local inputs cut production costs to some manufacturers. For example, Sterling Products has managed to cut expenditure by 50% on "Phillips mom 83ml" plastic bottles through importation of moulds from the mother company and contracting a local firm (Pan Plastics) to manufacture the bottles. The mould which cost Ksh. 120,000 (1970), is capable of producing about 10 million bottles. With a consumption of only 72,000 bottles per

month, the mould could be used at least for several decades. Furthermore, the mould can be repaired locally.[5]

Sterling products has also cut expenditure by 40% on 'Pluvarit PFB' and 'Andrews Liver Salt' laminate papers by obtaining them locally from Colour Packaging, Print Pak, and Cosmos.

There still exists potential for further import substitution of various inputs in the pharmaceutical industry in Kenya. Many local manufacturers still prefer imported bottles to local ones produced by EMCO Glass Works. According to the manufacturers interviewed, imported bottles are of higher quality and 50% cheaper than EMCO bottles. Poor quality is evidenced by the rejection rate given by individual manufacturers. Out of the total bottles supplied to the pharmaceutical manufacturers in Kenya, between 10-37.5% are rejected because of broken necks, or rough faces. However, EMCO reports that they have purchased new moulds which should improve the quality once the old inventory is used up[6]. EMCO Glass Works is also unpopular among many pharmaceutical manufacturers because it does not provide credit to customers, transport, or refunds against broken bottles.

Usage of local sugar provides another example of efforts by the local industry to encourage local inputs. Ten pharmaceutical firms are currently using local sugar in making dry syrups. Three MNCs, however, still believe that the local refined sugar is of poorer quality and thus prefer to import.

The above data shows that Kenya needs to develop more inputs for use by the pharmaceutical industry and to improve on the quality of existing ones. Additional inputs that could be produced by Kenya include aluminium caps, gelatine capsules, rubber caps, and laminate papers.

3.4 Exports

From Table 3.5 the exports of Kenya pharmaceutical products show an expansion from ksh. 3.3m in 1964 to kshs. 77m in 1983. It's significance in relation to total Kenyan exports has also increased from 0.2% to 0.6% in the same period. According to the trade reports[7], the only markets available for Kenya pharmaceutical products are the sorrounding African countries such as Uganda, Tanzania, Malawi, Zaire, Somalia, Ethiopia, Zambia and Burundi.

Table 3.5

Exports of Pharmaceutical Products by Kenya, 1964-83

Year	Quantity ('000 kgs.)	Value Kshs. (m)	Pharmaceutical Industry Exports as a Percentage of Total Kenya Exports
1964	1	3	0.3%
.	.	.	.
.	.	.	.
.	.	.	.
1974	5	40	0.3%
.	.	.	.
.	.	.	.
.	.	.	.
1977	11	44	0.5%
1978	8	42	0.6%
1979	2137	47	0.6%
1980	1368	66	0.7%
1981	975	74	0.6%
1982	737	63	0.6%
1983	1022	78	0.6%

Source for 1964 and 1974: East African Community, Annual Trade Reports for Kenya Uganda and Tanzania, Custom and Trade Department.

Source for 1977-83: Kenya, Annual Trade Reports, op.cit.

In 1974, Kenya introduced a 10% export compensation scheme to stimulate exports but this scheme has not influenced marketing decisions according to the entrepreneurs interviewed. Exporting is regarded by many firms as a secondary or relatively unimportant activity. The reasons given for this include: stiff foreign competition, limited markets, uncertainity regarding political situations, commercial policies in importing countries, and lack of foreign exchange by those countries.

3.5 Quality Control

There are between 5000-6000 pharmaceutical products manufactured and/or sold in Kenya. Some of these products do not conform to required international standards.[8] As documented by A.S. Tawfik, many of the local manufacturers do not have a well functioning quality control laboratory for quality assurance. Since 1980, the Ministry of Health (Drugs Inspectorate Department) has recommended the closure of two firms, Pharmaceutical Manufacturing Co. and Didy Pharmaceutical Co. The first firm was closed in 1982, while the latter continues to operate despite recommendations by the Drug Inspectorate Department to close it.

Sources by the Ministry of Health indicate that many other firms, both foreign and local, produce and/or distribute sub-standard drugs in Kenya. These include, among others, the manufacture of paracetamol, trimoxazole, magnesium trisilicate and ferrous suplhate.

Inspite of the efforts by the Ministry of Health to crackdown on unprofessional manufacturers, lack of physical, financial, and human resources remain a serious constraint in carrying some regulatory quality control programs.

3.6 Internal Market Structure

The market for pharmaceutical products in Kenya is about Kshs. 600m[10], of which, imports cover three-quarters. Foreign firms (importers and manufacturers) control about 90% in value[11].

Drugs sold in the internal market include both ethical and non-ethical drugs. The former require a physician's prescription while the latter do not. Thus, the medical practitioners are responsible for determining the sale of ethical medicines while the non-ethical (O-T-C) drugs can be bought and sold by anyone in the open market.

The most widely used drugs in Kenya are antibiotics (31.6%), antimalarials (8.6%), cytotoxics (6.3%) bronchial relaxants (5.4%) and sulphonamides (5.2%). This is reflected by the consumption pattern of the public sector (Central Medical Stores) as indicated in Table 3.6.

Table 3.6

Annual Drug Consumption of Main Pharmaceutical Categories By the Central Medical Stores During 1983-1984 (12 Months

		VALUE £K	% TOTAL
1.	Antibiotics	2,214,219	31.56
2.	Antimalarials	599,730	8.55
3.	Cytotoxics	441,047	6.28
4.	Bronchial Relaxants	381,649	5.44
5.	Sulphonamides	365,195	5.20
6.	Antidepressants	339,341	4.83
7.	Antispasmodics	285,140	4.06
8.	Analgesics/Antiinflammatories	246,342	3.51
9.	Tranquilizers/Sedatives	185,644	2.64
10.	Cough/Cold Remedies	134,332	1.91
11.	Dermatologicals	111,028	1.66
12.	Hypoglycemics	111,187	1.59
13.	Antihypertensives	110,637	1.57
14.	Antifungals	109,427	1.56
15.	Hormones	107,407	1.53
			81.89

Source: Central Medical Stores, as cited in Meneses, E., op.cit., Annex XIV, p. 53.

The pharmaceutical market in Kenya is characterised by much product differentiation, which sustains price variability between drug substitutes.[12] The consumers' attitudes also support product differentiation. According to the entrepreneurs, local consumers prefer imported goods and are accustomed to particular brands. This attitude inhibits consumers from changing or trying equally effective and cheaper generics.

The largest buyer of drugs in Kenya has been the Central Medical Stores, now Medical Supplies Co-ordinating Unit. This organisation has been buying about 75% of the drugs in the Kenyan market, through an open tender system. These drugs are then distributed to government medical institutions.[13] Because of the deficiencies in the system, high-priced brand-named pharmaceutical products continue to form a large share of public and private sector supplies.[14] By contrast, generically named drugs are seldom used.

The remaining products are sold to local pharmacies, dispensaries, private doctors or missionary hospitals directly through distributors or company representatives.

Degree of Competition in the market

The market for pharmaceutical products in Kenya exhibits

features characteristic of monopolistic competition. Firstly, there are many manufacturers and distributors in the market. Secondly, pharmaceutical products in the market are highly differentiated by shape, colour, or brandnames. For instance, septrin (anti-bacterial) is sold in different colours and packages. Furthermore, septrin is sold under different brand names such as sulphamethoxazole, trimethoprim, sulfotrim, co-trimethoxazole, trimoxol etc. Additional examples like this are provided in chapter 4. Through differentiation similar generic products appear unique and advertising might even make it worse. Differentiation also creates monopoly power to enable manufacturers to influence the price structure for specific products. Whereas many firms manufacture and/or sell their own specialities, these firms adapt aggresive price policies when necessary. This is often practised in government tenders. Beecham, for example, has two sets of prices, one for the government and the other for the private sector.[15] Another firm, Aspro Nicholas, had to reduce the retail prices on Aspro tablets by $33\frac{1}{3}\%$ when faced with stiff competition.[16]

3.7 Employment

The pharmaceutical manufacturing firms in Kenya employ about 1500 people. Of this, about 65% are engaged in direct production of pharmaceutical products. The leading

employers in the sector are Sterling (20%), Dawa (13%), Wellcome (13%), Mac's (7.3%) and Laboratory and Allieds (7.3%). Together, these firms constitute about 60% of total employment in the industry. Besides all the pharmaceutical manufacturers are capable of employing about 200 casual employees depending on the work load.

3.8 Market Shares

The market share of the pharmaceutical firms in Kenya can be analysed by looking at the firms' sales. During the survey, data on sales was either obtained from the company files at Central Bank of Kenya or directly from the entrepreneurs. The information available indicate that in 1983, the sales by the pharmaceutical firms in Kenya were approximately, Kshs. 700m. The leading firms ranked by pharmaceutical sales were Dawa (16%), Sterling (11%), Wellcome (11%), Glaxo (8%) and Boots (9%). The foreign based firms made 70% of the pharmaceutical sales while the local manufacturers and joint ventures made 15% each. These figures demonstrate the dominance of the pharmaceutical industry by foreign based firms.

CHAPTER FOUR

DATA ANALYSIS

4.1 METHODOLOGY

The list of firms engaged in pharmaceutical production was compiled from the Ministry of Health files, Register of manufacturing firms[1], Register of Kenya Association of Manufacturers[2] and by asking the firms to identify their competitors. These sources identified twenty five manufacturers. Of these, the author visited eighteen (see appendix 2A). The other seven firms are known to be small.

The author interviewed the eighteen manufacturers between January and May 1985. The interviews were administered through a questionnaire structured to obtain the following information.

i) history of the firm
ii) working time and slackness in the factors of production,
iii) productive capacity,
iv) terms of technology contracts in license agreements,
v) prices of imported raw materials and finished drugs,
vi) local production potentials for cinchona alkaloids,
vii) financial statements. (see appendix 4).

The interviews normally lasted two to four hours. In cases where sufficient information was not obtained, the author re-visited the firms. Additional data on contracts, financial statements and imports was gathered through an

examination of company files at the Central Bank of Kenya. The author also visited several firms in Tanzania to compare invoices on imported pharmacutical raw materials.

Secondary data was collected from Central Bureau of Statistics Publications, Ministry of Commerce and Industry (Industrial Promotion Department), Economic Journals, Medical Abstracts, UNIDO; GATT; UNCTAD, and other publications.

4.1.1 HYPOTHESES STATED

This study will investigate technology transfers, capacity utilisation, transfer pricing, use of generic and brand names, protection of local manufacturers, and production of cinchona alkaloids in Kenya. The following hypotheses are used in the investigation:

Hypothesis one

"The contractual terms of technology transfer into the Kenyan pharmaceutical industry retard the development of the industry in Kenya".

Hypothesis two

"Capacity underutilisation exists in the Kenyan pharmaceutical industry".

Hypothesis three

"From a micro perception, demand factors are mainly responsible for the existing capacity underutilisation".

Hypothesis four

"Transfer pricing exists in the Kenyan Pharmaceutical Industry".

Hypothesis five

"Brandname drugs cost much more than their generic counterparts in Kenya".

Hypothesis six

"The local pharmaceutical manufacturers are not protected against imports of finished drugs".

Hypothesis seven

"Local processing of cinchona alkaloids could yield substantial foreign exchange earnings and savings to Kenya".

4.1.2 Data Limitations

The following are the major limitations of the study:

i) It was difficult to get a comparison of invoices on many imports. This is because the firms do not necessarily import similar items during the same period. Consequently, the author obtained additional quotations on pharmaceutical raw materials from the local manufacturers to supplement information obtained from the Central Bank's files.

ii) Also, some entrepreneurs considered the survey to be too confidential to be released to outsiders. Hence,

they were reluctant to give some information.

iii) In some cases, it was not easy to distinguish between those raw materials used in veterinary and pharmaceutical preparations. For this reason, some firms could not give accurate data on raw materials usage for some preparations.

4.2 TECHNOLOGY

Nearly all the technology used in the preparation of pharmaceuticals in Kenya is imported. This section examines the restrictions contained in the contractual agreements for technology transfers in Kenya.

The technology used in the manufacture of pharmaceutical products in Kenya is mainly imported from U.S.A., West Germany, England, Yugoslavia, India, and Italy. This technology is imported through subsidiaries of MNCs, or contractual agreements with reputable pharmaceutical manufacturers.

Due to government pressure to encourage local manufacturing through import restrictions, several MNCs have contracted some local manufacturers to process their products in Kenya through licensing agreements. This entails the provision of technology and guidelines related to the manufacture of licensed products. As shown in chapter two, contractual agreements for the transfer of technology to the third world

contain many terms which limit the operations of, and inhibit the development of the pharmaceutical sector in LDCs.

During the survey, the author analysed twenty contracts related to the manufacture of pharmaceutical products in Kenya at the Central Bank of Kenya. Twelve of the contracts relate to MNCs and their subsidiaries operating in Kenya. The remaining contracts are between local firms and various MNCs. The analysis confirms (1) the existence of requirements to purchase raw materials exclusively from the parent or licensing MNC, (2) inflated royalty payments and (3) export and distribution restrictions. These restrictions are examined in detail below.

4.2.1 Tied purchase of material inputs

The manufacture of licensed pharmaceutical products require specific know-how and technical assistance. This includes working instructions and specifications for quality control. To conform with the required standards, 80% of the contracts analysed state that the licensee must obtain raw materials and specific components from the licensor or sources approved by the licensor. All the MNCs required their subsidiaries to obtain packaging and raw materials from the parent or sister companies.

Tied purchases of materials inputs has many advantages to the licensor. The licensor can engage an affiliate or

parent company to purchase the required raw materials for the licensee. At times, this enables the licensor to increase the prices of raw materials and the level of commissions for negotiation or buying.

More than half of the licensees in Kenya pay about 3% of total purchases in negotiation or buying commission to their licensors or approved sources. Inspite of this, many firms press for an increase in the commissions. For example, in 1973, a MNC with a subsidiary in Kenya demanded an increase in the buying commission from 3% to 6% of total purchases. Reasons given for the increase were related to alleged high costs in performing the following activities[3].

i) Receiving and processing the orders,
ii) Negotiating prices and purchasing the goods,
iii) Receiving and warehousing the goods,
iv) Arranging inspection by General Superintendence Co.,
v) Delivering the goods to the port for shipment.

The proposal was rejected by the Central Bank of Kenya and the MNC continue servicing Kenya.

Tied purchases of raw materials also inhibit the local capacity to produce inputs. Whereas, some packaging materials like cartons, glass bottles, laminate papers, aluminium caps and gelatine capsules can be obtained locally, many firms manufacturing licensed products have to rely on licensors' sources.

4.2.2 Patents

Kenya grants patent protection for some pharmaceutical products. Out of the 3550 patents registered in Kenya, about 15% relate to pharmaceuticals.[4] During the period of protection the patentee is granted monopoly on the production and importation of the patented product. Due to the protection, other manufacturers are restricted from importing, compounding or even distributing the patented product within the protected territory. This situation does hinder the importation of cheaper raw materials and finished drugs, thus providing an obstacle to industrial development. This is further demonstrated by the following example from Kenya.

In 1981, the government changed its decision to buy amoxycillin trihydrate from a cheaper source to a high cost supplier because of the existing patent laws. The government tender no. 11/80-81, for the supply of 4.47m capsules of amoxycillin trihydrate had earlier been awarded to a local company who had the lowest quotation, K.Shs., 395 per 1000 capsules. Later, a MNC patent holder, claimed that amoxycillin trihydrate was patented in Kenya and deserved monopoly rights over the product.[5] Even though the local company had earlier confirmed by a letter from the Registrar of Patents and Trademarks that the product was not registered in Kenya, the MNC prevented the local company from dealing in the product. Consequently, the government was forced to buy

amoxycillin trihydrate under the brandname Amoxil, from an agent of the MNC patent holder. The product was bought at K.Shs. 1074 per 1000 capsules. In total, the government could have saved about K.Shs. 3 million had it bought the product from the cheaper source (local company).

4.2.3 Royalty payments

Royalty payments for the manufacture of pharmaceutical products in Kenya range from 1% to 8.37% of the net sales (see table 4.1). This study further reveals that royalty payments depend on bargaining. Inspite of the fact that most licensors request for royalty payments of about 10% (net sales), stronger negotiation can lower the figure. Table 4.1 shows that in cases where the Central Bank of Kenya has intervened, the royalties which were previously more than 5% have been reduced. This organisation has been forceful despite limitations in the number and quality of personnel used in negotiation.

The data below confirms findings by Kaplinsky that the Central Bank of Kenya is committed to reduce service fee payments in technology contracts to less than 5% of net sales.[6]

Table 4.1

Royalty Payments as a Percentage of Net Sales in the Kenyan Pharmaceutical Industry, 1984.

Contracts	Original Payment	Payment in December 1984
1+	2.5%	2.5%
2+	3.3%	3.3%
3+	1.0%	1.0%
4+	12.5%	12.5%
5+	12.5%	4.0%
6+	10.0%	3.0%
7+	9.0%	4.0%
8+	10.0%	2.5%
9+	5.0%	4.0%
10	-	8.37%
11	10.%	5.0%
12	-	7.5%
13	-	3.0%
14	-	4.0%
15	4%	1.0%
16	-	2.5%
17	-	3.0%
18	-	1.0%
19	-	2.0%
20	-	2.5%

Source: extracted from Central Bank Company files, December 1984.

\+ Contracts re-negotiated by the Central Bank

\- No information.

4.2.4 Export and distribution restrictions

Export restrictive clauses frustrate the Kenyan pharmaceutical sector by limiting the market size and productive capacity. From the twenty contracts evaluated in the Kenyan pharmaceutical Industry, fourteen contained restrictions to approved markets, especially Somalia, Burundi, Tanzania, Uganda and Ethiopia. This partially explains how MNCs use Kenya as a base to promote their products in East and Central Africa, while the same time restricting sales elsewhere.

Besides the export restrictions, many licensed products are channelled through distributors appointed by the licensor. These distributors earn export or sales commissions ranging from 5-10% on sales. Thirteen of the contracts studied had specific appointed distributors that were usually affiliated to the MNCs (licensors).

4.3 CAPACITY UTILISATION

Capacity underutilisation is common in developing countries. This section demonstrates the extent of underutilised capacity in the pharmaceutical Industry in Kenya. The method adopted here is the Weighted Average Time Based Measure illustrated in chapter 2. During the survey, data related to working time, and productive capacity were obtained from the entrepreneurs in this industry. This data was used to estimate the extent of idle capacity.

Three overall measures of capacity utilisation were obtained using the number of production workers in each plant as the weight.

U_1 measures the weighted average utilisation rate without slack (Ai = 0). The measure uses 120 hours as the potential maximum hours entrepreneurs are willing to operate. This is based on findings by the ILO Mission to Kenya,[7] and by Coughlin,[8] that firms are willing to run a second shift plus an overtime of four hours if demand were to increase permanently.

U_2 introduces the slack variable. It assumes that there is some slack in the use of labour and capital. For this reason Ai = 0. Data relating to the slack (Ai) was obtained by asking entrepreneurs the potential increase in production (a) with the same number of hours, same labour, same plant and equipment and (b) with the same number of hours, same plant and equipment but additional labourers. The potential maximum hours firms are willing to operate per week still remains at 120 hours.

U_3 slightly differs from U_1 and U_2. During the survey, 78% of the firms in the pharmaceutical industry in Kenya preferred operating 96 hours per week instead of 120 hours. Consequently, 96 hours is used as the potential maximum hours in U_3. Thus U_3 is expressed as:

$$U_3 = \frac{U_2 \times 120}{96}$$

Table 4.2

Capacity utilisation in the Kenyan pharmaceutical Industry, 1985

Firms	shifts		Labourers in production	Hours worked per week	Potential increase in production		capacity utilisation rates (%)		
	Actual	Desired			a Same hrs, labour plant, equipment	b additional labourers	U_1 120 hrs without slack	U_2 120 hrs with slack	U_3 97 hrs with slack
1	1	2	29	45	200%	200%	38	13	16
2	1	2	22	45	200%	250%	38	13	16
3	1	3	164	45	200%	400%	38	13	16
4	1	1	23	45	0	0	38	38	48
5	1	2	18	45	50%	100%	38	25	31
6	1	2	16	40	100%	200%	30	15	19
7	1	3	90	45	60%	100%	38	24	30
8	1	2	92	42	200%	400%	35	12	15
9	1	2	6	40	50%	100%	30	20	25
10	1	2	16	40	100%	200%	30	15	19
11	1	2	4	40	200%	300%	30	10	13
12	1	2	21	43	200%	200%	36	12	15
13	1	2	50	45	100%	150%	38	19	24
14	1	3	129	40	100%	300%	30	15	19
15	1	2	30	40	200%	400%	30	10	13
16	1	2	12	44	200%	300%	37	12	15
17	1	2	100	45	100%	300%	38	19	24
18	1	2	90	45	200%	400%	38	13	16
Total production workers			912		*Weighted average		32%	17%	21%

* The overall measures of capacity utilisation were obtained using the number of production workers in each plant as the weight.

Source: Own survey

Table 4.2 shows that all the firms in the pharmaceutical industry in Kenya are currently operating one shift of 40-45 hours per week. If demand were to increase, fourteen firms would be willing to operate a second shift, and three firms, a third shift. The remaining firm would not operate additional shifts. All the entrepreneurs interviewed expressed that additional shifts would not lower the productivity. Thus productivity in the first, second and third shifts is assumed to be constant.

The capacity utilisation rates for individual firms and the entire industry are presented in Table 4.2. In this study, U_3 is chosen to best represent the capacity utilisation in the pharmaceutical industry in Kenya. This is because it uses a slack variable and the potential maximum working hours which were preferred by a majority of entrepreneurs in this industry. U_2 gives the lowest capacity utilisation rate because it exaggerates the number of hours pharmaceutical manufacturers are willing to operate.

The rate of capacity utilisation was also calculated for five processes, namely, tabletting, labelling, granulation, capsulation, and ointments filling. For each section the Weighted Average Time Based Measure is used, though with the number of production workers in each process as the weight. Also, data relating to the

productive capacities and slackness in the use of labour and capital were arranged according to firm and process. The results obtained are presented in Table 4.3. These results show a significant difference between the rates of capacity utilisation in the various processes.

Table 4.3

Capacity utilisation for selected processes

Process	Production Labourers	Capacity utilisation rates		
		U_1	U_2	U_3
Tabletting	65	50%	36%	45%
Labelling	30	44%	15%	19%
Granulation	64	30%	10%	13%
Capsulating	71	20%	8%	10%
Ointments filling	25	5%	1%	2%

Source: Own survey

The study shows that by any measure there is massive underutilisation of labour, plant, and equipment in the pharmaceutical industry in Kenya. Firms use far less than half of their productive capacities. This result demonstrates hypothesis two.

4.4 Causes of capacity Underutilisation

The preceding section demonstrated the underutilisation of productive capacity in the pharmaceutical industry in Kenya. This section examines in detail the causes of the

idle capacity as perceived by the plant managers.

During the survey, the author suggested six causes of excess capacity to the entrepreneurs. These causes were derived from the literature review of other LDCs. They include:

i) Demand factors

a) Market limitations (inadequate and seasonal demand)

b) Competition from imports.

ii) Supply factors

c) difficulties encountered in obtaining raw materials

d) Plant breakdowns

e) Shortage of skilled personnel.

iii) f) Other factors

Next, the entrepreneurs were asked to rank each of the above causes inorder of importance. The ranking was as follows:

(1) Very important (3) Just important

(2) Important (4) Not important

The results by entrepreneurs is represented in table 4.4.

Table 4.4 shows the ranking of causes of capacity underutilisation as very important is as follows: Demand factors 56%, competition from imports 56%, difficulties encountered in obtaining spare parts 0%, difficulties

Table 4.4

Causes of Capacity Underutilisation in the Kenyan Phamaceutical Industry, 1984-85

R E S P O N S E S

Firm	Demand reasons		Supply reasons				
	a	b	c	d	e	f	g
	Market	Competition	Raw Materials	Spare parts	Break downs	perso-nnel	Other
1	3	1	2	2			-
2	1	2	3				-
3	1	1		3			-
4	1						1
5	2	1	3				1
6	1	2	2				-
7		1					1
8	2		2		3		-
9	1	1	2				-
10	2	1	2				-
11	1						1
12	2	3		3	2		2
13	1	1	2				-
14	1		2				2
15	1	1					-
16	2	1	1	3	3		-
17	1	3	3	3			-
18		1	1				-
Total (1)	56%	56%	11%	0%	0%	-	22%

Source: Own Survey
Blank: Not important
-: No response.

encountered in obtaining raw materials 11%, plant breakdowns 0%, shortage of skilled personnel 0%, and other factors not mentioned by the author 22%.

In the last category (g), the plant managers mentioned many factors related to the inconsistency of the investments into the industry. Many plant managers were against the policy of allowing investments in areas already running below their potential capacities.

This result clearly indicates that the plant managers in this industry consider demand rather than supply factors to be the major constraint in utilising their productive capacity to the maximum.

4.5 TRANSFER PRICING

There is much overpricing of some pharmaceutical raw materials in Kenya, especially those containted in license agreements. Some MNCs also inflate service payments to remit funds abroad. This section provides more discussion on these issues.

The author obtained prices on pharmaceutical raw materials (1983 and 1984) by examining: 1) company invoices at Central Bank of Kenya 2) invoices in Tanzania 3) supplier's quotations directly or from individual manufacturers. Next, analysis was done by comparing the invoices and quotations for identical generic products. The invoices within

three months were considered comparable due to fluctuations in world prices of pharmaceutical raw materials.

The analysis indicates that some MNCs paid much higher prices for raw materials than were obtained by other Kenyan firms. This has been more prevalent in contracts where the licensee was tied to obtain raw materials from the licensors' source. The following examples will suffice.

In 1984, a MNC quoted a price of U.S. $ 115 for a kilogram of Methyldopa to a licensed local manufacturer, while the same product could be obtained elsewhere at U.S. $ 68. Another MNC sold Diazepam at U.S. $ 600/kg to a local licensee while the same product could be obtained from the free market at U.S. $ 60/kg. Also, Ampicillin was sold at U.S. $ 200 per kilogram while the free market price was between U.S. $ 55-64 per kilogram. These and other comparisons obtained during the survey are presented in Table 4.5.

From the sixteen imports contained in Table 4.5 overpricing ranges from 3% to 2038%. Much of the overpricing relates to tied agreements. Even excluding Diazepam, the average rate of overpricing is 102%. Contrasted to 40% for the other contracts. Besides Diazepam, other raw materials that are highly overpriced are Frusemide, Ampicillin and Sulphamethoxazole. These products are specialities and are produced in Kenya under license from big MNCs.

Table 4.5

Comparison of CIF Prices/kg for Some Pharmaceutical Raw Materials Imported into Kenya, 1984-85

	Generic names	a Highest Price (K.Shs)/kg.	b Lowest Price Shs./kg	c Over pricing (%)	
1.	Diazepam	9000*	421	2038%	
2.	Ampicillin Trihydrate Compacted	2329*	897	160%	
3.	Methyldopa	1666*	985	69%	
4.	Oxytetracycline Hydrochloride	339*	329	3%	
5.	Sulphamethoxazole	430*	120	258%	
6.	Frusemide	881*	298	196%	
7.	L-Ephedrine Hcl Crystalline	542*	341	59%	
8.	Codeine Phosphate	5665*	4491	26%	
9.	Tetracycline Hd B.P.	462*	323	43%	Average 102%
10.	Chloroquine	366	306	20%	
11.	Paracetamol	76	33	130%	
12.	Aspirin	45	35	29%	
13.	Acetylsalicylic Acid	50	35	43%	
14.	Caffaine Anahydrons B.P.	125	115	9%	
15.	Sulphadimidine	210	175	20%	
16.	Metronidazole	355	270	31%	Average 40%

* Tied agreements

a. Highest price paid by a Kenyan importer

b. Lowest price paid by a Kenya importer or the cheapest supplier.

c. Overpricing is calculated as: $\left(\frac{a - b}{b}\right) \times 100$

Source: Central Bank Company files, and quotations from individual manufacturers.

This overpricing could possibly be due to transfer pricing or high costs in production. This evidence is quite strong and certainly consistent with a pattern of transfer pricing.

4.6 USE OF GENERIC AND BRANDNAMES

Using hypothesis five, this section examines the price difference between similar products sold under generic and brandnames. Ten products obtained from the price lists of some manufacturers and importers are used for comparison. The products were selected to represent some group of medicines. The price lists contain ex-factory, wholesale, and retail prices as agreed by the Price Control Department in the Ministry of Finance and Planning.

The prices of pharamaceutical products in Kenya are controlled by the Price Control Department which negotiates with the suppliers. However, in government tenders the Price Control Department is not included in analysing the quotations. The price lists studied indicate that the wholesaler is allowed a 15% profit margin while the retailer 33%. In addition, the Pharmacies charge a dispensing fee of K.Shs. 10/- per prescription. This substantially increases the charge for clients. The author did not systematically study to what extent the controlled prices are obeyed. However, seven pharmaceutical retail distributors in Nairobi asserted that they sold drugs at controlled prices.

Table 4.6

Wholesale and Retail Prices of Generic Versus Brand Name of Identical Products in Kenya, 184-85.

	Product	Generic Brand	Manufacturer Distributor	Packing Units	Wholesale Price (K.Shs.)	Retail Price (K.Shs.)	Ratio of the most expensive to the cheapest
1.	Septrin Tabs 500 mg.	G	-				
	Unitrim	B	Regal	1000 Tabs	450.00	600.00	
	Ultrasept+	B	Assia	1000 "	558.00	744.50	
	Co-Trimoxazole	B	Mac's	1000 "	405.00	540.00	
	Trimoxol	B	Dawa	1000 "	411.80	547.70	1.38:1
2.	Diazepam Tabs (5 mg.)	G	Dawa	1000 Tabs	55.00	73.30	
	Diazepam	G	Mac's	1000 "	67.00	89.30	
	Diazepam	G	Didy	1000 "	55.00	73.30	
	Assival	B	Assia	1000 "	85.00	113.30	1.55:1
3.	Frusemide Tabs (40mg.)	G	Mac's	1000 Tabs	300.00	400.00	
	Frusemide	G	Dawa	1000 "	200.00	266.00	
	Fusid+	B	Assia	1000 "	350.00	466.70	
	Lasix*+	B	Hoechst	1000 "	2842.05	3789.40	14.2:1
4.	Franol Tabs (150 mg.)	G	Sterling	1000 Tabs	210.00	279.90	
	Tephedral+	B	Assia	1000 "	126.95	169.25	1.65:1
5.	Magnesium Trisilicate Tabs (500 mg.)	G	-				
	Magnomint	B	Regal	1000 Tabs	50.00	67.00	
	Actal*	B	Sterling	1000 "	231.60	308.70	4.62:1
6.	Chloroquine Tabs (250mg.)	G	Dawa	1000 Tabs	170.60	226.10	
	Chloroquine	G	Mac's	1000 "	180.00	240.00	
	Aralen	B	Sterling	1000 "	450.00	600.00	
	Intaclor	B	Regal	1000 "	160.00	213.30	2.8:1

7.	*Metronidazole Tabs (200 mg.)*	G	Mac's	1000	Tabs	150.00	200.00	
	Eflaron	B	Dawa	1000	"	175.00	233.30	
	Megyl	B	Regal	1000	"	180.00	240.00	1.2:1
8.	Benzyl Benzoate 25% (emulsion)	G	Mac's	5	Litres	80.00	106.60	
	Benzyl Benzoate 25% (emulsion)	G	Regal	5	"	130.00	173.30	
	Scabil application	B	Novelty	5	"	100.00	133.30	1.6:1
9.	Paracetamol Tabs (500 mg.)	G	Mac's	1000	Tabs	70.00	93.30	
	Paracetamol	G	Dawa	1000	"	94.10	125.40	
	Paracetamol	G	Didy	1000	"	65.00	86.60	
	Cetamol	B	Regal	1000	"	75.00	100.00	
	Panadol	B	Sterling	1000	"	47.55	63.40	1.98:1
10.	Aspirin Tabs (300 mg.)	G	Mac's	1000	Tabs	26.00	34.60	
	Aspirin	G	Didy	1000	"	30.00	40.00	
	Dawaspirin	B	Dawa	1000	"	36.40	48.50	1.4:1

Source: Published Price lists as agreed by the Price Controller (Ministry of Finance and Planning

* Drugs specially developed by the Parent Comany through R & D (specialities)

\+ Imported.

The survey of ten products distributed in Kenya demonstrates wide price differentials between generic and brandname drugs. The ratio of the most expensive brand to the cheapest generic equivalent ranges from 1.2 to 14.2. For further details see table 4.6.

As shown in Table 4.6, generic products are cheaper than their branded items. Furthermore, imported and/or speciality branded items appear to be much more expensive than their local counterparts. For example, Lasix, a Hoechst speciality is fourteen times more expensive than frusemide from Dawa. Actal., a Winthrop product, is about five times more expensive than Magnomint from Regal. Table 4.6 gives a true representation of the pricing of drugs in the Kenyan market. The many brand items in the market also permit price variation even though the items are the same generically

During the survey, the author had access to the prices paid by the Central Medical Stores (CMS) on some finished drugs since 1980. This data reveals that the CMS has often bought expensive branded drugs which could be obtained elsewhere cheaply using generic names. For example, in October 1981, the CMS bought Diazepam Tablets (5mg) at K.Shs. 173/26 per 1000, but in November 1981 the same items were obtained at K.Shs. 9/65 per 1000. Also, in March 1982, Frusemide tablets (40mg.) were bought at K.Shs. 650/- per 1000 while in May 1983, they were obtained at K.Shs. 45/- per 1000. These and other examples are provided in table 4.7.

Table 4.7

Comparison of Prices Paid by Central Medical Stores for Identical Generic Products, 1980-85

Product	Date	Manufacturers/ Distributor	Generic Brand	Units	Selling Price K.Shs.	Ratio of the most expensive to the cheapest
Methyldopa Tabs (250 mg.)	Mar. 1985	Anpi Pharma	G	1000 Tabs.	360.00	
	Dec. 1980	Dawa	G	1000 "	570.00	1.6:1
Ampicillin cloxacillin (Ampiclox) 500 mg. caps.	Aug. 1983	Mac's	G	1000 Tabs.	779.50	
	July 1980	Westco	B	1000 "	1223.60	1.6:1
Penbrittin syrup (5 litres pack)	May 1983	Biochemie	B	5 Litres	7.32	
	May 1983	Rhino	B	5 Litres	7.2	
	Aug. 1982	Westco	B	5 "	11.52	
	Nov. 1981	Mac's	G	5 "	7.15	1.6:1
Frusemide Tabs (40 mg.)	May 1983	Kensara	G	1000 Tabs.	45.00	
	Mar. 1982	Hoechst	B	1000 "	650.00	14:1
Diazepam Tabs (5 mg.)	May 1985	Natmo	G	1000 Tabs.	45.00	
	Nov. 1981	Globe	G	1000 "	9.65	
	Oct. 1981	Howse & McGeorge	B	1000 "	173.26	18:1

Source: Central Medical Stores.

It is asserted that the above products were earlier obtained at much higher prices because of a preference for branded drugs. Many doctors prefer brandname drugs, This influences the decisions by the Central Tender Board.

4.7 BULK PURCHASING

Experience from many countries show substantial savings through bulk purchasing using generic names. (Section 2.9). In this study, entrepreneurs were asked about the establishment of a central agency to procure all pharmaceutical raw materials and finished drugs. Their response indicate mixed feelings between the local and foreign based firms.

All the subsidiaries of MNCs disliked the idea. To them, raw materials bought through centralised agency would not conform to the specifications required by the parent companies. Consequently, this would lead to a fall in the quality of drugs they produce. By contrast, 80% of the local firms supported the idea so long as (1) the purchases were from reputable organisations and (2) the buying agency was run by a non-profit, government agency.

The local firms identified commonly used drugs which could be bought jointly. These include aspirin, codeine, chloroquine, ferrous sulphate, tetracycline and sulphadimidine. Asked about the savings, that would result, the entrepreneurs indicated figures ranging from 15-20%.

4.8 PROTECTION OF LOCAL MANUFACTURERS

The need to protect Kenyan pharmaceutical manufacturers have been documented by P.Low,[10] A.S. Tawfik[11] and J.F. Jordan[12]. Before 1982, local manufacturers were burdened by heavy taxation (30-40% of their cif values) levied on pharmaceutical raw materials, whereas finished drugs came in duty free. This policy created a situation where local manufacturers could not compete favourably with imports. However, in 1982, the Government reversed the policy by exempting from custom duties all pharmaceutical raw materials not used in other industries. In this section we examine the effective rate of protection (ERP) for some pharmaceutical products before and after 1982.

Hypothesis six is used to investigate the extent to which the local manufacturers are currently protected against competing imports. This study uses Balassa's framework where ERP is defined as a percentage excess of domestic value added over its world price.[12] That is:

$$ERP = \left(\frac{\text{Net value added in the domestic market}}{\text{Net value added by international standards}}\right) - 1$$

This can also be presented algebraically as:

$$ERP\% = \frac{(1 + t_i) - \Sigma_j a_{ji} (1 + t_j) - (1 - \Sigma_j a_{ji})}{1 - \Sigma_j a_{ji}} \times 100$$

where: t_i = nominal rate of tariff

a = material input co-effecients

$1 - \Sigma_j a_{ji}$ = The proportion of value added to output all measured at world prices for commodities.

The formula will indicate the excess in domestic value added obtainable by reason of imposition of tariffs, as a percentage of value added in a free trade situation. If the weighted average of duties on material inputs is the same as the tariffs on the final product, the effective and nominal rates of duty will be identical. On the other hand, the effective rate will be higher than the nominal rate of duty if the product bears a higher tariff than its inputs.

Data relating to the variables contained in Balassa's formula were obtained during the field survey. Table 4.8 presents the data together with the ERP for tablets, infusions, injectables and capsules, before and after 1982.

Table 4.8

ERP For Various Pharmaceutical Products Before and After 1982

Product	*Import Content	Duty on Finished Product	Duty on raw materials		Effective rate of Protection	
			Before 1982	After 1982	Before 1982	After 1982
Tablets	68%	0%	30%	0%	-64.0%	0%
Infusions	3.5%	0%	30%	0%	-1.08%	0%
Capsules	74%	0%	30%	0%	-85%	0%
Injectables	74%	0%	30%	0%	-85%	0%

*the tariffs are subtracted from the domestic ex-factory costs to estimate the International costs of production.

Table 4.8 demonstrates that for all the pharmaceutical products considered, the local manufacturers were negatively protected before 1982. After the exemption of duties on raw materials in 1982, the ERP is zero for all products. This means that the local manufacturers are neither protected nor discriminated against competing imports.

4.9 CINCHONA

Cinchona bark is a biologically active plant containing more than twenty alkaloids, of which quinine and quinidine are the most commonly used in the pharmaceutical industry. Quinine is used as an anti-malarial drug, while quinidine as a cardiac depressent (anti-arrhythmic agent). The alkaloids are also used in the soft drinks industry as a bitter.

In Kenya, cinchona is grown on a 300 hectare farm in Kericho belonging to BrookeBond Leigbig. Between 1974-83, BrookeBond produced an average, 550 tons of cinchona bank annually. The individual production per year is presented in Table 4.8.

Table 4.8

Production of Cinchona Crop in Kenya

Year	Quantity ('000) kgs.
1974	406
1975	547
1976	585
1977	508
1978	663
1979	768
1980	393
1981	725
1982	471
1983	439

Source: BrookeBond Kenya Limited, Annual Report June 30, 1983.

The average production of 550 tons per annum is adequate to support a local industry producing about 49500 kgs of cinchona alkaloids. This is assuming an alkaloid content of at least 9% in the cinchona bank in Kenya.[14] Based on the lowest and highest world prices of quinine and quinidine, between Jan. 1981 - October 1982, of about K.Shs. (970-2282) per kilogram, the country could earn between K.Shs. 48 m. - 113 m. through local processing of the plant to extract alkaloids, especially quinine and quinidine.[15]

Statistics by the Central Medical Stores (CMS) indicate that anti-malarials are the second leading drugs consumed by the public sector. As shown in Table 4.10 In 1983-84, CMS spent about K.Shs. 12 m. in the purchase of antimalarials. This value was almost 9% of the total drug purchases by the CMS. In addition, the private sector also buys anti-malarials.

The data below indicate that there exists a big market for quinine/derivatives in Kenya. Since all the raw materials used in the preparation of anti-malarials in Kenya are imported, the country could earn foreign exchange by extracting cinchona alkaloids.

Table 4.10.

Consumption of Anti-Malarials by Central Medical Stores, 1983-84

Drug	Quantity ('000 Unit)	Value ('000 K.Sh.)
Chloroquine Phosphate Tabs, 150 mg. Base	88	8104
Chloroquine Phosphate inj. 40 mg/2 ml (Amps)	920	432
Chloroquine Phosphate inj. 40mg./5ml. (Amps)	783	775
Chloroquine Phospahte Syrup 50 mg. Base/5ml	36	1906
Primaquine Phosphate Tabs. 7.5 mg. Base	0.3	15
Quinine Bisulphate Tabs. 300 mg.	1	605
Priquanil Hydrochloinde Tabs. B.P. 100 mg.	3.8	546
	Total	12383

Source: Central Medical Stores.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the conclusions, recommendations and a summary of the study. The issues explored relate to development of the pharmaceutical sector in Kenya.

5.1 Technology

This study demonstrates the existence of many restrictive clauses in the contractual transfer of technology in the pharmaceutical industry in Kenya. These include restrictions on exports, distribution, and the source of raw materials. Besides, some MNCs charge high royalties for the manufacture of their products. Other MNCs register their products as patents in Kenya to frustrate local firms, and yet the products of the MNCs are imported.

Recommendation

It is necessary for Kenya to establish an independent organisation to scrutinise and monitor technology transfers. The organisation should set up conditions for evaluating imported technology. After this, all contractual agreements in technology transfers should be channeled through the organisation. Preferably, the Central Bank of Kenya could be used since it is the only government agency that has been forceful in decreasing service fee payments.

5.2 Capacity Utilisation

The pharmaceutical industry in Kenya uses only 21% of its productive capacity. According to the factory managers, demand factors explain much of the underutilisation. Moreover, the absence of consistent government planning is partly responsible for the underutilisation.

Recommendations

The government should adopt the following policies to improve capacity utilisation in this industry:

i) Kenya should encourage firms to produce veterinary preparations along with human pharmaceuticals.

ii) Future investments into this industry should be vetted by the government, priorities should be given to firms wishing to make different products from the existing ones.

iii) The government should consistently monitor the levels and causes of capacity utilisation in this industry. This will provide adequate data for future planning of the industry.

5.3 Transfer Pricing

The study demonstrates the tendency of MNCs, especially to overprice some pharmaceutical raw materials. This is more common with tied agreements where the average overpricing is about 102%. This raises the suspicion that the MNCs could be transfer pricing. This evidence

strongly supports the hypothesis though this needs further research.

Recommendations

To curb the overpricing of pharmaceutical products, all exports and imports should be channeled through a a central agency. The agency should have skilled personnel and adequate facilities to be able to scrutinize the prices. Also close supervision by the government is necessary to ensure effeciency in the operations of the organisation. Since much of the overpricing is related to tied agreements, recommendations in section 5.1 are also useful.

The formation of a central agency is likely to have strong opposition from some MNCs, especially those involved in overpricing. Besides, no matter what the structure is, it is likely to be corrupted.

5.4 Use of Generic and Brandnames

Many brandnamed drugs are much more expensive than their generic counterparts in Kenya. Through this, Kenyan consumers are burdened by paying high prices.

Recommendations

To cut drug costs, Kenya should encourage the medical supplies co-ordinating unit, formerly the Central Medical Stores to purchase drugs strictly using generic names.

Prices of drugs in Kenya should be determined jointly by the Ministry of Health, Price Control Department and the manufacturer or distributor. Also Price Control Department should be involved in analysing quotations received by CMS.

Lastly, the government should encourage the doctors to give prescriptions using generic names though some doctors who prefer using generic names might resist.

5.5 Bulk Purchasing

Whereas many local firms support the establishment of a Central Procurement agency to purchase all raw materials and finished drugs, all the MNCs are against it.

Recommendation

A Central Procurement agency would cut costs for consumers, especially if it uses generic names. The agency should be a non-profit organisation run by the government. Preferably, the agency could be attached to big organisations like W.H.O., to help in the procurement. More benefits would also accrue if Kenya pooled its drug purchases with other countries in Eastern, Central and Southern Africa.

5.6 Protection of Local Manufacturers

This study reveals that the local manufacturers of pharmaceutical products are not protected against competing

imports. Though the local manufacturers are better off than during the period before 1982 when they were negatively protected.

5.7 Production of Cinchona Alkaloids

Extraction of cinchona alkaloids locally might yield substantial earnings to Kenya. The large number of anti-malarials currently imported by Kenya could also be reduced drastically.

5.8 Areas for Further Research

1) This study indicates that some sub-standard drugs are distributed in Kenya. Another study is necessary to investigate the extent and causes of this.

2) The mechanisms and operations of the medical supplies co-ordinating unit need further investigation.

3) Whereas the prices of pharmaceutical products are controlled by the Price Controller (Ministry of Finance and Planning) a study of the criteria for establishing the prices is necessary.

4) The author did not conduct a pre-feasibility study of the possibility of establishing an extraction unit to process Cinchona alkaloids in Kenya. Further research is necessary to establish the technical, economic, and financial feasibility of

producing cinchona alkaloids locally. If the project is feasible, then it should be implemented.

5.9 Summary of the Results

Kenya's pharmaceutical sector has grown rapidly since 1936, with most of the firms establishing manufacturing units in the 1970's. This sector currently consists of twenty-five local manufacturers and about 150 pharmaceutical distributing houses. Foreign firms continue to dominate the sector both for imports and local production. The productive capacity of the pharmaceutical industry in Kenya is massively underutilised. Factors responsible for the underutilisation include market limitations, competing imports, difficulties in obtaining raw materials and spare parts, and ineffeciency in government planning.

More than half of the raw materials and finished drugs are imported. Some of these are overpriced especially by MNCs. This raises the strong suspicion that some MNCs could be involved in transfer pricing.

The market for pharmaceuticals in Kenya is dominated by wide product differentiation in the various shapes, colour, and brandnames for identical products. This is also reflected by the price differentials for identical generic products. Thus, the consumers are burdened by paying high prices for branded items which can be obtained

cheaply under generic names. To cut drug costs, bulk purchasing using generic names is essential.

The local manufacturers need some protection against competing imports.

Lastly, Kenya should look into the possibility of exploiting its medicinal plants. For example, more research is necessary on the production of cinchona alkaloids to reduce the large value of anti-malarials imported by Kenya.

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6. Field Survey of Mr. Thomas, Production Manager of EMCO Glassworks, conducted by P. Coughlin, May 1985.

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10. The exact market for pharmaceutical products in Kenya is not known This figure is based on estimated population of 18m (1984) and drug consumption per capita of US$ 2.20 (1978). This estimate is weak and inconsistent with other methodologies of estimating the market.

The data on population and consumption per capita were obtained from:

population United States Bureau of Census, "International Population Dynamics (1950-84)", ISP-WP-79(A), Washington D.C.

consumption per carita

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11. Gereffi G., op. cit., p. 213

12. For a detailed discussion on this issue refer to "the use of generic and brand names" in chapter 4.

13. Tawfik, A., S., op. cit., p. i.

14. Gereffi, G., op. cit., p. 217.

15. In 1984, for example, Beecham quoted US$ 57-65/kg for Ampicillin Trihydrate compacted for Government tender, while US$ 200/kg for the private sector.

16. Personal Interview with Mr. Patel, Production Manager, Aspro Nicholas, January, 1985.

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2. Kenya Association of Manufacturers (K.A.M.), The Kenya Association of Manufacturers Register.

3. Company Files at Central Bank of Kenya, December 1984.

4. Data from the Registrar of Patents and Trademarks in Kenya indicate that by July 1985, they had registered about 3550 patents.

5. Due to the patent protection the MNC (patent holder) demanded an immediate withdrawal of Amoxycillin Trihydrate from the price list of the local firm. The patent holder also demanded a written undertaking to the following effect:

   a) That the local firm should not import, compound, convert, manufacture, sell distribute or offer for sale Amoxycillin Trihydrate at any time during the pendency of the relevant MNC Kenya Patent into or in Kenya.

   b) That the local firm should destroy any existing stocks of Amoxycillin Trihydrate imported or held by the company at that time, in the presence of a representative of the MNC.

   C) That the local company should recover all stocks of the product distributed by them throughout Kenya.

   d) That the local company should provide a detailed audited statements of the stocks of Amoxycillin Trihydrate imported into, manufactured and sold by the company.

   In this example, patent protection restricts the manufacture of patented products to those manufacturers approved by the patent holder. Also patent protection permits inflating prices on drugs.

6. Kaplinsky, R., op. cit. p. 22.

7. International Labour Office, "Employment, Incomes and Inequality: a strategy for Increasing Productive Employment in Kenya", op. cit. pp. 182.

8. Coughlin, P.E., op. cit.

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11. Tawfik, A.S., op. cit. p. iii.

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13. Balassa, B., "Tariff Protection in Industrial Countries", Journal of Political Economy, Vol. 75, Feb-Dec. 1965 pp. 573-94.

14. Meneses, E., op. cit. p. 21.

15. Calculation based on:
a) Lowest and highest World Prices of Quinine and Quinidine (Jan. 1981 - Oct. 1982) i.e. US$ 1.85/OZ - US$ 4.35"OZ.

b) 1 oz. is equal 28.35 g.

c) US$ = 14.8698 (K.Shs.) exchange on 22/9/84.

For further information on prices see UNCTAD/GATT, Market for Selected Medicinal Plants and their derivatives", United Nations Publication, Geneva, 1982, p. 101.

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APPENDIX 1*

ESTIMATED COSTS AND SAVINGS ON SELECTED HIGH-VALUE PHARMACEUTICAL ITEMS REQUIRED BY EASTERN, CENTRAL AND SOUTHERN AFRICA.

Summary

	items costing 0.05 million dollars and above		items costing 0.10 million dollars and above		items costing 0.15 million dollars and above	
	no. of items	value in US $ m	no. of items	value in US $ m	no. of items	value in US $ m
injections	15	4.09	13	3.95	9	3.0
oral dosage forms	32	15.05	29	14.88	23	14.155
preparations for external use	1	0.42	1	0.42	1	0.42
pharmaceutical chemicals	8	0.83	5	0.58	1	0.15
surgical dressings	10	2.87	6	2.58	5	2.28
totals:	66	23.26	54	22.41	39	20.005

total values expressed as a percentage of total expenditure for the region on drugs and dressings

total expenditure on drugs and dressings = US $ 63.4 m

% of expenditure on 66 items (US $ 23.26 m) = 36.68%

% of expenditure on 54 items (US $22.41 m) = 35.34%

% of expenditure on 39 items (US $20.61 m) = 32.50%

* This appendix is extracted from: Commonwealth Regional Health Secretariat for East Central and Southern Africa, "Report of the Investigation on Regional Procurement and Bulk Purchasing of Drugs", Arusha, October 9, 1978. Table II, P.1

SELECTED HIGH VALUE DRUGS AND SURGICAL DRESSINGS*

A. INJECTABLES

Item No.	description (generic)	Unit	prevailing unit price (US $).	estimated regional annual requirement (millions)	estimated value of regional annual requirements (million US $)
1.	Ampicillin Injection 250 mg	ea.	0.2	0.7	0.14
2.	Chloroquine 40 mg/1ml. in 5 ml. (or nearest)	ea.	0.05	4.2	0.21
3.	Cloxacillin Injection 250 mg	ea.	0.3	0.4	0.12
4.	Diazepam 10 mg/ml. I.M./I.V.	ea.	0.35	0.45	0.15
5.	Ergometrine Malaete 0.5 mg/ml.	ea.	0.03	1.13	0.34
6.	Frusemide 20 mg/2ml.	ea.	0.09	0.27	0.24
7.	Gentamicin sulphate 10 mg.	ea.	1.09	0.09	0.09
8.	Hydrocortisone Succinate 100 mg I.M/I.V.	ea.	0.6	0.385	0.23
9.	Insulin soluble 40 U/ml x 10 ml.	ea.	1.2	0.085	0.10

* Commonwealth Regional Health Secretariat for Eastern, Central and Southern Africa, "Report of the Investigation on Regional Procurement and Bulk Purchasing of Drugs", ibid, Table II, p.2.

B. ORAL DOSAGE FORMS

Item No.	description (generic)	unit	prevailing unit price (US $)	estimated regional annual requirement (millions)	estimated value of regional annual requirement (million US $)
16	Abscorbic acid 100 mg	1000	2.0	60	0.12
17	Ampicillin 250 mg	100	7.0	12	0.84
18	Ampicillin syrup x 100 ml	bottle	1.5	0.15	0.225
19	Aspirin 300 mg	1000	1.5	300	0.45
20	Bendrofluazide 5 mg	100	1.5	7.0	0.105
21.	Chloramphenicol suspension 1 Litre	bottle	2.0	0.07	0.14
22.	Chloramphenicol 250 mg	100	2.0	28	0.56
23.	Chloroquine 200 mg	1000	10.0	340	3.4
24.	Chlorpheniramine malaete 4 mg	100	0.2	33	0.66
25.	Chlorpromazinechydrochloride 100 mg	1000	6.0	14	0.084
26.	Chlorpropamide 25 mg or nearest)	100	2.0	4	0.08

Item No.	description (generic)	Unit	prevailing unit price (US $)	estimated regional annual requirement (millions)	estimated value of regional annual requirement (million US $)
27.	Cloxacillin 250 mg	1000	70.0	3.8	0.26
28.	Codeine Compound (or nearest)	100	10.0	200	2.0
29.	Ephedrine hydrochloride 30 mg	1000	2.0	60	0.12
30.	Ferrous sulphate Compound (or nearest)	1000	1.5	250	0.75
31.	Frusemide 40 mg	1000	2.0	6	0.12
32.	Magnesium trisilicate Compound	1000	2.0	105	0.21
33.	Methyldopa 250 mg	1000	60.0	7.5	0.45
34.	Metronidazole 200 mg	1000	15.0	15	0.225
35.	Niridazole 500 mg	100	14.0	3	0.42
36.	Paracetamol 500 mg	1000	5.0	125	0.625
37.	Pencillin V 125 mg	1000	7.0	27	0.19
38.	Pencillin V syrup 125 mg/5 ml x 60 ml	bottle	0.9	0.13	0.12
39.	Phenobarbitone 30 mg	1000	1.0	90	0.09
40.	Piperazine phosphate 500 mg	1000	3.0	18	0.54

Item No.	description (generic	Unit	prevailing unit price (US $)	estimated regional annual requirement (millions)	estimated value of regional annual requirement (million US $)
41.	Propantheline bromide 15 mg	1000	25.0	8	0.20
42.	Sulphadimidine 500 mg	1000	5.0	140	0.7
43.	Sulphamethoxazole and trimethoprim adult tables	100	15.0	2.5	0.37
44.	Tetracycline 250 mg	100	1.5	36	0.54
45.	Tetracycline 125 mg/5ml 1 Litre	bottle	3.5	0.07	0.24
46.	Thiabendazole 500 mg	100	7.0	2.2	0.15
47.	Vitamins Multiple	1000	1.5	100	0.15
C. PREPARATION FOR EXTERNAL USE					
48.	Tetracycline eye ointment x 3.5 Gm	tube	0.6	0.7	0.42
D. PHARMACEUTICAL CHEMICALS					
49.	Cetrimide c Chlorhexidine concentrate (savlon)	5L	12.0	0.05L	0.12
50.	Cresol and soap solution (Lysol)	L	1.3	0.06	0.078

item No.	description	unit	prevailing unit price (US $)	estimated regional annual requirement (millions)	estimated value of regional annual requirement (million US $)
51.	Ethylchloride x 60 ml	tube	2.0	0.05	0.10
52.	General purpose disinfectant	L	0.6	0.22	0.13
53.	Glycerine	Kg.	1.5	0.05	0.075
54.	Halothane 250 ml	bottle	15.0	0.01	0.15
55.	Liquid Paraffin	L	1.0	0.08	0.08
56.	Dextrose anhydrous	Kg.	2.0	0.05	0.1
E. SURGICAL DRESSINGS					
57.	Absorbent Cotton Wool x 500 Gm	roll	1.4	0.5	0.7
58.	Absorbent Gauze BPC 36" 6 yds	roll	0.5	0.25	0.12
59.	Absorbent Gauze BPC 36" 100 yds	roll	6.5	0.14	0.91
60.	Bandage WOW 7.5 cm	doz	1.0	0.20	0.20
61.	Bandage Crepe 7.5 cm	ea.	0.3	0.175	0.52
62.	Elastic Adhensive Bandage 7.5 cm	ea.	1.5	0.275	0.41

item No.	description	unit	prevailing unit price (US $)	estimated regional annual requirement (millions)	estimated value of regional annual requirement (million US $)
63.	Paraffin Gauze Dressing with antibiotic 10 cm x 10 cm x 10's	tin	1.5	0.050	0.075
64.	Plaster of Paris Bandage 10 cm x 3 yds	doz	6.0	0.015	0.09
65.	Plaster of Paris Bandage 12.6 cm x 3 yds (or nearest)	doz	8.0	0.01	0.08
66.	Zinc oxide adhensive plaster 7.5 cm x 5 yds	ea.	1.2	0.20	0.24

Appendix 1 cont.

SAVINGS BASED ON PERCENTAGE DISCOUNTS ON LARGE QUANTITIES OF REGIONAL REQUIREMENTS

item no.	regional requirement (millions)	value of regional requirement in US $ (millions)	percentage discount	savings in US $ (from the discount)
1.	0.7	0.14	-	-
2.	4.2	0.21	-	-
3.	0.4	0.12	-	-
4.	0.45	0.15	-	-
5.	1.13	0.34	-	-
6.	0.27	0.24	-	-
7.	0.385	0.23	-	-
8.	0.085	0.10	-	-
9.	0.074	0.11	-	-
10.	1.6	0.48	-	-
11.	3.8	1.14	-	-
12.	5.4	0.27	2%	5,400
13.	1.0	0.16	-	-
14.	60.00	0.12	6%	7,200
15.	12.0	0.84	6%	50,400
16.	0.15	0.225	-	-
17.	300.0	0.45	8%	36,000
18.	7.0	0.15	2%	3,000
19.	0.07	0.14	-	-
20.	28.0	0.56	4%	22,400
21.	340.0	3.4	8%	272,000

Appendix 1 cont.

Item no.	regional requirement (millions)	value of regional requirement in US $ (millions)	percentage discount	savings in US $ (from the discount)
22.	33.0	0.66	4%	26,400
23.	3.8	0.26	-	-
24.	200.0	2.0	8%	160,000
25.	60.0	0.12	6%	7,200
26.	250.0	0.75	8%	60,000
27.	6.0	0.12	2%	2,400
28.	105.0	0.21	8%	16,800
29.	7.5	0.45	2%	9,000
30.	15.0	0.225	4%	9,000
31.	3.00	0.42	-	-
32.	125.0	0.625	8%	50,000
33.	27.0	0.19	4%	7,600
34.	0.13	0.12	-	-
35.	18.0	0.54	4%	21,600
36.	8.0	0.20	2%	4,000
37.	140.0	0.7	8%	56,000
38.	2.5	0.37	-	-
39.	36.0	0.54	4%	21,600
40.	0.01	0.24	-	-
41.	2.2	0.15	-	-
42.	100.0	0.15	8%	12,000
43.	0.7	0.42	-	-
44.	0.05	0.12	-	-
45.	0.05	0.10	-	-
46.	0.22	0.13	-	-
47.	0.01	0.15	-	-
48.	0.05	0.1	-	-
49.	0.5	0.7	-	-
50.	0.25	0.12	-	-
51.	0.14	0.91	-	-

Appendix 1 cont.

item no.	regional requirement (millions)	value of regional requirement in US $ (millions).	percentage discount	savings in US $ (from the discount)
52.	0.20	0.2	-	-
53.	0.275	0.41	-	-
54.	0.2	-0.24	-	-
			total savings:	860,000

QUANTITY DISCOUNTS *

item no.	description	unit	1 million (unit cost)	5 million (unit cost)	10 million (unit cost)	50 million (unit cost)	100 million (unit cost)
1.	Tab. Penicillin V K 125 mg	1000's	5.53	5.31	5.20	5.09	4.87
2.	Tab. Acetyl salicylic acid 300 mg (Asprin)	1000's	1.73	1.66	1.63	1.59	1.52
3.	Tab. Codeine Co. B P	1000's	12.92	12.42	12.16	11.90	11.38
4.	Tab. Sulphadimidine 0. 5 g	1000's	5.64	5.42	5.30	5.19.	4.97
5.	Tab. Ferrous Sulphate Co.	1000's	1.46	1.41	1.38	1.35	1.29
6.	Tab. Multivitamin STB	1000's	2.98	2.86	2.80	2.74	2.62
7.	Tab. Ascorbic acid 100 mg	1000's	2.49	2.39	2.34	2.29	2.19

* Commonwealth Regional Health Secretariat for Eastern, Central and Southern Africa, "Report of the Investigation on Regional Procurement and Bulk Purchasing of Drugs", ibid, Table IVa, p.4

VALUE FOR RANGE OF QUANTITY DISCOUNTS:

item no.	description	Botswana	Kenya	Lesotho	Malawi	Mauritius	Seychelles	Swaziland	Tanzania	Uganda	Zambia	cost for joint purchase	cost for individual purchase	savings
1.	Tab. Pen. V. 125 mg	-	74000	-	2323	-	-	-	26550	17696	11060	129832	131629	1797
2.	Tab. Acetyl salicylic acid 300 mg (Asprin)	64875	83793	-	50041	3260	768	-	228000	-	40750	396891	471487	74596
3.	Tab. Codeine Co. BP	38760	11297	-	45995	31008	-	-	361800	145920	1707000	2296920	2341780	44860
4.	Tab. Sulphadimidine 0.5 g	7050.	-	-	40650	-	270	-	-	264690	415200	694796	727860	28064
5.	Tab. Ferrous Sulphate Co.	4840	31935	-	2119	5840	1051	-	-	48300	193500	281685	287585	5899
6.	Tab. Multivitamin STB	13410	49280	-	21450	14300	2145	-	-	127400	42000	262546	269985	7439
7.	Tab. Ascorbic acid 100 mg	4980	13110	-	622	249)	262	-	46800	-	70200	135270	138464	3194
										Total		4197941	4368790	170849

Note: $ 170848 represents a saving of 3.9%

Cost for joint purchase is the cost of the total quantity for the countries at appropriate discount rates
Cost for individual purchase is the cost for purchase each country at appropriate discount rates.

No figures available for Lesotho and Swaziland

* Commonwealth Regional Health Secretariat for Eastern, Central and Southern Africa, "Report of the Investigation on Regional Procurement and Bulk Purchasing of Drugs.", ibid, Table IVB, p.5.

APPENDIX 2A

LIST OF FIRMS IN KENYA ENGAGED IN PHARMACEUTICAL PREPARATIONS

FIRMS VISITED

	FIRM LOCATION AND YEAR OF ESTABLISHMENT	OWNERSHIP
1.	Chemafric Pharmaceutical (1974) division of Kensara Ltd. P.O. Box 44993 NRB Tel. 20845, 26509 (closed down in 1985)	A joint-venture between Ambalal Sarabhai Enterprises (India) and Kenya Private partners
2.	Cosmos Ltd. (1976) P.O. Box 41433 NRB Tel 340630	Kenyan Asians
3.	Dawa Pharmaceutical Ltd. (1975) P.O. Box 47105 NRB Tel. 80-2401-6 (Ruaraka)	Joint-venture KRKA (Yugoslavia), Kenya Government and private investors
4.	Didy Pharmaceutical Ltd (1936) P.O. Box 41426 NRB Tel 23108, 332962	Kenyan Asians
5.	Elys Chemical Industries Ltd (1971) P.O. Box 40411 NRB Tel. 20244-5	Kenyan Asians
6.	Infusion Kenya Ltd. (1976) P.O. Box 30467 NRB Tel. 557744	Hoechst E.A. (MNC Subsidiary), Dr. E. Fresenius (Germany), ICDC and DFCK (Kenya)
7.	Laboratory and Allied Equipment Ltd. (1969) P.O. Box 42875 NRB Tel. 556367	Kenyan Asians
8.	[illegible] Pharmaceutical Ltd. (1977) P.O. Box 43912 NRB Tel. 555013, 558936	Kenyan Asians

9.	Manhar Brothers (Kenya) Ltd. (1961) P.O. Box 40447 NRB Tel. 558842, 555883	Kenyan Asians
10.	Nicholas Kiwi (Kenya) Ltd. (1966) P.O. Box 18194 NRB Tel. 540510	A subsidiary of Nicholas International from Australia
11.	Novelty Manufacturing Ltd (1982) P.O. Box 42708 NRB Tel. 554260	Kenyan Asians
12.	P.A.C. Laboratories Ltd. (1972) P.O. Box 18352 NRB Tel. 559906, 556966	Kenyan Asians
13.	Regal Pharmaceuticals (1981) P.O. Box 44421 NRB Tel. 541863	Kenyan Asians
14.	Sterling Products International Ltd, (1959) P.O. Box 40942 NRB Tel. 555688	A subsidiary of MNC (USA)
15.	Wellcome Kenya Ltd. (1973) P.O. Private Bag (Kabete) Tel. 592031 (NRB)	An affliate of Wellcome foundation (England)
16.	Pharmaceutical Products Ltd. (1981) P.O. Box 18835 NRB Tel. 553050	Kenyan Asians
17.	The Boots Company (K) Ltd. (1942) P.O. Box 18195 NRB Tel. 556402	A subsidiary of MNC (England).
18.	Glaxo E.A. (Ltd.) (1964) P.O. Box 18288 NRB Tel. 558444	A subsidiary of MNC (England)

FIRMS NOT VISITED

19. Cussons & Co. Limited
P.O. Box 48497 NRB

20. Vicks Products (E.A.) Ltd.,
P.O. Box 30454 NRB

21. Consumer Products (K) Ltd.
P.O. Box 40478 NRB

22. Westco Laboratories
P.O. Box 49691 NRB

23. Unga Feeds Ltd
P.O. Box 41788 NRB

24. Ashford Laboratories
P.O. Box 78142 NRB

25. Beecham of Kenya Ltd
P.O. Box 18195 NRB

Source: Own survey.

APPENDIX 2B

REGISTERED AND LICENSED RETAIL AND WHOLESALE CHEMIST

RETAIL CHEMISTS

1.	Howse and McGeorge Ltd.	P.O. Box, 9, Eldoret
2.	Howse and McGeorge Ltd.	P.O. Box 47, Nakuru
3.	Abbey Pharmacy Ltd	P.O. Box 47618, Nairobi
4.	Eros Chemist Ltd.	P.O. Box 46676, Nairobi
5.	Edwart St, Ros & Co. Ltd.	P.O. Box 80353, Mombasa
6.	Opa Limited	P.O. Box 43948, Nairobi
7.	Chemitex Limited	P.O. Box 11492, Nairobi
8.	Jacaranda Chemists	P.O. Box 40468, Nairobi
9.	Harleys Limited	P.O. Box 581, Kisumu
10.	E.T. Monks Ltd.	P.O. Box 30069, Nairobi
11.	Tealands Chemists	P.O. Box 222, Kericho
12.	Mombasa Chemists	P.O. Box 81356, Mombasa
13.	Nakuru Medical Stores	P.O. Box 141, Nakuru
14.	National Pharmacy Ltd.	P.O. Box 11096, Nairobi
15.	Chhanis Pharmacy Ltd.	P.O. Box 49606, Nairobi
16.	London Pharmacy Ltd.	P.O. Box 82422, Mombasa
17.	Portal Pharmacy Ltd.	P.O. Box 44029, Nairobi
18.	Mansion Pharmacy Ltd.	P.O. Box 49480, Nairobi
19.	Central Pharmacy Ltd.	P.O. Box 80085, Mombasa
20.	Ngong Road Chemists Ltd.	P.O. Box 24748, Nairobi
21.	Makupa Chemists Ltd.	P.O. Box 98300, Mombasa
22.	Nyeri Chemists Ltd.	P.O. Box 446, Nyeri
23.	Kam Pharmacy Ltd.	P.O. Box 44300, Nairobi
24.	C. Mehta & Co. Chemists Ltd.	P.O. Box 81366, Mombasa
25.	Kilindini Chemists Ltd.	P.O. Box 83977, Mombasa
26.	Nanyuki Chemists	P.O. Box 90, Nyanyuki
27.	Eldochem	P.O. Box 417, Eldoret
28.	City Square Pharmacy Ltd.	P.O. Box 41614, Nairobi
29.	Metro Pharmacy Ltd.	P.O. Box 47158, Nairobi
30.	Ring Road Chemists	P.O. Box 14387, Nairobi

31.	Kona Chemists	P.O. Box 457, Nairobi
32.	The Nairobi Hospital	P.O. Box 30026, Nairobi
33.	Malindi Chemists Ltd	P.O. Box 47, Malindi
34.	Sega Chemists	P.O. Box 46270, Nairobi
35.	Peoples Chemists	P.O. Box 42405, Nairobi
36.	Nakami Chemists	P.O. Box 982, Kitale
37.	Poly Chemists	P.O. Box 41525, Nairobi
38.	Triochemists Ltd	P.O. Box 46713, Nairobi
39.	Avenue Pharmacy Ltd.	P.O. Box 46166, Nairobi
40.	Pharmafrica (K) Ltd.	P.O. Box 40192, Nairobi
41.	Teens Chemists	P.O. Box 45267, Nairobi
42.	Pharmadex (E.A.) Ltd.	P.O. Box 72783, Nairobi
43.	Karuri Stores (K) Ltd.	P.O. Box 41742, Nairobi
44.	Mombasa Medical Stores (K) Ltd	P.O. Box 40428, Nairobi
45.	Muthaiga Pharmaceutical Agencies Ltd	P.O. Box 48349, Nairobi
46.	Meru Chemists Ltd.	P.O. Box 728, Meru
47.	Glove Pharmacy	P.O. Box 43912, Nairobi
48.	Sipril Pharmaceuticals Ltd.	P.O. Box 1555, Kisumu
49.	Kencity Pharmacy (1977) Ltd.	P.O. Box 30075, Nairobi
50.	Kisii Chemist Ltd	P.O. Box 801, Kisii
51.	Lady Myra Chemists	P.O. Box 51410, Nairobi
52.	Westwood Pharmacy	P.O. Box 45636, Nairobi
53.	Lords Pharmacy	P.O. Box 49397, Nairobi
54.	Cospharm Ltd.	P.O. Box 41795, Nairobi
55.	Thorn Tree Chemists	P.O. Box 42351, Nairobi
56.	Thika Chemists (K) Ltd.	P.O. Box 74, Thika
57.	Tononoka Chemists	P.O. Box 83418, Mombasa
58.	Care Chemists	P.O. Box 333, Nakuru
59.	Apsyn Pharmacy Ltd.	P.O. Box 98618, Mombasa
60.	Faizi Pharmacy	P.O. Box 86463, Mombasa
61.	Howse & McGeorge Ltd	P.O. Box 641, Kisumu
62.	Foto-Medica Chemists	P.O. Box 40297, Nairobi
63.	Pangani Chemists Ltd.	P.O. Box 42936, Nairobi
64.	Coast Medical Stores Ltd.	P.O. Box 80294, Mombasa

65.	Abardare Chemists	P.O. Box 875, Embu
66.	Kentons Chemists	P.O. Box 176, Kisumu
67.	Howse & McGeorge Ltd	P.O. Box 873, Embu
68.	Kuweka Chemists	P.O. Box 103, Eldoret
69.	Karatina Chemists	P.O. Box 68, Karatina
70.	Lake Naivasha Chemists	P.O. Box 412, Naivasha
71.	Pharmaceutica	P.O. Box 16216, Nairobi
72.	Western Pharmacy	P.O. Box 561, Kakamega
73.	Maendeleo Pharmacy Ltd.	P.O. Box 54422, Nairobi
74.	Meru Medical Stores	P.O. Box 786, Meru
75.	Pharvetag (K) Ltd.	P.O. Box 65, Kerugoya
76.	Furaha Pharmacy Ltd.	P.O. Box 110, Thika
77.	Westons Chemists	P.O. Box 45424, Nairobi
78.	Sears Dispensing Chemists	P.O. Box 14168, Nairobi
79.	Lyntons Pharmacy Ltd.	P.O. Box 58788, Nairobi
80.	Kam Pharmacy (Westlands) Ltd.	P.O. Box 40375, Nairobi
81.	Bandari Chemists Ltd.	P.O. Box 82040, Mombasa
82.	Popular Chemists Ltd.	P.O. Box 86677, Mombasa
83.	Westlands Chemists (K) Ltd.	P.O. Box 47613, Nairobi
84.	Muranga Chemists Ltd.	P.O. Box 20, Muranga
85.	Kitale Chemists Ltd.	P.O. Box 1579, Kitale
86.	Super Pharmaceuticals	P.O. Box 60763, Nairobi
87.	Eastern Drug House	P.O. Box 901, Machakos
88.	Supershem	P.O. Box 82696, Mombasa
89.	Karen Chemists	P.O. Box 74573, Nairobi
90.	Unique Laboratories Ltd.	P.O. Box 40918, Nairobi
91.	Medichem	P.O. Box 88016, Mombasa
92.	Rup Pharmaceuticals Ltd.	P.O. Box 12906, Nairobi
93.	Rafiki Chemists	P.O. Box 28, Malindi
94.	Undwewood (K) Ltd.	P.O. Box 46923, Nairobi
95.	Digo Chemists Ltd.	P.O. Box 88554, Mombasa
96.	Huplan (K) Ltd.	P.O. Box 51598, Nairobi
97.	South B. Chemists Ltd.	P.O. Box 26294, Nairobi
98.	Central Drug Co. Ltd.	P.O. Box 595, Nyeri

99.	Eastleigh Chemist	P.O. Box 73487, Nairobi
100.	Medic-Vet. Pharmaceuticals Ltd.	P.O. Box 86595, Nairobi
101.	Kugorani Chemists Ltd	P.O. Box 98300, Mombasa
102.	Olago Pharmaceuticals	P.O. Box 47422, Nairobi
103.	Afya Chemists Ltd.	P.O. Box 59851, Nairobi
104.	NEP Pharmacy	P.O. Box 29, Garissa
105.	City Chemists Ltd.	P.O. Box 74041, Nairobi
106.	Leo Pharma	P.O. Box 40959, Nairobi
107.	Thuji Chemists	P.O. Box 1147, Thika
108.	Kilimanjaro Pharmacy Ltd.	P.O. Box 43106, Nairobi
109.	Voi Chemists Ltd.	P.O. Box 207, Voi
110.	Cospharm (Westlands) Ltd.	P.O. Box 41795, Nairobi
111.	Karibu Pharmacie	P.O. Box 47508, Nairobi
112.	Kitui Chemists (K) Ltd.	P.O. Box 399, Kitui
113.	Breymer Pharmacy Ltd.	P.O. Box 43912, Nairobi
114.	Shah Chemists Ltd.	P.O. Box 14387, Nairobi
115.	Niks Pharmacy	P.O. Box 90311, Nairobi
116.	North Coast Chemists	P.O. Box 50, Malindi
117.	Nyambene Chemists Ltd.	P.O. Box 598, Meru
118.	Riverside Pharmacy Ltd.	P.O. Box 1492, Thika
119.	Maragua Pharmacy	P.O. Box 487, Maragua
120.	Kapsabet Chemists Ltd.	P.O. Box 302, Kapsabet
121.	Kaya Pharmacy Ltd.	P.O. Box 87018, Mombasa
122.	Bungoma Chemists Ltd.	P.O. Box 1053, Bungoma
123.	Tropical Pharmaceuticals Ltd.	P.O. Box 57001, Nairobi
124.	Saganko Limited	P.O. Box 206, Busia
125.	Equitor Dawa Ltd.	P.O. Box 156, Nyahururu
126.	Saced Pharmacy	P.O. Box 88780, Mombasa
127.	Boma Laboratories Ltd.	P.O. Box 17, Migori
128.	Ngong Hills Chemists	P.O. Box 56091, Nairobi
129.	Rawan Chemists Ltd	P.O. Box 20085, Nairobi
130.	Dema Pharmaceuticals Ltd.	P.O. Box 307, Limuru
131.	Gatundu Laboratories	P.O. Box 454, Gatundu
132.	Homes Lab. & Dispensing Chemists	P.O. Box 2233, Kisii

133.	Mathingira Kenda Medical Stores	P.O. Box 67113, Nairobi
134.	Highlands Chemists	P.O. Box 671, Nakuru
135.	Olympic Pharmaceutical Ltd.	P.O. Box 144, Kisumu
136.	Famret Supplies Retail Ltd.	P.O. Box 23335, Nairobi
137.	Midlife Pharmaceuticals Ltd.	P.O. Box 49433, Nairobi
138.	Chuka Chemists	P.O. Box 14, Chuka
139.	Usonga Chemists Ltd.	P.O. Box 253, Bungoma
140.	Blue Cross Pharmacy Ltd.	P.O. Box 83195, Mombasa
141.	Laikipia Pharmacy Ltd.	P.O. Box 169, Nanyuki
142.	Trichem Limited	P.O. Box 18788, Nairobi
143.	Metropolitan Chemists Ltd.	P.O. Box 2170, Nakuru
144.	Athi Chemists Ltd.	P.O. Box 547, Machakos
145.	Boma Chemists Ltd.	P.O. Box 335, Kericho
146.	Cresent Medical Aid	P.O. Box 22320, Nairobi
147.	Nandi Hills Chemists	P.O. Box 2383, Kitale
148.	Midwest Chemists	P.O. Box 471, Molo
149.	Kitale Chemists Ltd.	P.O. Box 44, Eldoret
150.	Rurago Chemists	P.O. Box 70, Maragua
151.	Upendo Naendelea Chemists	P.O. Box 537, Busia
152.	Majengo Chemists	P.O. Box [illegible] Mombasa

Source: Ministry of Health Statistics, June 1985

WHOLESALE CHEMISTS

1.	Didy Pharmaceutical Ltd.	P.O. Box 41426, Nairobi
2.	Kemipharma Ltd.	P.O. Box 40918, Nairobi
3.	Universal Pharmacy (K) Ltd.	P.O. Box 44555, Nairobi
4.	Pfizer Laboratories Ltd.	P.O. Box 10244, Nairobi
5.	Pangani Chemists Ltd.	P.O. Box 42936, Nairobi
6.	Dawa Pharmaceuticals Ltd.	P.O. Box 47105, Nairobi
7.	E.T. Monks & Co. Ltd.	P.O. Box 30069, Nairobi
8.	Station Pharmaceuticals Ltd.	P.O. Box 41556, Nairobi
9.	Century Chemicals & Pharmaceuticals Ltd.	P.O. Box 59851, Nairobi
10.	Elys Chemical Industries	P.O. Box 40411, Nairobi
11.	Chemafric Pharmaceuticals	P.O. Box 44993, Nairobi
12.	Ray Pharmaceuticals	P.O. Box 22830, Nairobi
13.	Anpi Pharma Ltd.	P.O. Box 46517, Nairobi
14.	Kaino (K) Limited	P.O. Box 67360, Nairobi
15.	Orbit Chemical Industries	P.O. Box 48870, Nairobi
16.	Medipharma Limited	P.O. Box 49678, Nairobi
17.	Westco (K) Limited	P.O. Box 49691, Nairobi
18.	Furaha Pharmacy Ltd.	P.O. Box 110, Thika
19.	Metro Pharmacy Ltd.	P.O. Box 47158, Nairobi
20.	Sampharma	P.O. Box 22756, Nairobi
21.	Nicholas Overseas Ltd.	P.O. Box 18194, Nairobi
22.	Jos Hansen & Soehne (E.A.) Ltd.	P.O. Box 82561, Nairobi
23.	Jos Hansen & Soehne (E.A.) Ltd.	P.O. Box 30196, Nairobi
24.	Harleys' Limited	P.O. Box 581, Kisumu
25.	Edward St. Rose & Co. Ltd.	P.O. Box 80353, Nairobi
26.	Sigma Laboratories (K) Ltd.	P.O. Box 50543, Nairobi
27.	Twokay Chemicals	P.O. Box 46189, Nairobi
28.	Natmo Chemicals Ltd.	P.O. Box 32762, Nairobi
29.	Twiga Chemical Industries	P.O. Box 30172, Nairobi
30.	May & Baker Ltd.	P.O. Box 30104, Nairobi
31.	Boots Company (K) Ltd.	P.O. Box 42569, Nairobi
32.	Popular Chemists Ltd.	P.O. Box 86677, Nairobi

33.	Regal Pharmaceuticals Ltd.	P.O. Box 44421, Nairobi
34.	Hoechst (E.A.) Ltd.	P.O. Box 30487, Nairobi
35.	Sipri Pharmaceuticals Ltd.	P.O. Box 1555, Kisumu
36.	Rup Pharm Ltd.	P.O. Box 12906, Nairobi
37.	Stuart Pharmaceuticals	P.O. Box 40057, Nairobi
38.	Pharmaceutical Manufacturing Co. Ltd.	P.O. Box 47211, Nairobi
39.	Apomed Products	P.O. Box 26027, Nairobi
40.	Naheel Sales (K) Ltd.	P.O. Box 43480, Nairobi
41.	Huplan (K) Limited	P.O. Box 51598, Nairobi
42.	Warner-Lambert (E.A.) Ltd.	P.O. Box 49410, Nairobi
43.	Galxo (E.A.) Ltd.	P.O. Box 19288, Nairobi
44.	Globe Pharmacy Ltd.	P.O. Box 58171, Nairobi
45.	Medic-vet Pharmaceutical	P.O. Box 86595, Nairobi
46.	Santowels Limited	P.O. Box 45484, Nairobi
47.	Karuri Stores (K) Ltd.	P.O. Box 41743, Nairobi
48.	Aberdare Chemists	P.O. Box 875, Embu
49.	Pharmad (E.A.) Ltd.	P.O. Box 72788, Nairobi
50.	PMG Medical Products Ltd.	P.O. Box 73609, Nairobi
51.	Pac Laboratories Ltd.	P.O. Box 18352, Nairobi
52.	National Pharmacy Ltd.	P.O. Box 11096, Nairobi
53.	Howse & McGeorge Ltd.	P.O. Box 72030, Nairobi
54.	Pac Laboratories Ltd.	P.O. Box 18434, Nairobi
55.	Am-Fric	P.O. Box 68029, Nairobi
56.	Mimea-Mifugo Protection Ltd.	P.O. Box 55056, Nairobi
57.	South B Chemists Ltd.	P.O. Box 26294, Nairobi
58.	Unique Laboratories Ltd.	P.O. Box 45461, Naiorbi
59.	Denken Pharmaceuticals Ltd.	P.O. Box 51550, Nairobi
60.	Vista Pharmaceuticals	P.O. Box 49475, Nairobi
61.	Sterling Products International	P.O. Box 40942, Nairobi
62.	Nimikam Limited	P.O. Box 46381, Nairobi
63.	Pharmaceutical	P.O. Box 16216, Nairobi
64.	Pan Pharmaceuticals Ltd.	P.O. Box 47393, Nairobi
65.	Bakpharm Ltd.	P.O. Box 53442, Nairobi

66.	Coast Medical Stores Ltd.	P.O. Box 80294, Nairobi
67.	Olago Pharmaceutical Ltd.	P.O. Box 47422, Nairobi
68.	Assia Pharmaceuticals Ltd.	P.O. Box 30620, Nairobi
69.	Westco (K) Ltd.	P.O. Box 87626, Nairobi
70.	Westco (K) Ltd.	
71.	Wellcome (K) Ltd.	Private Bag, Kabete
72.	Laboratory & Allied Equipment Ltd.	P.O. Box 42875, Nairobi
73.	Faiz Pharmacy	P.O. Box 86463, Nairobi
74.	Phillip Harisson & Crossfield Ltd.	P.O. Box 463, Kisumu
75.	Phillip Harrison & Crossfield Ltd.	P.O. Box 90244, Mombasa
76.	Phillip Harrison & Crossfield Ltd.	P.O. Box 10212, Nairobi
77.	Howse McGeorge Ltd.	P.O. Box 80370, Mombasa
78.	Kenya Swiss Chemical Co. Ltd.	P.O. Box 30393, Nairobi
79.	Manhar Brothers (K) Ltd.	P.O. Box 40447, Nairobi
80.	Westlands Chemists (K) Ltd.	P.O. Box 47613, Nairobi
81.	Nairobi Pharmaceutical Ltd.	P.O. Box 41633, Nairobi
82.	Salama Chemists Ltd.	P.O. Box 58069, Nairobi
83.	Mac's Pharmaceutical Ltd.	P.O. Box 43912, Nairobi
84.	City Chemists Ltd.	P.O. Box 74041, Nairobi
85.	West Chemist	P.O. Box 55715, Nairobi
86.	Karibu Pharmacie	P.O. Box 47508, Nairobi
87.	Kilimanjaro Pharmacy Ltd.	P.O. Box 34106, Nairobi
88.	Nairobi Dental Supply Co. Ltd.	P.O. Box 40875, Nairobi
89.	Harleys Limited	P.O. Box 42718, Nairobi
90.	Chhanis Pharmacy (K) Ltd.	P.O. Box 42606, Nairobi
91.	Breymer Pharmacy Ltd.	P.O. Box 43912, Nairobi
92.	Fanvet Supplies Ltd.	P.O. Box 23335, Nairobi
93.	Naheel International Ltd.	P.O. Box 14224, Nairobi
94.	Saganko Limited	P.O. Box 206, Busia
95.	Bungoma Cehemists	P.O. Box 1053, Bungoma
96.	Meru Chemists Ltd.	P.O. Box 728, Meru

97.	Kaya Pharmacy	P.O. Box 87018, Mombasa
98.	Bayer (E.A.) Limited	P.O. Box 30821, Nairobi
99.	Robsons Limited	P.O. Box 30077, Nairobi
100.	Pharmaceutical Products Ltd.	P.O. Box 18835, Nairobi
101.	Saeed Pharmacy	P.O. Box 88780, Nairobi
102.	Meditec (K) Ltd.	P.O. Box 60187, Nairobi
103.	Rawan Chemist Ltd.	P.O. Box 20085, Nairobi
104.	Central Chemists Ltd.	P.O. Box 56667, Nairobi
105.	Trade Wings Ltd.	P.O. Box 47413, Nairobi
106.	Unga Feeds Ltd.	P.O. Box 41788, Nairobi
107.	Unga Feeds Ltd.	P.O. Box 99840, Mombasa
108.	Unga Feeds Ltd.	P.O. Box 7202, Nakuru
109.	Kim Pharm (K)	P.O. Box 48485, Nairobi
110.	Letap (K) Ltd.	P.O. Box 46357, Nairobi
111.	Kentons Chemists	P.O. Box 176, Kisumu
112.	Voi Chemists	P.O. Box 207, Voi
113.	Amee Exim Ltd.	P.O. Box 59466, Nairobi
114.	Jos Hansen & Soehne (E.A.) Ltd.	P.O. Box 82561, Nairobi
115.	London Traders Ltd.	P.O. Box 42338, Nairobo
116.	Flamingo Chemical Supplies	P.O. Box 8295, Nakuru
117.	Crescent Medical Aid	P.O. Box 40629, Nairobi
118.	General Optical Co. Ltd.	P.O. Box 30070, Nairobi
119.	Midwest Chemists	P.O. Box 471, Molo
120.	Nakami Chemists Ltd.	P.O. Box 982, Kitale
121.	Pack Laboratories Ltd.	P.O. Box 18352, Nairobi
122.	Kona Chemists Ltd.	P.O. Box 28459, Nairobi

Source: Ministry of Health Statistics, June 1985.

APPENDIX 3

STEPS IN THE MANUFACTURE OF PHARMACEUTICAL PRODUCTS[1]

Tablets

Tablets are used in oral dosage forms and are produced by various degrees of compression. They can be of various types e.g. plain, chewable, sugar coated, enteric coated, film coated, layered and sustain release tablets.

The flow-chart in Figure I describes the various steps in the manufacture of tablets. Following are major unit operations carried out in the manufacture of tablets.

(a) Milling and shifting

Basic ingredients are pulverised and sieved.

(b) Mixing

Depending on the batch size, carefully weighed quantities of various ingredients like active components diluents, binders, colouring agents etc. are mixed in a mass mixer or planetary mixer as per the requirement.

(c) Preparations of paste

The solution for granulation is prepared separately.

(d) Dry and wet mixing

The granulation solution is added to the mass and fixed thoroughly.

(e) Wet granulation

The wet mass is granulated in a machine to required mesh size.

(f) Drying

The wet granules are dried in a thermostatically controlled dryer so that the potency of the drug remains uneffected.

(g) Granulation

The dried or partially dried granules are again passed through a smaller mesh in a granulator. Dry granulation is required in case of single action component comprising the major part of the product.

(h) Blending

The granules are blended with the lubricating and disintegrating agents.

(i) Tabletting

The lubricated granules are fed to tabletting machine where tablets are formed by compression. During tabletting quality control tests for disintegration, hardness, friability, uniformity etc. are carried out.

(j) Inspection.

Tablets are passed through inspection belts for checking of uniformity, coating etc.

(k) Packing

Depending on the requirements, tablets are packed either in glass, plastic, PVC or tin containers or strip packed or blister packed in suitable foils made of paper, plastics, aluminium, etc., counting is done either manually or by machine.

(i) Labelling

The packed tablets are labelled properly by putting the batch number, manufacturing and expiry dates - in case of Vitamins, antibiotics etc., the pack should indicate the composition of active ingredients and average doses.

COATED TABLETS

There can be sugarcoating, compression coating, or dry coating, enteric coating, film coating. The tabletting and packing process is the same as described in case of tablets (see Figure 1).

(a) Sugar coating

The coating is applied in successive layers to the tablets by deposition from a solution of sucrose. The coating shall be chiefly of sucrose together with purified talc, starch and shellac.

(b) Dry coating

The granules of different substances are prepared

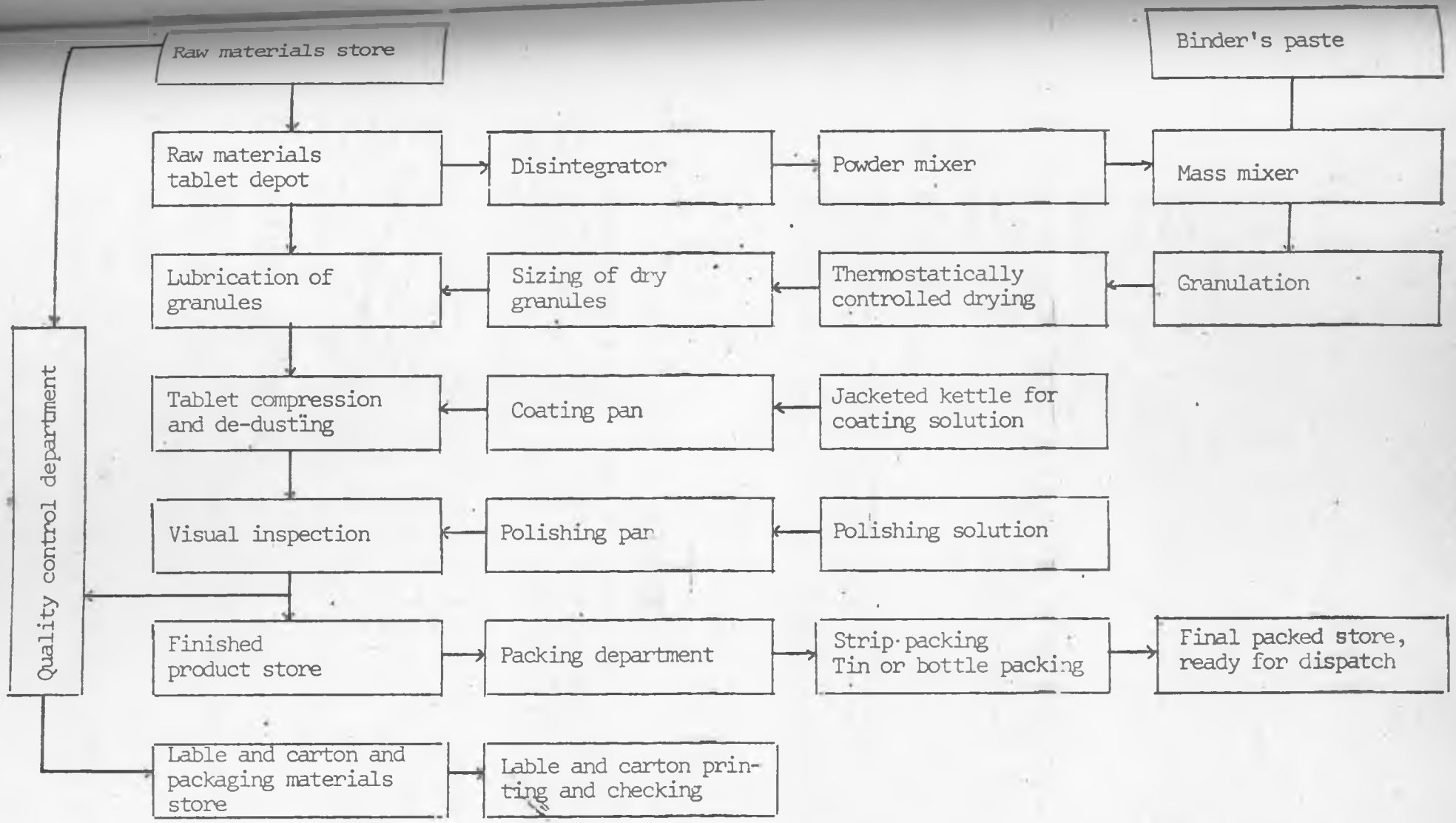


Figure I Flow chart for manufacture of tablets

separately and fed to rotary machine, the core from one rotary machine is being transferred to the other rotary machine by transfer mechanism, and further compressed with the granules of second active drug more stable for atmospheric conditions or with the granules of inert auxiliary material forming the outer layer of the tablet.

(c) Enteric coating

A suitable coating is applied such that the tablets comply with the disintegration test for enteric coated tablets, i.e. delayed release in the gastric juice.

(d) Film coating

The coating which normally comprises less than 10 per cent by weight of the finished tablet is applied by deposition from a suitable solvent. It may consist of any suitable synthetic or natural filming form.

CAPSULES

The capsules are used for keeping the potency of the drug. It protects the same from atmosphere and also masks the taste and odour of the drugs. It is easier to be swallowed. The capsules are of three types - hard gelatine, soft gelatine and seamless capsules.

As capsules are made out of gelatine, these have to be stored in a dry and cool place. The flow charts in Figure II describe the various steps in the manufacture of capsules. The following major operations are involved in filling the empty hard gelating capsule: (a) sieving and powdering, (b) blending, (c) sealing, (d) filling, weighing and blending, (e) packing and (f) labelling.

(a) Milling and sieving

Basic ingredients are powdered and sieved through suitable mesh.

(b) Mixing

As per the batch size, the required ingredients are weighed and mixed thoroughly in mass mixer or plentary mixer.

(c) Preparation of solution

If small granules are required the granulation solution is prepared separately.

(d) Wet mixing

The solution is added to the mass and mixed thoroughly.

(e) Wet granulation

The wet mass is granulated to required mesh size.

(f) Drying

The wet granules are dried in a thermostatically controlled dryer without affecting the potency of the drug. Steps (e) and (f) are not commonly followed unless otherwise required for special type of preparations. However, granulation is done in all cases.

(g) Blending

The granules are blended with the lubricants.

(h) Sorting and cleaning of empty capsules

The empty hard gelatine capsules are stored in humidity-controlled air conditioned area. They are sorted out and cleaned before filling.

(i) Filling of capsules

The empty gelatine capsules are taken in the hopper of automatic capsule filling and closing machine and after adjusting the weight, the mass is filled by the machine. Hand-operated machines are also used for filling the capsules. These operations require himidity-controlled air-conditioned area. Weight variations are to be eliminated by properly adjusting the machine.

(j) Polishing and inspection

The filled and sealed capsules are put in polishing pans and after that, the capsules are subjected to inspection and quality control before packing.

(k) Packing

Depending on the requirements, the capsules are filled in glass, plastic, PVC or tin containers or strip-

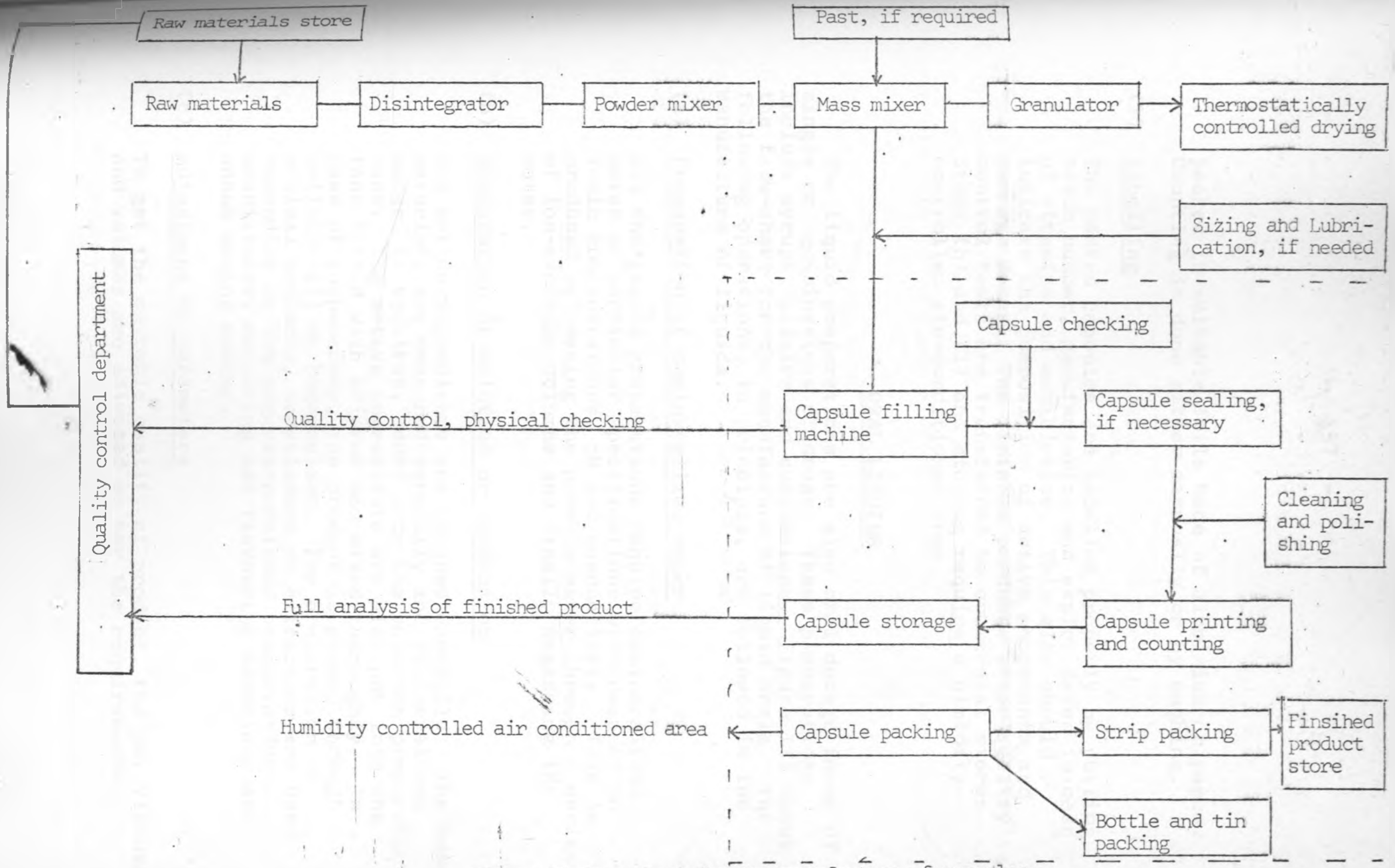


Figure II Flow chart for the manufacture of capsules

packed in suitable foils made of aluminium or paper. Counting is done either mannually or by machine.

(l) Labelling

The packed capsules are labelled properly by putting batch number, manufacturing and expiry dates in case of vitamins and antibiotics. This also should indicate the composition of active components and average doses. The finished products after quality control tests are transferred to commercial stores. Steps (h) and (l) and storing require a himidity-controlled air-conditioned area.

ORAL LIQUIDS.

The liquid preparations are also oral dosage forms of single or combinations of drugs. These preparations include syrups, elixirs and suspensions. Figure III shows the flow-chart for the manufacture of liquid orals. The following operations, in principle, are followed in the manufacture of liquids.

(a) Preparation of demineralized water

All the liquid preparations require demineralized water of particular specifications with respect to ionic concentrations, pH and conductivity. This is produced by passing the potable water through a series of ion-exchange columns and finally degassing the water.

(b) Preparation of solution or suspension

The active ingredients are weighed carefully. The base materials are measured carefully and dimineralized water, if required, added into the solution preparation tank. The active ingredients are also put into the tank fitted with stirrer and mixed thoroughly. In case of suspensions, the product is passed through colloid-mill or homogenizer. For preparation of ethical products, percolators or extractors are used. Depending on the process-permitted preservatives, stabilizers, colouring and flavouring materials are added during mixing.

(c) Adjustment of parameters

To get the suitable quality of product, the pH, viscosity and volumes are adjusted as per the requirements.

(d) Filtration

In case of solution - the mixed mass is filtered through suitable filter media. Suspension do not require filtration. Samples are given for quality control.

(e) Transferring the mass

The final mass is transferred to the vessels for filling.

(f) Washing and cleaning of bottles

The suitable containers are cleaned and washed throughly with dimeralized water. If required, they are dried in ovens or continuous driers.

(g) Washing and cleaning of PP caps

The rubber caps are cleaned and washed thoroughly.

(h) Filling

The liquid preparations are filled into bottles or jars to uniform volume by a suitable filling machine.

(i) Capping

The filled containers are capped properly and sealed. In case of delicate preparations, inert gas sparging is necessary for storage capacity of the product.

(j) Labelling

The containers are labelled by putting batch number, manufacturing and expiry dates. The label also should indicate the composition, average doses, storage conditions etc.

(k) Packing

For transportation, suitable number of containers are packed in cartons and transferred to commercial stores after quality controls.

PARENTERALS (Injectables)

Parenteral preparations are used for intramuscular or intravenous administration. The flow-chart in Figure IV describes the overall operations involved in the manufacture

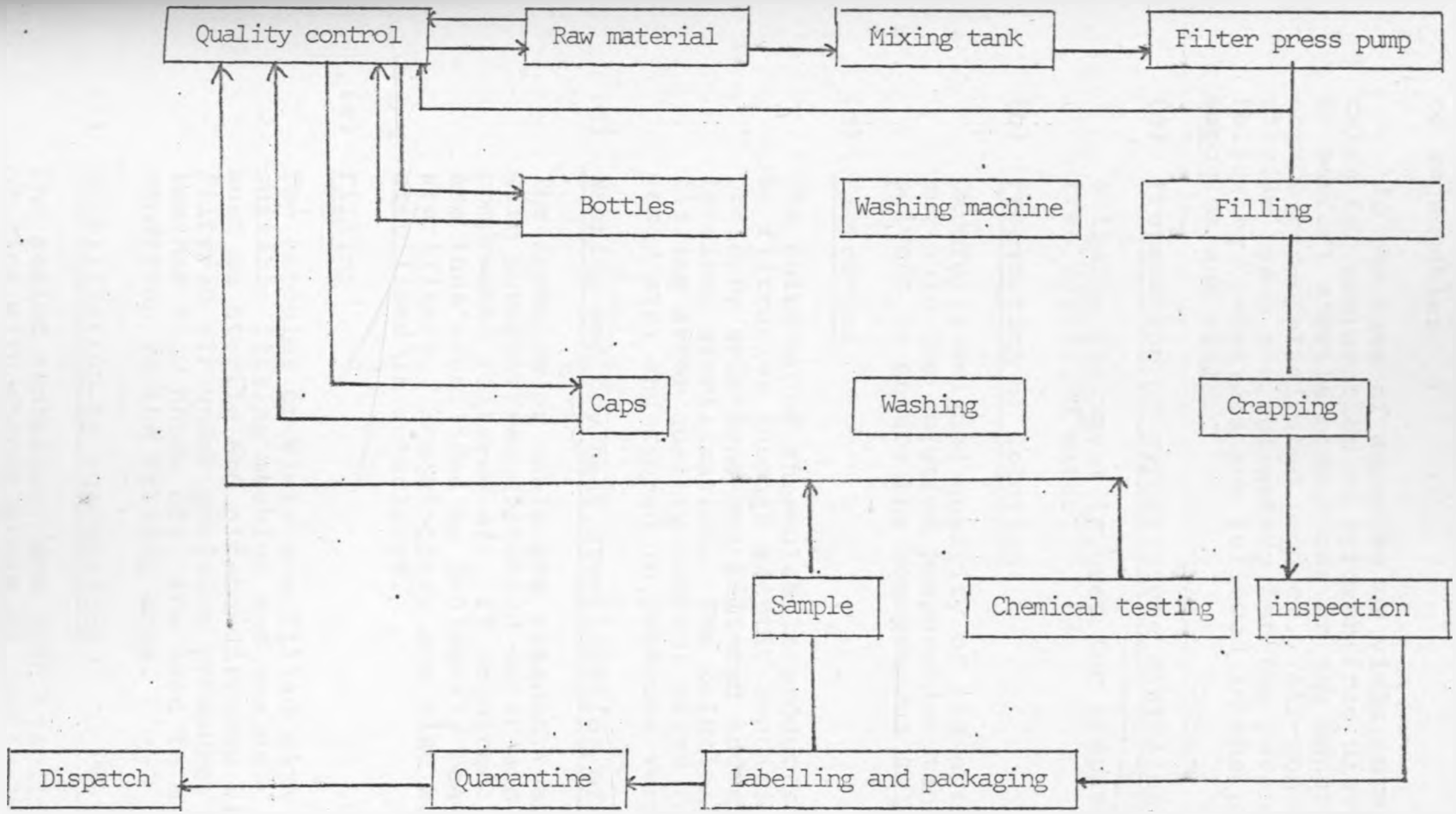


Figure III Flow chart for the manufacture of syrups, elixirs and solutions

of injectables.

In the case of ampoules or vials, utmost care has to be taken for preparation of pyrogen-free distilled water as well as perfect sterile conditions in the manufacturing areas to ensure non-contaminated product. Air-conditioned and sterile zones are obligatory for the parenteral preparations. Following operations are followed in the production of ampoules and vials.

(a) Preparation of pyrogen-free distilled water

Suitable equipment is used for preparation of pyrogen-free distilled water.

(b) Preparation of solution

Carefully weighed quantity of the active ingredient is put into the solution preparation tank, stirred well in solvent to ensure the homogeneous solution.

(c) Filtration

The solution of thermolabile products are sterilised by filtration through aseptic conditions. While ordinary solutions are filtered and subjected to terminal sterilization. The solution is ready for filling after quality control tests for sterility, essay etc. and stored in pressure vessels.

(d) Washing and dry heat sterilization of ampoules and vials

The ampoules or vials are cleaned, washed thoroughly with pyrogen-free distilled water and flushed with compressed filtered air, if required. These containers are then sterilized by indirectly heated dry sterilizers. The stoppers are also washed and sterilised in autoclaves..

(e) Filling

The ampoules or vials are filled with the solution in suitable filling machine and sealed. The filling room must be sterile and air-conditioned with the flush of filtered air under positive pressure. U.V. lamps, laminar flow hoods etc. are used to maintain aseptic condition in the filling area.

(f) Sterilization by autoclaving

The sealed containers are then sterilized by autoclaving with direct steam at particular steam pressure and time. The heat sterilization depends on the

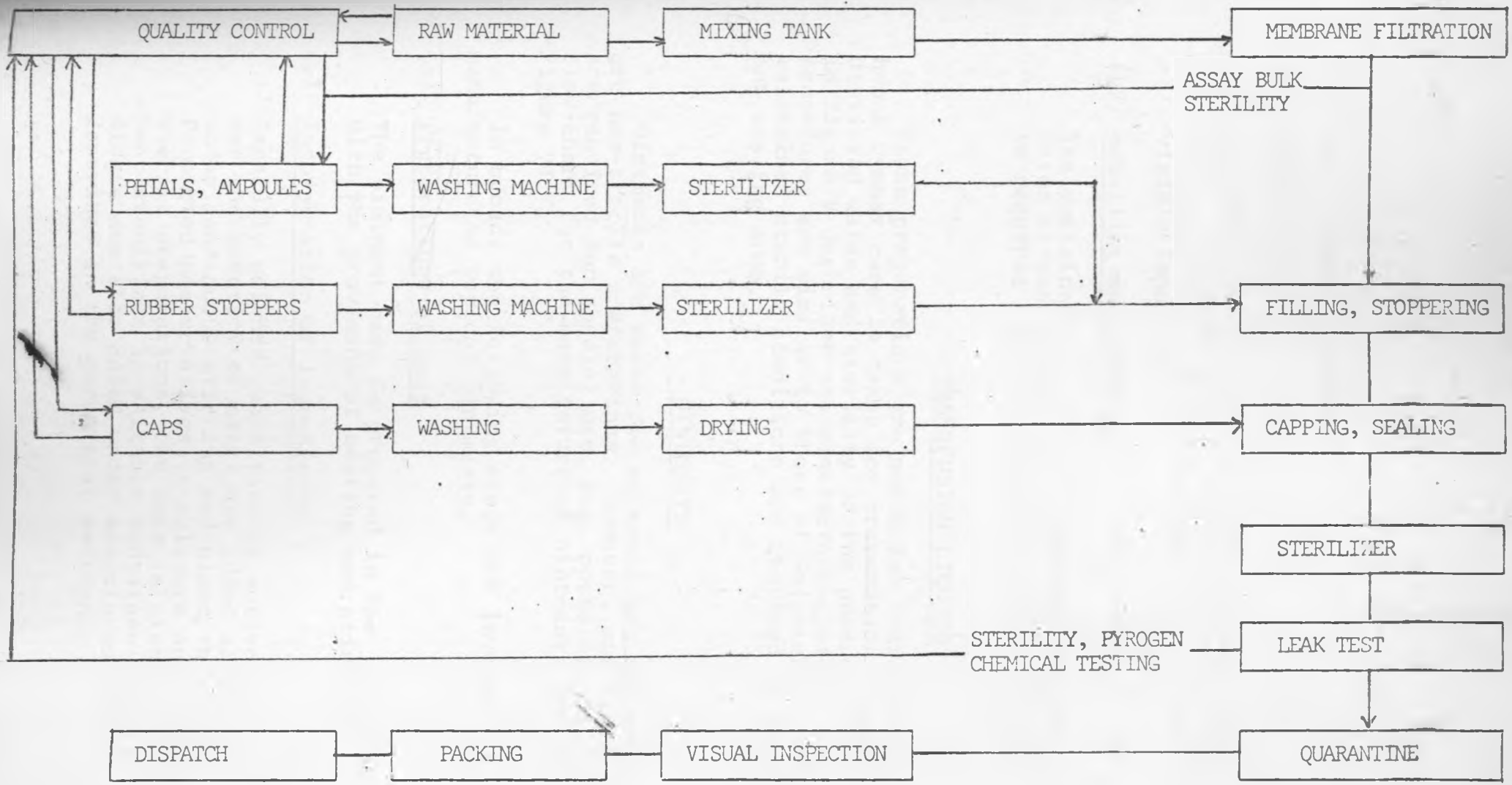


Figure IV: Flow chart for parenterals

particular type of products.

(g) Leak testing

The ampoules or vials are tested under vacuum for leak test. Rigorous quality control tests are carried out for sterility. Visual inspection is conducted for visible impurities.

(h) Labelling and packing

The containers are labelled by putting batch number, dates of manufacture and expiry etc. Isolated area is required for penicilling group of products.

TRANSFUSION LIQUIDS

These preparations are meant for intravenous use and hence utmost care is taken for preparation of pyrogen-free distilled water and sterility of the product. The flow-chart in Figure V describes the manufacturing steps. All the procedures are similar to those of injectables. Strictly maintained sterile conditions are required in the filling and sealing area.

OINTMENTS

Ointments are meant for external use and hence these are non-sterile preparations. However, sterile preparations are required for special use, e.g. opthalmic ointments. The flow-chart for the manufacture of ointments is shown in Figure VI.

In broad, the following steps are involved in the manufacture of topical ointments.

(a) Preparations of base

The ointment base is prepared in the jacketted vessels with the provision of heating and stirring.

(b) Incorporation of ingredients

Carefully weighed quantities of active ingredients (as per the quantity of base) are added slowly into the base under continuous stirring and mixed thoroughly. Permitted preservatives, stablizers are added here. For sterile preparations, the base is sterilized in dry heat sterilizer in suitable container and the ingredients are also added under aseptic conditions as described in the parenteral section.

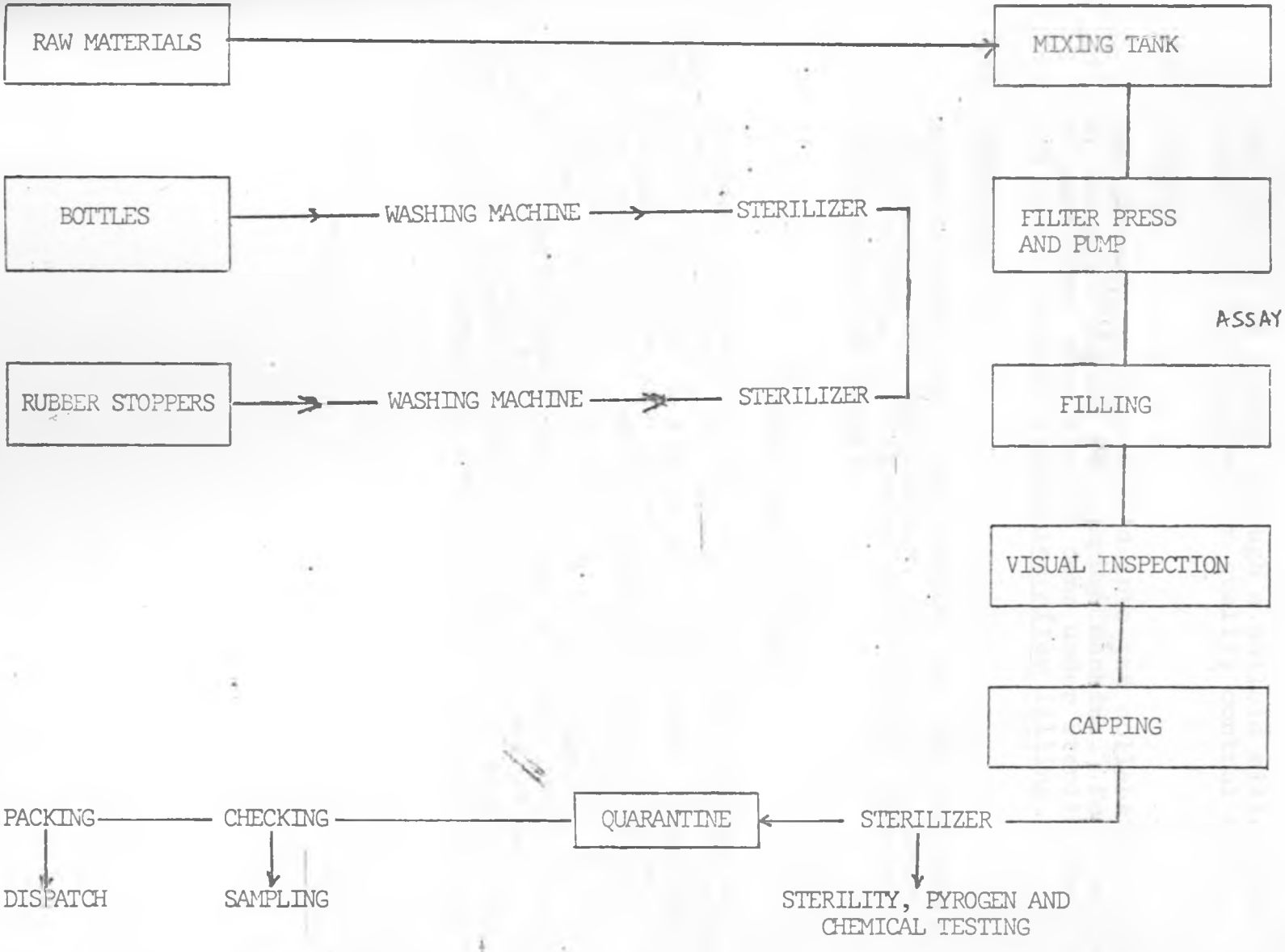


Figure V: Flow chart for transfusion fluids

(c) Smoothing

The mixture is passed through a colloid mill/triple roller mill and sampled for quality control tests.

(d) Filling

The ointment is then filled into the collabsible tubes by automatic filled and crimping machine. For sterile preparations, smoothing is done under sterile condition and tubes are also sterilized after filling.

(e) Labelling

Apart from the tubes are printed with the necessary information like composition, warning etc., these are labelled after filling with batch number, date of manufacture and expiry.

POWDERS AND GRANULES

Powders and granules are used for oral, topical or parenteral administration. The flow chart for the manufacture and filling is shown in Figure VII. The major operations are similar to those for tablet manufacture. After milling, sieving, granulation, drying, blending, quality control tests are conducted. The granules are then filled into bottles by automatic filling machine and capped. Sampling is done for weight variations. The bottles are then labelled and packed. After quality control tests they are stored. Depending on the nature of product and final use, sterile and air-conditioned areas are required for final product and filling.

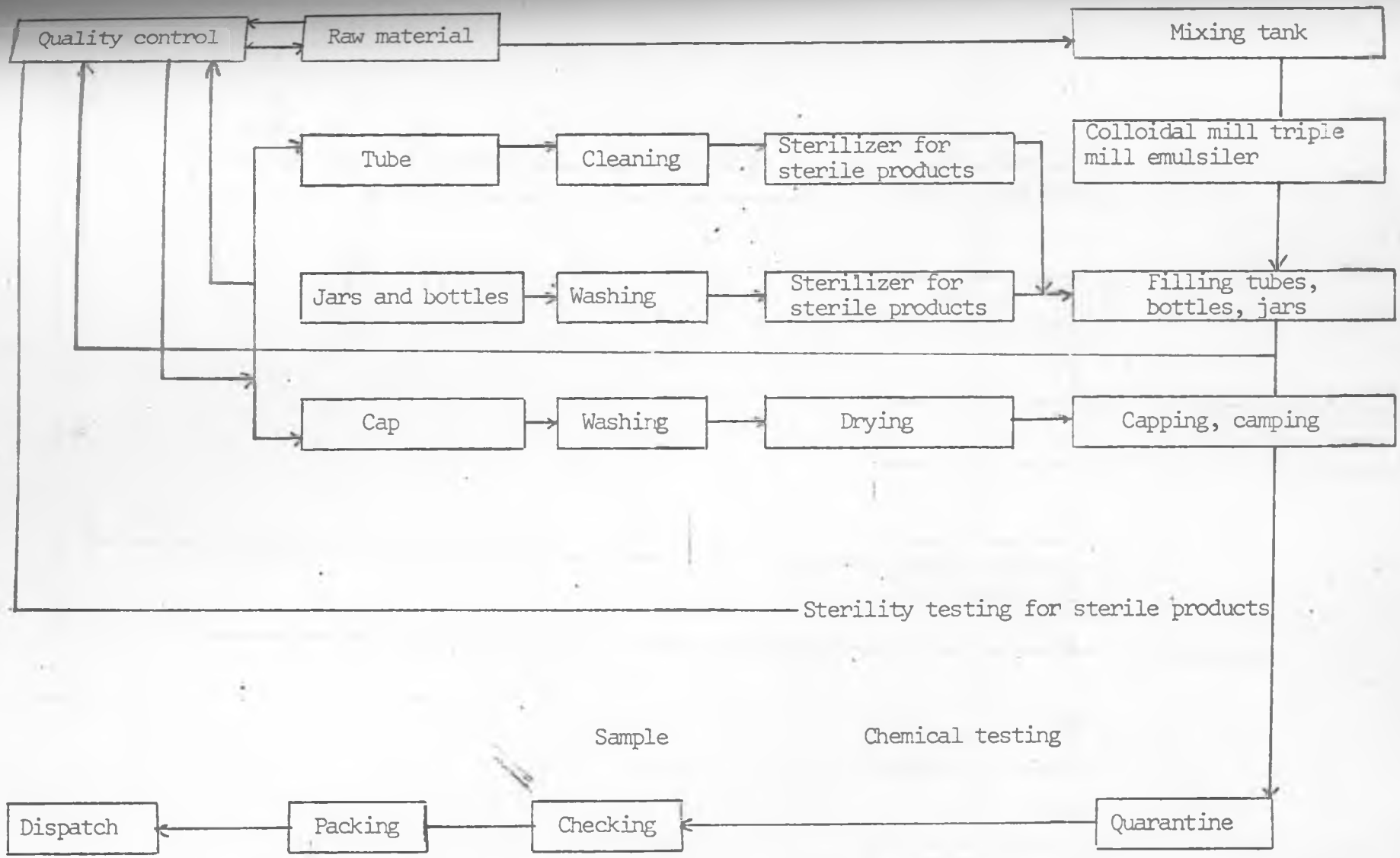


Figure VI Flow chart for the manufacture of ointments, emulsions, lotions and suspensions

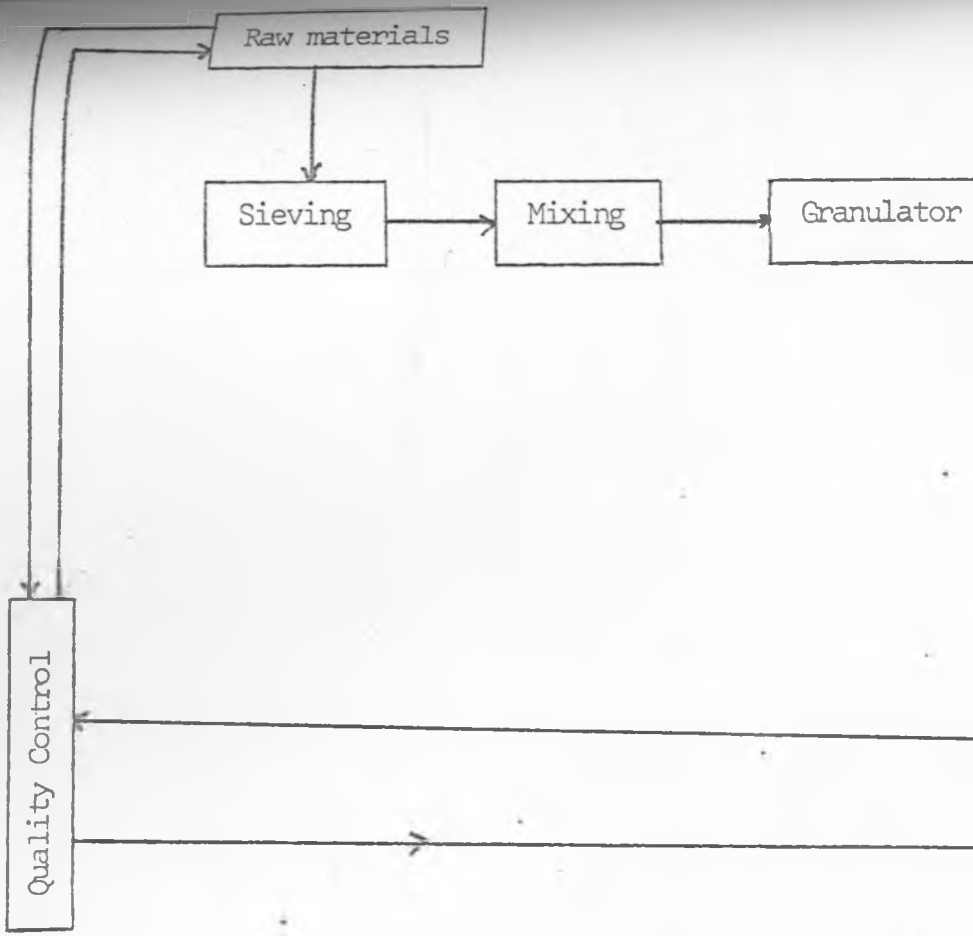
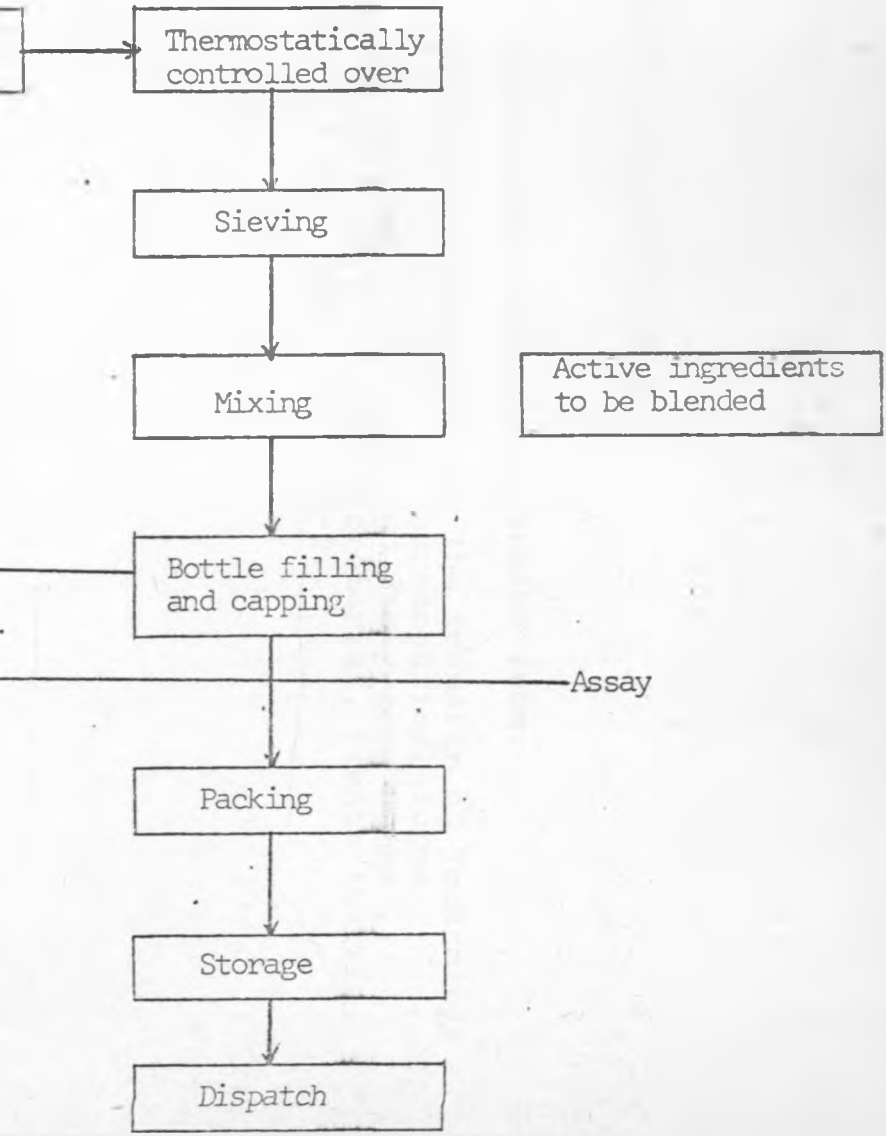


Figure VII Flow chart for powder filling


Thermostatically controlled over
Sieving
Mixing
Active ingredients to be blended
Bottle filling and capping
Assay
Packing
Storage
Dispatch

FOOTNOTE FOR APPENDIX 3

1. This entire appendix is copied from:

   UNIDO, "Arrangements for the transfer of Technology for the formulation of Pharmaceutical forms. Contractual Conditions and Background notes", (ID/WG. 385/2), UNIDO Secretariat, Vienna Austria, 15-17 Dec. 1982. pp. 69-83.

APPENDIX 4

INTRODUCTORY LETTER

University of Nairobi,
Economics Department,
P.O. Box 30197,
NAIROBI.

Date----------

Dear Sir,

RE: STUDY VISIT

I am a post-graduate student in the Department of Economics, University of Nairobi. Currently, I am doing an in-depth study of the Kenyan Pharmaceutical Industry for my M.A. thesis, with the approval of the Office of the President. As part of my research, I would appreciate it, if I could interview you about the operations of your firm.

My study focuses on aspects such as capacity utilisation, labour utilisation and protection of local manufacturers. The interview might take about 1-1½ hours. I would also wish to tour the plant briefly.

The result of the research will be presented to the Department of Planning in the Ministry of Finance and Planning. We will also recommend policy changes to better assist the development of your industry. This report is part of a much larger effort by the Industrial Research Project to re-assess Kenya's industrialization strategy.

If convenient I would like to visit your plant on ..... Please confirm if this suggested time is convenient. If not, please suggest an alternative time.

Perhaps to quicken the interview, you could go through the attached questionnaire in advance and fill in parts ..... I am sure you will provide me with every assistance to enable me produce an empirical contribution to the development of the Kenyan Pharmaceutical Industry.

Thanking you in advance.

Yours sincerely,

APPENDIX 4

QUESTIONNAIRE

Serial No.---------- Date----------

THE PHARMACEUTICAL INDUSTRY IN KENYA

Name of the firm_____ Person interviewed_____

Location_____ Position held_____

Name of street/road_____ Address_____

_____

Address_____ Confidentially Requested for financial section only (yes/no)

Telephone No_____

1. a. When started (year).....

   b. Value of initial investment Kshs. .....

   c. Is the firm:

      i) Multinational Corporation Subsidiary

      ii) Joint venture with the Government or any other organisation.

      iii) Local manufacturer.

      (Tick whichever is applicable)

   d. What percentage of Products by value do you

      i) manufacture.....%

      ii) simply re-package ....%

   e. Broad classification of Pharmaceutical Products currently manufactured or imported?

Tablets	.....	Capsules	.....
Ointments	.....	Syrup (liquid & dry)	.....
Suspensions	.....	Liniments	.....
Any other (mention)	.....	Lotions	.....

(indicate M for manufactured, I for imported and M/I for both)

f. Approximately what percentage of your products by value are:

i. Sterile .....%

ii. Non-Sterile ...%

g. What percentage of the total production (by value) are Pharmaceutical products .....%

h. List other products manufactured apart from the pharmaceutical products: (e.g. foods, cosmetics etc.)

....

....

i. Later expansions to Investments:

Year	Type	Value Kshs.	Line of production
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

2. WORKING TIME DECEMBER 1984

a. Number of days worked per week .....

b. Number of shifts per day .....

c. Usual length of each shift .....

DAY	SHIFT	STARTING TIME	BREAKS	ENDING	OVERTIME	NO. OF	ADMIN.
	1	.....	.....	.....	.....	.....	.....
MON-FRI.	2	.....	.....	.....	.....	.....	.....
	1	.....	.....	.....	.....	.....	.....
SATURDAY	2	.....	.....	.....	.....	.....	.....
	1	.....	.....	.....	.....	.....	.....
SUNDAY	2	.....	.....	.....	.....	.....	.....

d. Does the equipment continue running during the breaks? (yes/no)

3. LABOUR (DECEMBER 1984)

CLASS	SHIFT 1	SHIFT 2	SHIFT 3
Managers	.....	.....	.....
Supervisors	.....	.....	.....
Technicians	.....	.....	.....
Skilled labourers	.....	.....	.....
Semi-skilled labourers	.....	.....	.....
Unskilled	.....	.....	.....
Casual labourers	.....	.....	.....
Other office workers	.....	.....	.....

(show the number of expartriates in each cateogory, for example, if there are 10 supervisors in the first shift and 4 expatriates; write 10(4))

4. LABOUR AND WORKING TIME PER PROCESS e.g. capsulating, tabletting, packing etc.

a. Section.....Process.....

b. No. of machines used for the process.....

c. For each machine give the data below:

	CAPACITY		WORKERS		
MACHINE	MAXIMUM	ACTUAL	MAXIMUM	ACTUAL	COST.KSHS.
1	.....	.....	.....	.....	.....
2	.....	.....	.....	.....	.....
3	.....	.....	.....	.....	.....
4	.....	.....	.....	.....	.....
5	.....	.....	.....	.....	.....

d. The number of hours the machines are operated per day:

MACHINE	START	BREAKS	STOP	HOURS WORKED/DAY
1	.....	.....	....	.....
2	.....	.....	....	.....
3	.....	.....	....	.....
4	.....	.....	....	.....

e. When were the above machines inoperational in 1984?

MACHINE	MONTHS INOPERATIONAL	REASON
1	.....	.....
2	.....	.....
3	.....	.....
4	.....	.....
5	.....	.....

f. How much additional work can the machines handle with the existing labourers and capital stock?.....
.....

5. CAPACITY UNDERUTILISATION

To what extent are the following factors important in explaining the current underutilisation of plant and equipment in your firm:

a. Market limitations (inadequate + seasonal demand) .....

b. Difficulties encountered in obtaining raw materials .....

c. Difficulties entered in obtaining spare parts .....

d. Plant breakdowns .....

e. shortage of skilled personnel .....

f. Competition from importers .....

g. Any other (mention)..... .....

Indicate: 1 for very important
2 for important
3 for just important
4 for not important

6. CHOICE AND COST OF TECHNOLOGY

a. How do you choose the technology and machinery to use in your firm?

.....

.....

b. How does your production techniques compare with those of the mother company?

.....

.....

c. Enumerate the factors considered in determining the equipment/machinery/material inputs/spare parts etc.

i. .....

ii. .....

iii. .....

iv. .....

v. .....

d. Where do you obtain your purchases from (explain)

item	country & company	reason
e.g. machinery raw materials		e.g. cheaper price better quality
.....	.....	.....
.....	.....	.....
.....	.....	.....

e. What has the firm done to adapt the imported equipments for the local environment?

.....

.....

f. Who controls i. the production techniques.....

.....

ii. marketing techniques .....

.....

iii. Personnel policies .....

.....

g. How much royalty and fees do you pay under licence and service agreements for the products you manufacture (give examples) .....Kshs.

	Fees		Amount	Paid to	Period	
e.g.	technical mgt.	Product	(as a % of)	Co. & country)	from	to
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

h. Do the mother company or Licensors insist that you obtain some spares, inputs, equipment etc. from them or "approved" sources? (yes/no).....

Explain:.....

.....

.....

i. What % of your sales is allocated for local Research and Development? .....

Do you contribute some money for any foreign R&D? yes/no

If yes, to which organisation and of what value:.....

.....

.....

j. If a multinational subsidiary:

i. To maintain the drug quality required by the mother company, you need to obtain various items through their purchasing department; what % of these categories do you obtain?

raw material inputs ....% Packaging material ...%

Spare parts .....,.% Capital equipment .....%

ii. How much does the mother company charge for the service (in form of buying commission, negotiation commission)?

.....

iii. Are you free to obtain the same items elsewhere at a cheaper price? .....

.....and do you?.....

Explain .....

.....

k. Inorder to have access to technology, it is necessary at times to enter into Licensing agreements with the parent Co. and/or various foreign drug firms. Through these agreements, the licensor provides the recepient with secret formulae, processes, technical know-how etc. to manufacture pharmaceutical products.

a. How many such contracts has your firm entered since its establishment?.....

Name them.....

b. It is often argued that the Licensing agreements usually contain various restrictive business clauses. With respect to the above (a) agreements, how many have the following restrictive clauses?

i. Export restrictions .....

permission of licensor prior to export .....

exports permitted only to certain countries .....

exports prohibited to certain countries .....

exports restricted to licensor's agents/distributors .....

ii. Tied-in purchases of raw materials .....

iii. Restrictions on production patterns .....

iv. Restrictions on termination of agreements .....

7. a. How much did you spend last year (1984) in the importation of:

i. Pharmaceutical raw materials.....kshs.

ii. Pharmaceutical spare parts .....kshs.

iii. Capital equipment .....kshs.

b. In importing the above products, what amount of duties do you pay?

Item	Custom duty	Sales tax
.....	.....	.....
.....	.....	.....
.....	.....	.....

c. What are the weighted averages of import duties you pay on the above:

Pharmaceutical products .....

Pharmaceutical spare parts .....

Capital equipment .....

d. Did you experience any problems in obtaining import licence and foreign exchange to purchase the above products? (yes/no).....

explain .....

.....

.....

e. List the additional expenses you incur to bring the items above (a) to your factory stores:

.....

.....

f. What is the weighted average of duties you pay on imported pharmaceutical inputs + spares together?

.....

g. Does the current level of custom duties favour importers of finished drugs? (yes/no).....

explain .....

.....

h. What are the duties and sales tax tax charged against importers of finished drugs competing with your products?

Item	cif (Msa/Nrb)	Duty	Sales Tax	Price for your domestic product
.....	.....	.....		.....
.....	.....	.....		.....
.....	.....	.....		.....

i. The weighted average of duties against competing imports .....%

j. Is this sufficient to protect your products?

.....(yes/no).

If no, what should be a favourable duty .....%

k. Are competing imports banned? .....(yes/no).

i. Approximately what % of the local market is supplied by the imports? .....% Of this, what % can be supplied by the local manufacturers .....%

m. How do your ex-factory prices compare to the cif cost (before duties) of competing imports .....
.....
.....

n. Do you give any suggestions to the government in regard to tarriff establishment? Explain,
.....

o. List the problems you encounter when competing against imports:
i. .....
ii. .....
iii. .....
iv. .....
v. .....

p. i. About how much of Cinchona alkaloids is imported into the country?
i.e. quinine, quinidine etc.
.....Kg.) .....Kshs.

ii. What amounts do you use.....Quantity
.....Value

8. BRAND AND GENERIC NAMES

a. May I obtain the Wholesale Price list of the products manufactured and/or sold by the company.

b. Approximately what % of your products are sold under:
i. generic names.....% ii. brand names .....%

c. It is often argued that if doctors prescribed drugs under generic names it could yield some savings to the consumers: Do you agree, explain

.....

.....

.....

d. What are the advantages and disadvantages of using generic and brand names:

.....

.....

.....

9. a. INTER AND INTRA-FIRM TRADE

For a selected range of pharmaceutical raw materials and finished drugs commonly used in the firm, give the following information:

Raw material/Finished drug .....
(indicate the generic name)
Use .....
Country of origin .....
Sellers .....Relationship to the firm.....
....
....

Quantity bought .....e.g. kgs./litres unit price...
F.O.B. Value Ksh. .....
Freight/Shipping charges .....
Insurance .....
C&F/C.I.F. Msa, Nrb (specify).....
Duty rate .....
Sales tax .....
Any other duty .....
Amount payable .....

b. BULK PURCHASING

i. Suppose you purchased the above products in

large quantities, what level of Quantiy discount could you obtain (give examples)
.....
.....
.....

ii) What benefits would accrue if the Government established a centralised purchasing agency to buy all intermediate imports and finished drugs .....
.....
.....

iii) What are the likely problems to be faced by the Agency .....
.....

iv) How can they be solved.....
.....

10. QUESTIONS FOR MANAGING DIRECTORS

a. What were your reasons for investing in Kenya?
.....
.....
.....

b. Have you invested in any other countries that use what you produce as an input? If yes, give the following details: (country/input/value)
.....
.....
.....

c. Give details of your negotiation process with the Government during your original investment (i.e. details of entry, any protection promised by the Govt. etc.).....
.....
.....

d. Did any of the firms or the Government resist to your entry? Explain.....
.....
.....

e. Suppose you were to expand your operations, what procedures are you required to follow?.....
.....
.....

f. Do you need to inform the Govt. in advance? Yes/no) .....

g. What is the target return on capital required by yourselves or the mother company (if a subsidiary of a multinational Co.) to justify your investment in Kenya? Explain .....
.....
.....

h. What problems does your firm encounter while operating in Kenya? i.e. Technical, Economic, Social .....
.....
.....

i. How often do you experience firm shut downs? Explain, giving reasons .....
.....
.....

j. How will the following benefit your firm?

   i. Border opening with Uganda and Tanzania .....
   .....
   .....
   .....

   ii. The recently concluded PTA (Preferential Trade Area) involving some countries in East and Central Africa .....
   .....

k. Do you sell your products to the Government? If so, what % ..... Do you still encounter problems in regard to the payments for their purchases? Explain .....
.....
.....

l. What is your estimate of the current (1984) Kenyan Pharmaceutical market .....Kshs. What is your share .....%

m. What is the approximate value of the import content of the products you manufacture locally?.....
(express as a % of the ex-factory value)

n. How do you judge your share of the entire Kenyan market since the establishment of the firm:

i. growing (at what %) .....
ii. decreasing (at what %) .....
iii. steady .....

Reasons for the above .....
.....
.....

o. What effects does the recently introduced system of registering drugs have on i) sales and ii) dumping .....
.....
.....

p. Suggest recommendations that would require Government assistance or co-operation to give your business a boost especially in regard to:

Problems	Suggestions for improvement
i. Import licensing	.....
.....	.....
.....	.....
ii. Foreign exchange allocation	.....
.....	.....
.....	.....
iii. Obtaining material inputs	.....
.....	.....
.....	.....
iv. Obtaining spare parts	.....
.....	.....
.....	.....
v. Any other (mention) ..	.....
.....	.....
.....	.....

BALANCE SHEET (1984)

	Kshs.	Kshs.	Kshs.
CURRENT ASSETS			.....
LONG TERM ASSETS			
Equipment	.....	.....	
Less Depreciation	.....	.....	
Land		.....	
Building		.....	
Motor-vehicles		.....	
Other long term assets			
.....		.....	
.....		.....	
Total long term assets			.....
TOTAL ASSETS			.....
LIABILITIES			
Short term liabilities			
Domestic	.....		
Foreign	.....	.....	
Long term liabilities			
Domestic	.....		
Foreign	.....	.....	
TOTAL LIABILITIES			.....
TOTAL EQUITY			.....

INCOME STATEMENT

	Kshs.	Kshs.
SALES		.....
Less COST OF SALES		
Domestically purchased raw materials	.....	
Imported raw materials	.....	
Domestically purchased spares	.....	
Imported spares	.....	
Wages + Fringe benefits	.....	
Salaries + Fringe benefits	.....	
Rent	.....	
Electricity	.....	
Fuel	.....	
Other items	.....	
.....	.....	
Add Opening inventories Shs.....		
Less Closing inventories	.....	.....
GROSS PROFIT ON SALES		.....
Less EXPENSES		
Overhead		
Interest paid in foreign exchange	.....	
Interest paid locally	.....	
Depreciation	.....	
Administrative salaries	.....	
Other administrative Overheads	.....	
Other Overheads	.....	
.....	.....	
.....	.....	
Other Expenses	.....	.....
NET PROFIT FOR THE YEAR BEFORE TAXATION		.....

CINCHONA PRODUCTION

(only for Cinchona producers)

1. When did you start growing cinchona bark .....(year)
2. Area occupied .....(Acres or Hectares)
3. First output realised in which year/month .....
4. How grown (e.g. interplanted with other crops).....
   .....
5. Alkaloid content of the bark .....(% of total weight)
6. Number of workers employed in the production of Cinchona bark .....

PRODUCTION

7. How do you measure your production (e.g. Kgs. Tons, Ksh.) .....
8. Actual production

	quantity (kgs)	value (ksh)
1984	.....	.....
1983	.....	.....
1982	.....	.....
1981	.....	.....
1980	.....	.....

9. With the existing investment outlay (labourers, equipment etc.) By how much can you increase the production without additional facilities .....
   .....
10. Do you expect your production in 1985 to increase, decrease or remain constant? Explain .....
    .....
    .....
11. Approximately what % of your Cinchona Bark is sold to:
    a. Soft drink industry .....% .....Ksh.
    b. Pharmaceutical industry .....% .....Ksh.
    c. Any other (mention .....% .....Ksh.

12. Major export markets

Country	Volume/value	Use
.....	.....	.....
.....	.....	.....
.....	.....	.....

13. Do you supply any of the local firms with the product (yes/no) .....

If yes, name the:

Firm	Volume/Value	Use
.....	.....	.....
.....	.....	.....
.....	.....	.....

14. Do you have a plant to extract the Cinchona alkaloids? yes/no.....If yes, name a. the plant .....
b. capacity .....(tons per year)

If not, why not? .....
.....

15. How much could it cost you to establish a local extraction unit .....Ksh. How judged .....
.....

16. Have you done a Feasibility study? yes/no.....
May I have a copy?

17. List the major problems hindering the establishment of a local processing unit:

i. .....
ii. .....
iii. .....
iv. .....

18. Suppose the above problems were solved and that there existed sufficient world demand for the Cinchona alkaloids, approximately how much could a local extraction unit produce?. volume .....kg/ton
value .....kshs.

How judged .....
.....

19. Do you know of any firm/firms in Kenya who could process the product? mention if any .....

20. What is the estimated current consumption of cinchona alkaloids in Kenya? .....

21. What is the current estimated world market growth rate for:

i. Cinchona bark .....%
ii. Cinchona alkaloids .....%