



TOGETHER
for a sustainable future

OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

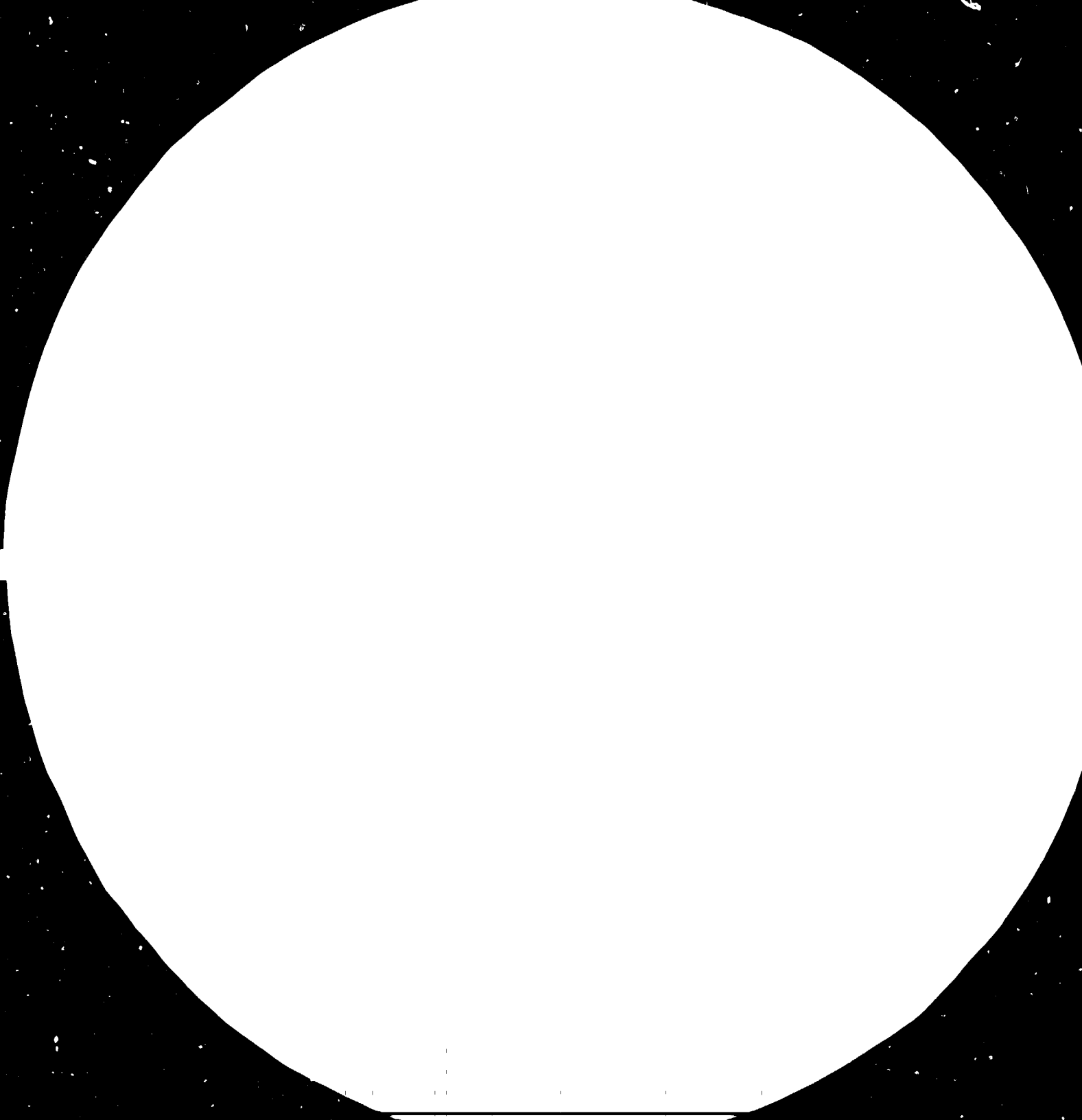
FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org





3.2

3.6

4



MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010
APPROXIMATE TEST SPEED: 1000 X

RESTRICTED

13107

DP/ID/SER.A/482
16 November 1983
English

SURVEY OF PACKAGING DEMANDS AND MANUFACTURES
FOR DEVELOPMENT PLANNING

SI/ETH/82/804

ETHIOPIA

Technical Report: Study on the Status of Packaging
and Related Industries*

Prepared for the Government of Ethiopia
by the United Nations Industrial Development Organization
acting as executing agency for the United Nations Development Programme

Based on the work of R.K. Chowdhary
Expert in Packaging Technology

United Nations Industrial Development Organization
Vienna

* This document has been reproduced without formal editing.

V.83-64007

P R E F A C E

In making this report, I wish to express my indebtedness and gratitude to the great courtesy and unreserved cooperation extended to me by all the persons on whom I called for information and comments. My profound thanks are due to Dr. K.F.S. King, Resident Representative, UNDP, Addis Ababa, Ato Shiferaw Jamo, General Manager, Development Projects Study Agency, Govt. of Ethiopia, for all the facilities and help provided to me by them and their staff members. Mr. J.Belo Industrial Development Officer UNIDO (HQ), Dr. F.L. Csagoly, Project Manager, Mr. J. Lissner, Assistant Resident Representative, UNDP, Addis Ababa, have facilitated me immensely to pursue the investigational study at a reasonably good tempo, and I feel extremely grateful to them.

To Ato Yohanese, Economist DPSA, I owe my profound sense of gratitude for the sacrifices he made both in and out of office hours and being with me throughout the survey. Ato Mersha, Miss Aselefech, Miss Aster and Miss Genet deserve my utmost appreciation and thanks for the pains they had taken to get the report typed within a record time.

TABLE OF CONTENTS

	<u>Page</u>
Preface	
Introduction (Part I)	1
Summary of Findings	4
Extent of Losses and their Prevention ..	9
Survey of Packaging Industry its Strengths and Weaknesses	
(i) Corrugated ¹⁰³¹²⁰⁰⁴ Box Making Industry ..	22
(ii) Folding Cartons	29
(iii) Plastic Containers	33
(iv) Glass bottles and jars	40
(v) Metal Containers and Closures ..	46
(vi) Wood	51
(vii) Hessian Bags/Sacks and Cloth ..	53
Recommendations	
(i) National Level	57
(ii) Corrugated Box Making Industry ..	63
(iii) Folding Cartons	66
(iv) Plastics Containers and Films of Laminates	68
(v) Glass	71
(vi) Metal Containers	73
(vii) Wood	76
(viii) Printing Industry	77
(ix) Hessian Sack and Cloth	79
Proposal for further Technical Assistance to Socialist Ethiopia	82
Project Profile on Pulp and Paper Production in Ethiopia	94
Project Profile for a Corrugated Box Making Unit	98
Project Profile on HDPE or Polypropylene Sacks	101

	<u>Page</u>
Project Profile on Paper and Board Film Coating and Lamination	105
Packaging Laws and Regulations	109
Packaging Design and Graphic Arts	114
Packaging for Exports - Mineral Water	116
Used Packaging Material/Waste Disposal	120
Integrated Plan for the National Packaging Industry	128
 <u>Appendices</u>	
Appendix I - Terms of Reference	137
Appendix II - Product and Produce Loss in the Distribution System	138
Appendix III - UNDP Envisaged Equipment Supplies	143
Appendix IV - Fabric and Bag Specifications	145
Appendix V - Quick Estimates of Demand for Packaging Materials and Proposed Sources of Supply	146
Appendix VI - Field Investigations (Part II)	147

INTRODUCTION (PART I)

Study Objectives:

The report is the result of a project commissioned by the Development Projects Study Agency of the Government of Socialist Ethiopia, the United Nations Development Programme through the United Nations Industrial Development Organisation. The study aims to draw up a programme for the development and growth of the Ethiopian Packaging Industry so as to enable it to meet its obligations to the domestic distribution system; minimise distribution losses and facilitate exports. This programme should, among other things, address itself to devise ways and means of utilising effectively the indigenous raw materials, national skills and be able to strengthen the base of the country's packaging industry.

Study Scope:

The study has been pursued broadly in conformity with the terms of reference laid down by the sponsoring agency (Appendix I). However, in the light of the discussions held and at the expressed desire of the G. Manager of DPSA, the terms of reference were expanded to study the extent of damages suffered by different products in the distribution system and suggest ways and means to prevent these through improvements in packaging. Production and consumption data on packaging materials have been obtained from the information contained in the published and even in the unpublished

records of various organisations. The production data is considered to be more comprehensive in coverage and reliability, however, the data on consumption is scanty. In depth field investigational approach based on a sample basis, was adopted to examine various dimensions and applications of packaging materials in different segments of the economy and the extent to which these fulfil the requirements called for in the country. Each of the packaging material segment has been reviewed from the point of view of its strengths and weaknesses witnessed in different production and end use industrial and agricultural sectors.

On the spot suggestions, wherever feasible, were made to improve the operations. A demonstrative approach was adopted for the purpose.

Major findings have served to formulate a set of recommendations with a particular emphasis on future growth and development of the packaging a related industries through the introduction of improved techniques, and technologies. Few project profile considered to serve the felt needs of the country have been drawn up with details about the financial outlays and types of technologies deemed appropriate for Ethiopia.

As a prelude to the introduction of any significant improvement in the packaging industry, it is important that both the manufacturers of packaging material, the end users and the distribution agencies should be able to comprehend the right role of this industry in the economic stream of

the country and realise their respective roles in the prevention and minimisation of losses and damages suffered by the products in the distribution channels. Perceiving that such an awareness is far below the desirable level, a seminar on 'Packaging and Loss Prevention' was planned and organised to deliberate on various issues. More than 80 participants representing diverse but highly related aspects of the packaging industry and its application areas discussed various issues and endorsed the findings and recommendations of the study.

Methodology:

The scenario of the packaging industry has been generated by relying heavily on the indepth investigational approach mainly undertaken through field visits by the expert. Relevant statistical data on production and derived consumption of the packaging industry have been used to complete the scenario. Opinions solicited from officials of major end use industries, trade organisations, representatives of various corporations, port and airport authorities, transport undertakings, material handling, warehousing and storage agencies etc. have greatly contributed to the study. The sample of organisations interviewed was based primarily on their being of a representative character and the importance these enjoyed in the economic arteries of Ethiopia.

The data gathered both from the indepth studies and published sources have been analysed and judgements made thereof.

SUMMARY OF FINDINGS

1. The study on packaging and related systems obtaining in Ethiopia was carried out at the expressed desire of the UNITED NATIONS DEVELOPMENT PROGRAMME, the Development Projects Study Agency of the Government of Socialist Ethiopia and UNIDO. Based on an investigation study of more than sixty industrial, agricultural and commercial units and relevant published and unpublished data, the analysis presented in the main body of the report attempts to highlight certain strong and weak areas of the packaging industry in Ethiopia and what remedial actions would be needed to overcome these shortcomings.

2. Packaging industry's key problem area is the acute shortage of trained manpower and the absence of cost and quality control systems in what it produces. At the user's end, there exists, by and large, a lack of serious concern for protecting what is produced. Almost in every segment of the national economy, occurrence of product losses and damages is being deemed as a fate-accomplish, without the least realisation that nearly 70-80 percent of these losses are avoidable through improvements in the total system of distribution viz. packaging, storage, handling and transportation. A developing country like Ethiopia, can ill afford to lose an estimated 400-425 million birr or 200 million US\$ every year by way of product losses or damages.

3. With a focus on the possible contributions which adequate packaging can make to the minimisation of product losses and damages, a set of recommendations have been made for each of the main sectors of the packaging material producing industry in Ethiopia - viz. glass, paper, board, cartons and boxes; plastic film, crates and bags; metal cans, fibre (hessian) sacks and cloth; wooden boxes and crates and the package related printing industry. These recommendations appear in the main body of the report. In additions, a few gaps in the packaging material production industry have also been identified and the recommendations have emerged in the form of project profiles - one each on paper and pulp making unit; corrugated box manufacturing, HDPE/polypropylene woven sacks, composite material lamination and film coating. The financial outlays envisaged are of a modest scale to enable the country to seek resources for implementation from within.
4. Of paramount importance, is the creation of a nucleus institution which should serve as a centre for continuing packaging education and training, research and development, testing and evaluation of packaging material and packages, collection and dissemination of information. In addition, it is envisaged that the proposed centre days to come, will play a leading role in the development of packaging for exports, assist in

the formulation of packaging laws and regulations, packaging standards and certification. To make this centre an effective instrument of upgrading packaging technology and management in the country, a series of steps with international cooperation have been proposed. Amongst these, training of the national professionals in the science and technology of packaging and creation of right packaging concept and industry related development of skills, have been accorded the top most priority. A project profile on further technical assistance to Socialist Ethiopia has been accordingly prepared, the implementation of which should be possible through the assistance of UNIDO in terms of providing resources for fellowships, testing equipments and expertise.

5. Keeping in view, the country's need to promote its exports and reduce its import bill, a few products have been identified which may form the core of the non-conventional product lines to be explored for export marketing. The guidelines for further work required in this context have also been outlined. Simultaneously, a few suggestions, in the interest of achieving substantial economies in country's import bill, have been made whereby with judicious change in the composition of imports - from its present form of receiving some of the goods in consumer/retail packs to bulk packs it should be possible to achieve significant benefits.

6. The awareness for the right packaging and its pivotal role in the distribution system is considered to be at its lowest ebb in the country. A seminar to deliver this message through discussion oriented sessions on different facets of packaging with a target audience of packaging material manufactures, the material users and the policy makers was held and findings of the study were brought to the notice of the participants.
7. The investigational study extending over more than sixty establishments revealed a few packaging related weak spots in the operations. These have been commented upon for each of the units visited separately. The suggestions and the revelations of the operational weak spots, it is hoped, will be taken in the right spirit and not be construed as an unwarranted criticism.
8. In a planned economy, the development of a service industry like that of packaging, derives its life blood from the total planning process of the country. It is important that a course of planned growth of the industry should be pursued in association with the growth plans of the end user industries, agriculture and commerce. An outline of the approach has also been attempted. The endeavour to project the demand for the various types of packaging material did not prove to be a success due to 'paucity' of data on 'consumption norms' and, the absence of details about the sale of packaging material to different users over a number of

years. The production data of the packaging material manufacturing units was utilised to forecast future directions expected in the use of packaging material. However, it is felt the approach from the consumption side would have been much more appropriate and reliable.

EXTENT OF LOSSES AND THEIR PREVENTION

Socialist Ethiopia's economy is a complex structure with diversities in consumer's knowledge, purchasing power, buying habits and distribution system. The country has launched, through its own efforts and with the cooperation of various international agencies and bilateral arrangements, a number of programmes of improvements in various sectors such as agriculture, industry, education, transportation, port development, road building and health. It is expected that these programmes would yield the desired rewards in days to come. However, it must be borne in mind that a techno-economic production base does not automatically lead to improvements in the distribution of what is produced. The inadequencies of the distribution system bring in their wake- the horrors of product losses and result in a heavy depletion of scarce and much needed resources.

The distribution mechanism consisting of packaging, handling, transportation, storage for a variety of products and commodities is not strong enough to ensure the availability of goods to the consumer in right quantities, in right form, at right places and prices. Many of these goods are not able to fend for themselves against the vagaries of nature - brought about by sudden and frequent climatic changes, fail to balance themselves against the hazards of harsh handling, horizontal and vertical impacts, shocks; and

attacks by moulds, insects, rodents in storage and last but not the least, against the human temptation to pilfer.

Product Losses

Instances abound - where product wastages and losses surpass even the imaginable limits - in the distribution system. A sixth of food grain, one third of fresh fruits and vegetables, a tenth of meat and meat products and milk and milk products, are estimated to become unfit for human consumption; Amongst the manufactured products, sizeable quantities of cement, sugar, soap and detergent, pasta, flour, wine and beer, biscuits, stationery items, canned food are lost to the consumers in varying proportions. On a most conservative basis, these losses put together are costing the country nearly 400-425 million Birr or 200 million US\$ every year. This magnitude will be such more if the distribution losses of imports are also clubbed with the above. A detailed break up of the distribution losses as estimated by the consultant is given in Appendix II.

Not only the occurrence of such losses and damages is painful but these are eroding the confidence of the consumers in the products of the country. At times, it is argued that every thing is saleable - true, the damaged and spoiled goods are passed on to the consumers who accepts these out of compulsions brought about by the economics of scarcity. But during bouts of shortages, the consumers may get accustomed to purchase damage goods, may ignore its

quality aspects altogether. Over a period of time, this apathy may assume enormous proportions and create a climate of utter helplessness and concern for quality in the production mechanism. No country can permit a technological evolution to recede into the dark arrays of technological regression. In the case of exports, product losses particularly for hides and skins, and other agricultural produce due to infestation do not, it is learnt, bring the same value realisation in foreign exchange what the other countries are able to get.

National Consciousness

It is a strange paradox that larger the incidence of waste in a country lesser is the realisation and concern to arrest it. Ethiopia too is in the grappling grip of this paradox. The current programme of achieving success in the agricultural and industrial growth are not well embedded with strategies to protect and preserve what is produced. This agony is further compounded by the fact that no reliable information exists even to quantify these losses at the national level and trace their origins. No doubt such a task is difficult to accomplish. Losses do occur and are taking place day and day out. It is another question that their physical quantification is alluding the balance sheets - perhaps on account of an innocent lapses. In this context, an illustration may serve to elucidate the point. In some enterprises, stocks of raw material and packaging materials which even after becoming completely unserviceable are not

salvaged, kept physically intact and are carried forward to the balance sheet as materials in stock year after year.

The devastation of losses could be of different gravity - in case of pharmaceutical products - where failure of a container or even inadequate protection afforded by a container for these products may lead to loss of life. So the most predominant consideration is the utmost functional efficiency. In case of products for defence services, any deterioration of product quality could be disastrous and of great consequence to the safety of those who guard country's frontiers. A contamination in the processed canned food, could be a source of slow poison to impair the health of the armed forces - and other consuming public.

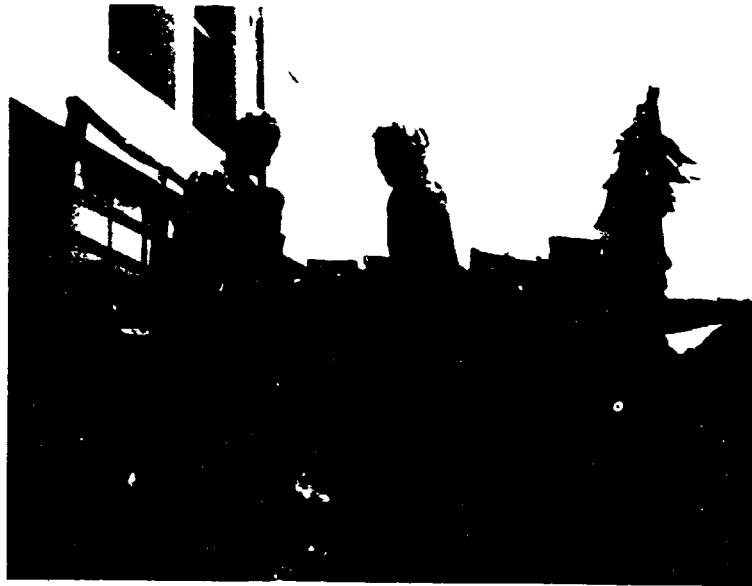
Nearly 80 percent of the product losses and damages are avoidable. A reduction on waste can be attempted through effecting improvements in packaging, handling, storage, transportation together with toning up of the administrative machinery controlling the infrastructural system. Improvements in packaging alone may do a limited job. The entire body system of distribution mechanism needs improvement. However, till the resources for effecting improvements in the other sectors of economy are located, which by any reckoning, would be enormous in magnitude and require a much longer gestation period for producing results; the improvements in packaging are much less capital intensive and have a shorter gestation period.

In a number of enterprises visited by the consultant, expenditure on packaging has been substantially reduced to demonstrate a measure of economy. This treatment defeats the spirit of austerity and the consequent losses, suffered by products, it is learnt, have risen.

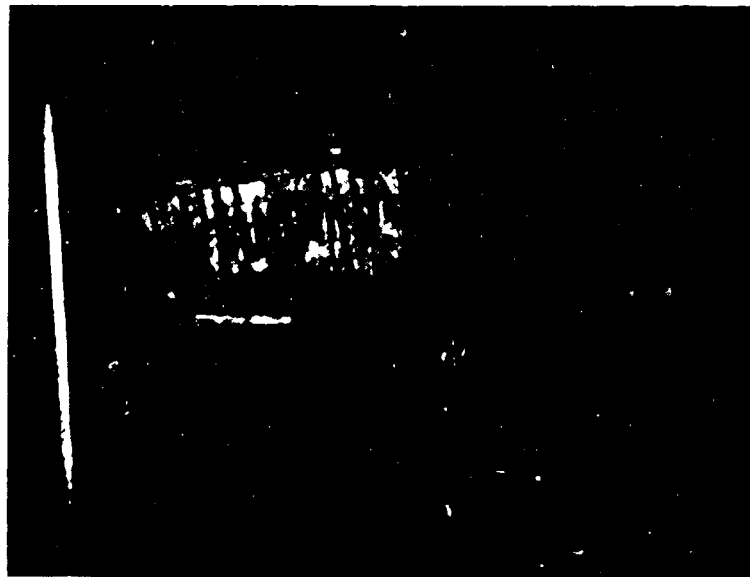
No doubt, the search for economy is a virtue, but when it cuts at the root of dependability that it turns out to be a 'poor-man's economy'. The best way to focus attention on this matter of being right is to take account of what is so distinctive about the system. The problem of cutting corners in the distribution system owes certain interesting and distinct problems. For instance, while it may be possible to substitute a machine for human labour in a production process along with a reduction in one operation without seriously impairing the rest of the production system, this is hardly true in the case of efforts to reduce the distribution costs. Any indiscriminate reduction in cost elements such as packaging does lead to disastrous and unpleasant effects on the efficiency of the system as a whole. The prospects can be pleasing and handsome if the total perspective is kept in view, otherwise the net effect could be higher product losses, an increase in loading/unloading operational time and poor utilisation of transport and storage space. Thus, the reduction in packaging costs, in isolation, can hardly contribute to the overall economy.

The survey of the packaging and the users industries have been carried out and the recommendations and suggestions made are primarily from the point of view of minimizing product and produce losses through improvements in packaging. By no means, it should be construed that the improvements in packaging as and when brought about would be an all pervasive remedy.

UNLOADING BANANA



STACKING BANANA IN STORAGE



UNLOADING OF BANANA



WHOLESALE DISTRIBUTION
OF BANANA



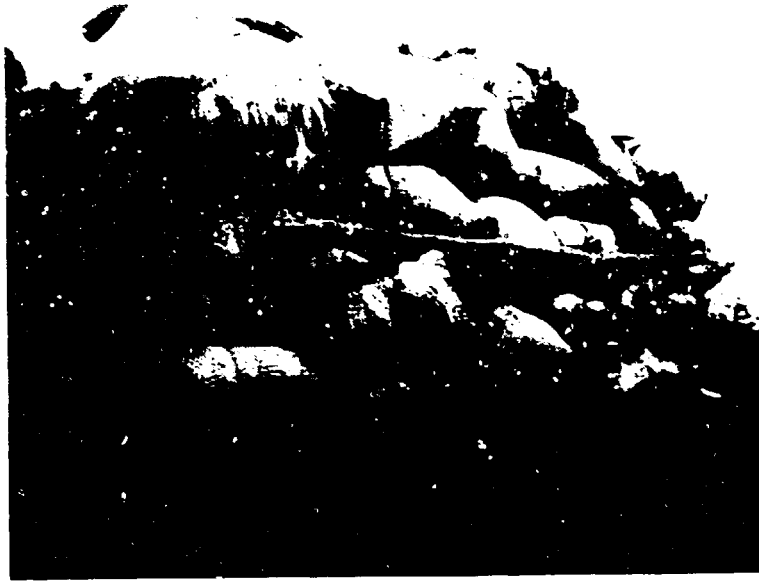
DAMAGED PEACHES AND MANGOES



ORANGE STACKING AND UNLOADING
IN PLASTIC CRATES



TRANSPORTATION LOSS
RED CHILLIES



DISTRIBUTION LOSSES — FRUITS
TOTAL LOSS ACCUMULATIONS



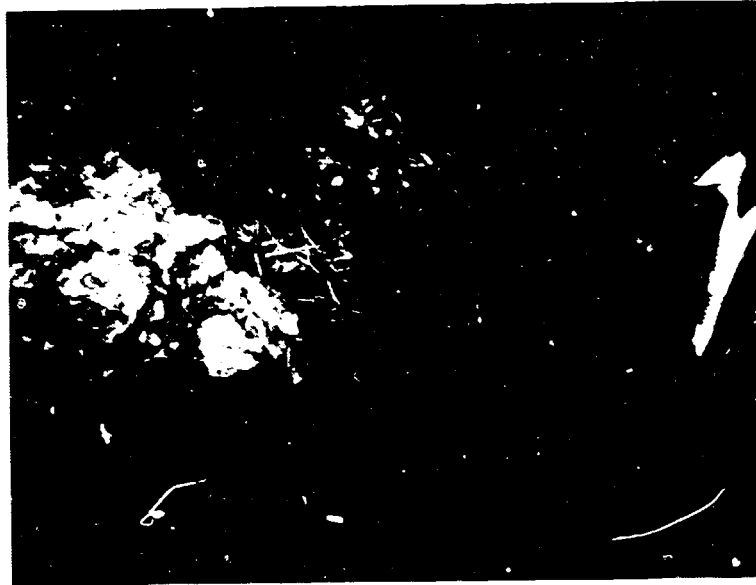
RETAIL STACKING OF FRESH VEGETABLES



DEFORMED CARTONS OF FRESH FRUITS



**DISTRIBUTION LOSSES
FRESH VEGETABLES & FRUITS**



**BANANA CRATE -
LOAD CRUSHING HAZARD**



CEMENT HANDLING AND
TRANSPORTATION IN 3 PLY SACKS.



SURVEY OF PACKAGING INDUSTRY ITS STRENGTHS AND WEAKNESSES

(i) Corrugated Box Making Industry

There are two major corrugated box manufacturing units in Ethiopia, one each in Addis Ababa and Asmara. The total combined capacity is 6000 tonnes per year and the utilised capacity is 4,500 tonnes. All these units cater to the regional demand of various industries and two of the three units are owned by the Government.

The kraft paper and the fluting medium and test liners are imported from the Scandinavian Countries. At times, the fluting medium is made in the local paper and pulp mill. Kraft Single face corrugator with a 62" wide roller is used for the production of 3 ply board. 5 ply board/boxes are made manually by one of three manufacturers, although there is sufficient demand for these boxes in the country. Boxes with glued side seams are mainly in use. Facilities exist for two colour flexo printing. Imported - starch adhesive are used on the corrugated surface with use of PVA adhesive side seam glueing. One of the units uses sodium silicate produced indigineously. There is an acute shortage of corrugated boxes and the emphasis seems to weigh heavily in favour of producing whatever boxes could be produced irrespective of the quality standards. Mainly B and C flutes are used for board making.

The technical manpower is not well exposed and needs to be trained on the developmental aspects of board and box making. No triple walled and to a very limited extent double walled containers are being made and accordingly,

there exists a near absence of strong corrugated boxes needed in abundance in the country. Moreover, the industry relies on the experience of the workers and seldom use testing equipment to assess the quality of the new material and the finished board. The typical products of the industry are 150/130/150; 150/150/150; 180/127/180.

Comments of the Users

In all, fourteen end users of corrugated fibre board were contacted and requested to give their opinions. In addition, observational assessment was made of the filled boxes in the stores and warehouses, airport and sea port terminals. End use industries engaged in the manufacture of pharmaceuticals, biscuits, cigarettes and tobacco, processed fruits and vegetables, ready made garments, baby food, paints, and varnishes, meat concentrates, shoes, confectionery, crown corks, domestic distribution agencies, glass manufacturers, were visited and reactions of users were recorded. Their comments and opinions are summarised below.

- (i) All of them expressed dis-satisfaction with the inordinate delays in deliveries of boxes and as such a majority of them have to carry heavy inventories of stocks ranging between 4 to 6 months.
- (ii) Almost everyone of the end users expressed dis-satisfaction with the strength characteristic of the boxes. Poor compression strength leading to bulging and bursting of the boxes in storage and handling is

reported to be a critical distribution hazard. The position in respect of boxes made in Asmara factory is much better.

- (iii) Import duty to the tune of 49 percent on the raw material and other inputs is making the industry's product highly expensive.
- (iv) Delamination of flaps due to improper glue application and poor adhesion of flaps is a source of constant worry.
- (v) Odd sizes of boxes often accompanied by excessive variations in dimensions, lead to problems of dunnage and deformation and instability in stacking.
- (vi) Scant regards is paid to customer's complaints by the box manufacturers on account of prevailing scarcity of boxes.
- (vii) Poor and often smudged printing on the boxes.

Problem Identification and Recommendations

1. The users, by and large, are ignorant about the specifications of the boxes. Suppliers specifications are insufficient to warn/caution the users against filling of the boxes with product weights far in excess of the desired load. For instance a particular box primarily meant for 15-20 kg of product weight - is filled with 30 kg of product and filled boxes are stacked 8 to 10 high. Bulging and consequent bursting of boxes is a natural phenomenon. It is simultaneously observed that

the compression resistance of these boxes is very low. Compression strength of the boxes should be improved by better construction and strengthening of the corners of the boxes. End use industries should be properly oriented to the use of containers, their filling, closures, handling and stacking.

2. The conditions of handling and the methods of transportation determine the nature of the shipping container to be used. Both these conditions are adverse in Ethiopia hence the container will necessarily have to be stronger than what the products actually require. Use of double walled - 5 ply container is recommended in certain selected cases.
3. Use of neutral sodium silicate instead of starch prove to be more beneficial.
4. The existing facilities should be augmented to manufacture 5 ply board on a fully automatic line. Pending its augmentation, use of hand fed gluing machine would be more economical. Asmara unit is already practicing, the same and practice can be adopted by others.
5. The board manufactured in the paper and pulp factory had a high incidence of warping. The problem was brought to the notice of the consultant during field visit. This was due to variations in moisture levels of the liner and the fluting medium. For elimination of warping and production of better bond characteristics, maintenance

of uniformity in moisture level of the liner and fluting medium is essential. To overcome this problem pre-heated liner should be passed over steam before it reaches the corrugating roller. This was demonstrated at the spot and warping of board was minimised in the paper and pulp unit Weinji.

6. The entire industry does not manufacture water proof board. A process known as 'curtain coating' is used for water proofing of board by the application of wax. Molten wax is sprayed under pressure onto the surface of the board. This forms a very fine film of wax. Both or one side of the board can be waxed to pack products like frozen meat, chicken, fish etc. Where 100 percent water proofing is needed the adhesive used for production of board should be such that it is incorporated with urea - formaldehyde - this could prevent delamination of the board even in conditions of high humidity.
7. Judgement on the quality of the box is done by observations. There is a need to measure the physical properties of board and its nature of construction or the box under controlled conditions and the performance of the box filled with the requisite material should be correlated to pre-determined material properties and due relationships established.
8. At least two more units for the production of corrugated boxes should be established in the country. These and

the existing ones should be well equipped with trained manpower and testing equipment for evaluating the quality of the board and boxes.

9. The basic raw materials viz. kraft paper, fluting medium and test liners are being imported at a great cost of scarce foreign exchange. The country produces enough agricultural residue to feed mini paper and pulp making mills based on the inputs of agricultural residue and recyclable waste. A feasibility study incorporating techno-economic features of setting up craft paper manufacturing unit should be undertaken immediately.
10. During field visits undertaken to market places, it was observed that biscuits, tea, detergent powder, spices, shirts, hosiery items, etc. are packed in duplex board printed cartons. It is possible to pack some of these items in E flute printed corrugated cartons of simple construction. This would greatly reduce the packaging cost and result in saving of foreign exchange spent on the import of duplex board.
11. There is a need to review the import duties levied on basic industrial material including the kraft paper, semi-chemical pulp, glues and printing inks. Since the corrugated boxes manufactured out of the imported raw material are used as distribution packages, the burden of import duties in effect are a burden on the distribu-

tion system and ultimately its incidence is on the consumer. It should be possible to reduce the quantum of duties levied.

12. In certain cases, it is observed that the boxes manufactured in the country use more material than the minimum required for a functional box. With proper design changes, it is possible to achieve substantial savings in material consumed for construction of boxes.-
13. Development of corrugated board hessian sandwiched or hessian laminated using bitumen could contribute to superior strength properties of the box - allowing it to carry increased load. This could be adopted.
14. More frequent contacts with the Ethiopian Standards Institute should be developed and ways and means devised to formulate standards for corrugated board and boxes.
15. The emphasis appears to limit production of boxes to two or three types only. A variety of designs with beneficial attributes are available and can be varied as per/felt needs of the industry.

(ii) Folding Cartons

Certain fragile, highly hygroscopic and vulnerable to atmospheric dust and light - products require protection and facility for dispensation in purchasable quantities. In certain cases the products must be accompanied by instructions for their use. Folding cartons are considered suitable for such products and are used in a number of industries viz. cigarette, biscuits, pharmaceuticals, detergent, dry cells, certain varieties of fruits, foot wear, etc.

A major paper converting unit in Addis Ababa and a few printing presses are engaged in the production of folding cartons printed in two to five colours for use of various end users. Many of the units do not maintain strict dimensions of the cartons manufactured by them, which consequently creates problems on the automatic form, filling, and sealing machines. Complaints made by the manufacturers of detergent and pharmaceutical products related to (i) wide variations in the dimensions of the cartons, (ii) cracking at the seams and (iii) poor crease properties. These combined to create problems on high speed form, fill and seal machines. In view of the problems encountered on the high speed machines, these end users have to deploy a large number of workers to carry out forming, filling and closing operations manually.

It is worth mentioning that the cartons in flat forms are delivered in bundles banded by a paper bond. At the users end, these are stored on the floor with a possibility of high incidence of moisture absorption. In fact many of these cartons were found to be in soggy conditions with a loss of desirable and basic properties of cartons.

The carton manufacturing units hardly carry out any quality testing of the raw material, duplex board, print and its crease qualities, stiffness characteristics, etc. Neither, they varnish the print surface. Board characteristics such as stiffness, moisture content, ash content, amenability of the surface to print, creasibility of the board, its resistance to folding or crease, rub resistance of the print and the whiteness of the board surface are not being tested to judge the suitability or otherwise of the board for carton making.

The entire supply of duplex board and printing inks are imported according to specifications laid down by the converters. It is doubtful whether the deckle width of the reels ordered fit optimally into the deckle width of the production reels. In its absence, the wastages encountered are likely to be transferred to the customer in the price quoted.

Assistance by a packaging laboratory can help raise the standards of carton manufacture and other packaging materials manufactured in the country.

Letter press printing, and gravure printing are the common processes of printing duplex board. The major manufacturers of cartons are well equipped with photographic departments including facilities for retouching and colour separation to turn out good production. The printing standards are at times reasonably adequate but follow an erratic trend.

Most of the units engaged in the conversion activity are fairly well stocked with material and carry large inventories of paper and board, ink and other auxiliary items needed in the process and printing of packaging.

Folding Carton Users

It is little surprising that the carton users like the manufacturers of detergent cigarettes, dry cells, biscuits, ready made garments, foot wear, beverages, with few exceptions, do not inspect the cartons received by them. Whereas carton inspection is much more rigorous in many other countries, in Ethiopia, their being of the right quality is taken for granted. When more pressed for reasons for such a passive attitude, the respondents expressed their helplessness and reluctance to complain about the above products originating from another unit in the public production system. This attitude of modesty and submissiveness to accept whatever quality is available have been responsible for a downward trend in quality and help build up converter's, indifference and lack of concern to improve it. Some of the

end users continue to use cartons which are deceptives in nature and bear no relationship whatsoever, with the properties, shapes and styles of the products these pack. Biscuits packs are an illustration in view.

There is very little effort put in by the user industries to suggest new and creative graphics on the cartons. Accordingly, the graphics on packages is far remote from the Ethiopian culture. The underlying cause could be lack of competition and or concern on the part of the consumer goods producing industries to cover a wider segment of the market. Or else, it could be a marketing strategy to project graphics akin to those obtaining in the Western Europe, so that the local purchasers could consider the product to be similar to those currently being imported in to the country. The validity of this hypothesis could not be tested. Nevertheless, the need to have creative graphics hardly be overemphasised.

(iii) Survey of Plastic Container Manufacturing Units

Plastic as a packaging material in Ethiopia has made a modest beginning by having injection moulded bottles (one - two types), polyethylene film, pouches and sachets; blow moulded jerrycans, polyethylene sheets, and plastic crates. The family of thermoform products, LDPE & PP woven sacks, PVC and LDPE collapsible tubes, laminates of composite material, shrink and stretch films etc. have yet to be seek entry into the indigeneous production. Similarly, production of clear PVC film, blister packaging, skin packaging, adhesive tapes and PVC bottles, polystyrene bottles and foam is not being taken up.

There is one major unit, Ethio-Plastic which serves as the main source of supply of polyethylene film, printed poly, pouches and sachets, etc. It also manufactures polyethylene bottles by injection moulding process. Plastic film blown is mainly limited to LD polyethylene with automatic machines for bag making. The raw material viz. poly-granules are mainly imported.

Plastic Crates

Injection moulded crates for handling of beverage bottles, fruits and vegetables are being manufactured by another major unit-Plastic Crates and Gas manufacturing company. Particularly in the case of soft drinks and beer, these crates have completely replaced the wooden crates. However, in the case of wines and other alcoholic drinks for

local/short distance distribution, and for handling of fruits and vegetables - a major break through is yet to come. The unit has limited capacity and due to bottlenecks prevailing in the procurement of dies and tools and limited availability of foreign exchange, the progress to instal additional capacity in order to meet the demand fully, is extremely slow.

Plastic trays for handling of milk and other dairy products for a local dairy enterprise are also produced by this unit.

IMPORTS

Among the imported material, cellophane, LDPE, HDPE, polypropylene and laminates of foil and polyethylene; paper and polyethylene are being imported in ready to use form.

Survey of Users Industries

The consultant visited many of the end use industries using plastic material. These included a dairy enterprise, meat corporation; ready made garment manufacturer, manufacturers of sugar and confectionary, pharmaceutical products, textiles, handicraft, crown cork; fruits and vegetable corporation and soap and detergent manufacturers, etc. Most of them preferred to carry very heavy stocks on account of basic uncertainties in the supply of material by Ethio-Plastic.

Most of the users complained of improper edge sealing of the bags and extremely poor ink adhesion. The incidence of flaking off the ink on the printed bags was frequently observed. The end users, do not possess the requisite knowledge to formulate or test specifications of the supplies received by them. Neither the material manufacturers are able to test and certify the specifications of the products supplied by them.

One is faced with a very depressing situation in respect of the filled bags for powders, flour, salt, spices; potato chips, pulses, grain, rice, sugar, milk cream and biscuits. Leakages due to improper sealing, open ends, and edges are a common feature and result in product losses due to seepage and infestation. Such seepage and noticeability of the spilled products on the shelf are stated to be of utmost concern to the distributors and the consumers alike. It is building up an impression that the quality of the products manufactured in the domestic market is poor and the consumers do not get their money worth. This impression is fast gaining momentum and should not be allowed to persist any longer.

Plastic Crates Users

The quality of crate as perceived and commented by the users is very good. During the visit, it was observed that due care was being exercised for weeding out the substandard crates. Due to limited capacity and rising demand for the

crates, the manufacturer is not able to satisfy the growing demand. Moreover, the 'dies' are mainly imported and their procurement is a highly time consuming process. Accordingly, the customer's dis-satisfaction caused on account of inordinate delays appears to be mounting. Simultaneously, there are complex problems encountered in the material handling of processed beef and mutton in some of the manufacturing units. The use of plastic crates and trays can greatly ease the situation and be helpful to the users in many ways.

Laminates

No lamination facilities exist for the production of laminated material. Film laminated to paper improves the barrier properties as well as resistance to water, grease, while lamination to aluminium foil and/or sandwiching of plastic film in two layers of aluminium foil adds considerably to the strength and aids easier sealing Bottle & jar.

Closures

Since the bottle/jars manufacturing activities whether of glass or plastic have a very limited range of production, the closure making industry has not developed much. Closures are as important as the main body of the container. These are either compression moulded from thermosetting resins like phenol formaldehyde, urea formaldehyde or injection moulded from thermoplastics like polystyrene or polyethylene. Similarly, plug fittings made out of injection moulded low density polyethylene are not available.

Plastic Bottles/Jars

Of the entire packaging industry in Ethiopia, production of plastic bottles is the weakest area of the total operation. Yellow colour, two to three sizes of unprinted bottles containing liquid detergent are an obvious sight in the market place. These bottles are with an unprinted surface body and the purchasers after their primary use, do utilise them for other household purposes. These bottles are of very low thickness and have a tear off closure and are categorised as 'squeeze bottles!.

The moulds appear to be worn out and accordingly the meeting points of two faces of the bottle appear to be worn out. The consultant could not get an evidence of any antistatic agent being added to polyethylene granules for the manufacture of bottles, the addition is considered desirable, as the static charges built up on the plastic accelerate the process of leakage.

Technical Abilities

Technical abilities do exist to produce fine quality films, printed bags and sachets, but there is a general complaint of insufficient care and application of production processes, inadequate quality control measures and the desire to assess quality at different stages of production. This is more a managerial lacuna and requires an immediate attention. No serious attempts are underway to keep the production costs within control. The management of many users industries get surprised when asked to comment on the

cost and quality control aspects as they seem to be according to these a second place in their production management.

Technological Aid

With a view to upgrade the performance of the unit producing plastic packaging material, it is fair and judicious to suggest that this unit need further technical help - in the production processes, cost and quality controls. They also need help to seek further areas of application and improvements in the utilisation of plant and equipment capacities.

As the use of plastic material increases and extends to the food market, it would be desirable for the manufacturers that they used the harmless additives. So that the extent of monomer present in the polymer is kept within limits so as not to pose to be a health hazard. Facilities will have to be created to test such levels. The nature and reactions of additives and not permitted must be fully known to the manufacturer, so that the possibility of dangers was avoided. Simultaneously, the manufacturers should be able to indicate the level of monomer content present in the material supplied by them and preferably this should be counter checked by another independent body, and this should be re-checked by an independent laboratory.

FINISHED GOODS INVENTORY OF
PLASTIC CRATES



SHOE BOXES ON DISPLAY



(iv) Glass Bottles, Jars

There are two factories engaged in the production of glass bottles, jars, tumblers—one each situated at Addis Ababa and Asmara. Both of these produce soda-lime glass suitable for packaging of beverages, foods, pharmaceuticals and other products. Boro silicate glass - which is far superior in durability and thermal shock resistance is not produced and the glass for injectables, plasma is being imported. It is worth mentioning that the glass manufacturing unit at Asmara is very well equipped to manufacture a great variety of bottles needed for satisfying the growing demand in the country. The containers are formed directly from molten glass by blow and blow, press and blow and even by direct press process. A majority of the production is by completely automated process.

The product mix mainly consists of bottles for (i) soft drinks, (ii) beer, (iii) mineral water, (iv) wines and other alcoholic drinks (v) squash and fruit juices. Besides, jars for jams and jellies, and tumblers for parafin, yoghurt are also being produced. A sizeable proportion of the production capacity amounting to 20 percent is utilised for the production of tumblers for domestic use.

It has been observed that first grade glass sand with minimum iron content is available to SAVAGLASS Factory Asmara, the other unit has to put up with inferior quality of sand. Moreover, the skill component in the SAVAGLASS Unit has acquired a superior expertise than what is available

in Addie Glass Unit, in Addis Ababa. Closer contacts between the two units may be more helpful to the country's glass packaging industry.

At the Addie Glass Factory loss on the annealing line appears to exceed the desirable proportions. It is estimated to be of the order of 15-20%percent, while 20-25 percent of the empty bottles get broken or damaged during sea voyage from SAVAGLASS Factory to Asmara to Asab for onward distribution to other consuming centres.

Survey of Users of Glass Packaging

Bottles are mainly used for soft drinks, beer, wines, mineral water, syrups, squash and fruit juices. On an average 22-23 million bottle are used every year. Almost all the bottles are of returnable type and carry a deposit to ensure returnability. The bottles used for soft drinks encounter much less problems than those on the beer filling lines.

The pharmaceutical manufacturing unit has to procure almost its entire requirement of glass bottles through imports save for a small quantity obtained from the national glass industry. The use of glass as a food container is not yet very popular in Ethiopia. Only for a very limited range of food products, glass containers are being used. This is in striking contrast to the fact that the alternative medium of packaging for processed foods in use is tin container which are imported. It must be recognised that glass is indigenously produced and can be and should be used in food packaging. It is not only an indigenous resource but is recyclable and re-usable. With due augmentation of production capacities, the glass containers can be supplied in adequate quantities.

The manufacturers of wine fix labels on the bottles. Most of these labels are unvarnished and in some cases these de-laminate making it difficult to identify the type of wine these contain.

The success of the glass containers as a medium of packaging depends, among other things, on the type and performance of closures. Making good closures, which are simple to fix is a sophisticated operation. At present, all the winery plugs, are imported and the glass bottle/jar closure industry has not developed well. It is advisable that the glass factories should start working in association with some of the closure manufacturing units otherwise the application area would remain very much confined to few uses.

There appears to be acute shortage of bottles for edible oil, liquid squash, pastes likes tomato -ketchup, liquid toileteries-shampoos, hair oil; chemicals like liquid detergents etc. Paradoxically, coexistence within association of the shortage of bottles prevailing in the country, a major manufacturing unit viz. SAVAGLASS continues to build up inventories of soft drink and beer bottles through its continuous flow production mechanism even after saddling itself with an accumulated stock of six month inventories of these bottles. The reluctance to switch over to the production of much demanded types of packaging glass, more particularly in the light of huge stock pile up of soft drinks and beer bottles, is not understandable.

Marketing Aspects

The market development programmes and strategies adopted by the glass manufacturing units are not only inadequate but lack continuity. Both the units should pay a greater attention on product and market development aspects. They both lack trained manpower resources for effective marketing. This malady needs to be corrected immediately.

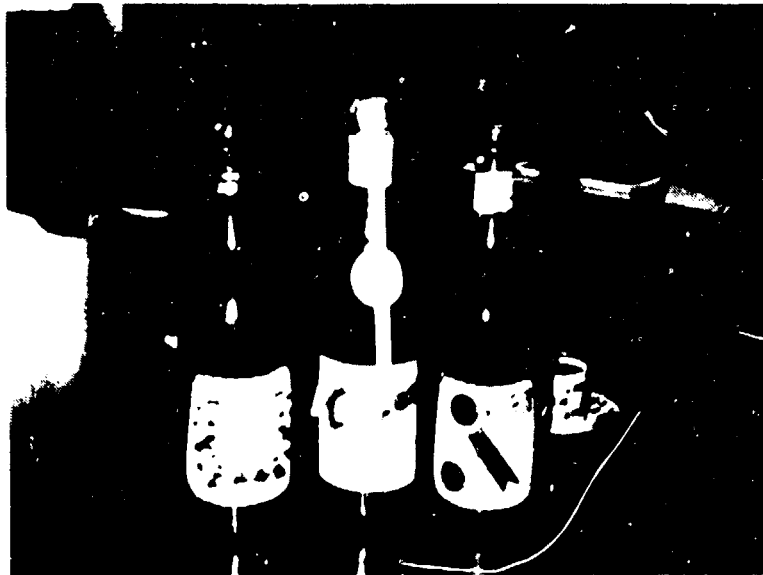
Bottles for Exports

It is understood that the country used to export bottles to the neighbouring markets and earn foreign exchange. The export demand for the bottles does exist in the traditional export markets for Ethiopia; but the local industry is not able to harness it. The reason for such a failure is said to be that the Ethiopian manufacturer of bottles cannot meet the price competition from the suppliers from India, Singapore and even from some of the European countries. In a number of countries, the manufacturers follow the principle of marginal costing for export and are able to have a good foothold in these markets. In many cases, the need to meet the requirements of the export markets have brought about technological innovations among the domestic producers with utmost gains to the domestic industry. It is suggested that at least, SAVAGLASS factory can divert part of its capacity to meet the requirements of the export market. Efforts to augment the capacity and reduce damages caused to bottles should be considered on a priority basis.

EXPORT PACK FOR WINES



WINE IN GLASS



(v) Survey of Metal Containers and Closures

Combination of steel and tin - viz. tin plate, found to be one of the most suitable materials offering an optimum solution with regard to the strength of the container based on the property of steel and with regard to protection of the product based on the properties of tin - has made tin container popular all over the world. The tin's formability, printability, solderability has made it usable for end uses like cans, bottle/jar closures, crown caps, etc.

There is only one unit engaged in the manufacture of crown corks and cans for industrial uses. While the crown corks made out of tin free steel plate are printed in two colours, the cans are formed out of tin plate - and are supplied to the paint pharmaceutical, and baby food making industries. Cans of various dimensions with lever lid closures are manufactured by the unit. Open top sanitary cans for processed food, pre-cooked vegetables, fruit juices, soups, meat, etc. are not manufactured in the country and the demand for these is met through imports.

No manufacture of 18 litre/16.5 kg capacity square cans for use in packaging of edible oil, confectionery, biscuits and which are simple to manufacture on semi-automatic lines, is being undertaken in the country.

Tin plate is imported from Japan and at times from other countries through floating of international tenders. For general cans, no tin free steel is being used. No lacquering

is done in the country but lacquered sheets if needed are imported pre-coated. Cans manufactured are out of unprinted stock metal sheet sizes, - a process that can be more costly, an account of high incidence of waste. The total usage of tin plate is of the order of 600,000 US\$ - every year.

Metal Can Users Industry

Major end users of general cans' include the manufacturers of paints, pharmaceutical products and powdered foods. All of them seem to be satisfied with the quality of the cans supplied to them. Since, all the three major users are situated within a few kilometers of the can manufacturing unit, they do not carry heavy inventories and are able to fulfil their requirement well on time. All the cans used have wrap around printed labels without any varnish coating and fail to offer protection against accumulation of dust, soiling, discolouring of labels.

Cans for Food Packaging

Lacquered cans in flat form are currently being imported from Italy, and a few other countries in unprinted form by the Meat Corporation and Horticulture Development Corporation. Heat processed meat and other processed food are packed in these container after these are reformed on forming machines. The cans are with soldered bodies. Strict maintenance of hygiene is the watch word for the success of canning of food items throughout the processing, sterilisation/pasturisation of the filled and sealed containers.

In consultant's opinion, the quality of food packed should be the subject of continuous analysis and evaluation by an independent laboratory. During the discussions held with the officials of the meat corporation, it was learned that a project to undertake the manufacture of OTS cans is

underway. A unit with a 60 million 'can capacity' is considered to be highly viable. OTS can manufacture is a highly complex phenomenon and the current trend is to go in for welded cans in place of the soldered ones, so as to reduce the hazards of migration of lead from the soldered portion of the can.

The food packing units have no means to check the quality of the cans obtained through imports. Adequacy or inadequacy of lacquering, extent of solder use, temper of the tin and dimensional specifications, no doubt specified in the purchase document, are by no means checked when the supplies are received. Simultaneously, the quality control procedures in the food canning units leave much room for improvement. Positioning of a consultant to formulate quality control procedures and train the local staff in carrying these out could be useful-

Blown and leaking filled cans in the incubation rooms are a frequent sight. These coupled with delamination of labels tell their own tale of can failures. In some of the stores selling canned food, nearly 15 percent of the filled cans are estimated to be dented or bear liquid marks and or having delaminated labels or are rusted. In certain cases, the cans' suffer from all the defects.

Canned food's safety does not yet appear to be a major concern and the shop keepers and even the Government owned stores do not enjoy any discretion in returning the filled

and defective products to the manufacturer or the distributor. Accordingly, an utter state of helplessness has developed which is not conducive to the growth of the food processing industry in the longrun.

Survey of Crown Cork Users

Two colour printed crown corks with a PVC wad are supplied to the beer, soft drinks and edible oil manufacturing units in Ethiopia. Lack of reflective surface and smudged printing on crown corks for soft drinks are the main defects noticed. The manufacturing units when pressed to comment on the steps that they proposed to take to improve quality - expressed the limitation of the lithographic printing press. The neck dimensions of the soft drinks bottles are standardised and are same; each bottle bears brand marks, and are well differentiated. It is worth while to eliminate printing of crown corks altogether rather than to have smudged print surfaces.

(vi) WOOD

On account of the inherent strength properties, formability to any size, reusability, wooden crates are used for fresh fruits and vegetables, onions, meat, potatoes, etc. The prevailing scarcity of wood in the country has forced the manufactures of these crates to use any type of wood or lumber including the wood obtained from crates or boxes used for industrial goods which are imported into the country.

It is true that the wooden crates are fast being replaced by plastic crates but their predominant use, at least in the next five years or so, for fresh fruits, vegetables, meat appears to be an accepted phenomenon.

The wooden crates manufactured in their present form use plenty of wood and are heavier in handling even when these are empty. Accordingly, the tendency in handling is to drag or drop these as soon as possible. It is possible to economise the use of wood by having wire bound crates. There is no standard for the dimensional specifications of crates. The variations in dimension pose problems of inefficient utilisation of space in transport vehicles and storage.

As Ethiopia's exports expand, the requirements to manufacture wooden pallets is likely to multiply manifolds. The importing countries and the shipping companies may, as the trends suggest, insist that the products should be

exported in pallets to facilitate unit load handling. The options to refrain from doing so may be limited. It is time, the operation of unitisation and pallet manufacture were commenced at a reasonable scale. Even a large number of pallets received through the import of paper, celluphane, polythylene films, automobile spares, electrical machinery, hi-fi equipment, communication and telephone systems etc. are re-useable for export purposes. Unfortunately, these are not being re-used and are often dismantled for satisfying the requirements of firewood or crates.

The world all over, wood has come in for intense competition with fibre board and the consideration to maintain ecological balances has promoted further the use of fibre board and other direct substitutes of wood including plastic crates and boxes. With scarce resources of wood, and the desire to preserve the forest wealth of the country, non-availability of wood for packaging use is shortly expected in Ethiopia. Already, the use of plastic crates has overtaken the use of wooden crates in the distribution of milk, beer and soft drinks and to some extent fruits and vegetables. In days to come, the use of plastic crates is likely to replace the use of wooden crates for fruits and vegetables as well.

(vii) Hessian Bags/Sacks and Cloth

The country has three factories, two in Addis Ababa region and one in Asmara to manufacture sack cloth, bags of hessian cloth mainly required for packaging purposes. The country imports jute from Bangladesh and KNEF from China. At each of the factories mixing of different grades of fibre, viz. KNEF, jute cuts and jute long staple fibre is done to attain batch cost at an economic level. The factories are equipped with softening machines, preparation machines, machines for carding, breaker cards, finishing cards, drawing, spinning, twisting, recting, winding and beaming, weavings and finishes. These units do not have facilities for coating and lamination, rot proofing bleaching, dyeing and fine printing.

Manufacture of Bags:

The cloth is cut as per dimensions of the bags and cut pieces folded. Thereafter, seaming is done at the edges to be sewn and stitched.

Standardisation:

For quality parameters viz. (a) dimensions, (b) weight/unit area (at a reference moisture region), (c) number of threads/unit length (porter or ends/dm and picks or shorts indm), and (d) tensile strength (in the case of bags - both fabric and seam strength) (d) moisture and oil content, the nominal values are generally specified with certain tolerance limits. In order that the finished products can meet the

Standard requirements, a close control over the manufacturing processes is essential. Unfortunately, in all the three factories, this control is extremely inadequate. Commencing from 'batching' (selection of raw jute fabrics of various grades), application of emulsion for softening, quality characteristics of silver at different stages, weight control or unevenness in weight/unit length or thickness of silvers, yarns, and fabric - the sphere of in process quality control appears to be weak. Nor the final inspection of bags is being done according to well laid down procedures. For instance the finished products are not inspected in compliance with the standards as well as the consumer's special requirements. It is time, that quality standards were improved.

A great deal of unevenness in the sack cloth produced and variations in the types of seaming, stitching done at the point of production are observed. Given the quality and type of fabric, the method and style of seaming and stitching can make a lot of difference in the strength characteristic of the bag. Such processes and requirement for different types of bags should be studied and practiced.

Availability of the trained manpower, is the key problem area of the industry as a whole.

There does not exist any facility for utilisation of jute waste, nor the need to do so has been recognised. A number of ancillary units can be set up to produce various products out of jute waste.

Customer complaints about the quality of the finished products are hardly analysed and attended to. The contacts with the customers are weak and there is no visible attempt, whatsoever, to popularise the products of the jute industry through promotional efforts.

RECOMMENDATIONS

The survey of the packaging industry and the end users have revealed many gaps in operations and quality standards. Based on the investigational studies and opinions pooled, a set of recommendations have been formulated in order of priority. While formulating these recommendations, care has been taken to weigh their influence when implemented on loss/damage minimisation of products, direct cost reduction due to over packaging, reusability of packaging material, requirements to meet export obligations and reduction in the import bill. It is hoped, these recommendations would be considered by various corporations involved and evaluated in the right perspective. Packaging improvement is a continuous and an ongoing activity and need uninterrupted programmes of action. It is strongly felt that a nucleous body should be created and entrusted with the task of carrying out research and development, and implementing programmes for up-gradation of packaging technology. It should also act as a catalyst in improving packaging material, designs, structures and styles in wide and varied end uses and in relation to the hazards of handling, storage, transportation and climatic variations experienced by the products during their journeys from the point of production to destination markets.

(1)	<u>National Level</u>	<u>Priority</u>	<u>Recommendations</u>
1.		1	Serious considerations are needed for creation of a nucleous centre for packaging research and development; evaluation and testing, education and training, information collection, and dissemination - (A suggested project profile on the subject appears elsewhere in the report).
2.		1	A national level campaign for loss prevention of food grains, fruit's and vegetables, meat and meat products, coffee, cotton, cement, milk and poultry etc. is called for. Peasant associations, transportation, handling and storage agencies, general managers of the industrial and distribution organisation need to be continuously oriented towards the need to save what is already produced. Ethiopian Airlines and Maritime Transport Corporation, Ethiopian Insurance Corporation and Development Projects Study Agency may formulate a joint approach to organise such a campaign.
3.		I	The emphasis in almost every industrial and distribution organisation is on quantitative production. The quality and production of right products are often sacrificed. Cost controls

Priority

Recommendations

are conspicuously absent. Urgent considerations should be given to these aspects.

Technical staff in the packaging and end use industries should be trained on quality testing, and in process quality control. There are no quality control tests performed on the suitability or other wise of the packaging material. The purchase managers are seldom aware of the packaging specifications and hardly any rejection of material takes place and returned to the suppliers.

4.

I

Accumulation of stocks of finished packaging material particularly for corrugated boxes, cartons, sacks, plastic crates, tin containers, is very high. In certain cases ready to use packaging material inventories are carried for more than six months. This leads to aging of material, its obsolescence in storage and simultaneously results in massive locking of capital due to disproportionate inventory accumulation. A synchronisation of production plans and schedules between the suppliers of packaging material and end users is needed. The suppliers should maintain frequent contacts with the users.

Priority

Recommendations

5.

I Country's dependence on imports of various items is expected to continue for a considerable length of time. The import bill, in certain items can be reduced by 20 to 30 percent by importing these items in bulk or in intermediary packs rather than in retail packs. Items like stationary, toiletries, edible oil, ready made garments, liquid pharmaceuticals, building hardware, feeding bottles and baby wares are some of the illustrative leads. A review of the entire field of imports, in this context, is recommended.

6.

I Packaging for exports should be given a better treatment and prominence. Products like powdered coffee, pre-cooked beef, gold and silver jewellery, leather garments, fresh and dry flowers, fresh water prawns and shrimps, (to be developed) fresh vegetables and fruits are prospective candidates for exports with market need based packaging.

Studies on packaging requirements; laws and regulations, designs, structures and styles in line with the requirements of selected export markets should be immediately undertaken. Literature survey of the studies already done by the international trade center - UNCTAD, UNIDO, is recommended as a starting point.

	<u>Priority</u>	<u>Recommendations</u>
7.	I	Health and hygiene standards for packaging of food and pharmaceutical products need to be enforced more rigourously. Sterilisation of packaging material for packaging of such items to repel chances of contamination is a must.
8.	I	The level of exposure of technical personnel to the science and technology of packaging is very low. Through international/bilateral cooperation, the level of exposure should be improved. Visits to international packaging exhibitions and conferences, deputation to packaging industries and institutions in other countries should be encouraged.
9.	I	Every effort should be made to formulate packaging standards, laws and regulations. The existing machinery in the Ethiopian Standards Institute should be activated for formulating standards of packaging for glass bottles, corrugated board and boxes, plastic bags and sacks for various uses. The need to review existing standards is of paramount importance.
10.	I	A strong case exists for indigenous manufacture of KRAFT and wrapping paper by making use of the KRAFT and wrapping paper by making

Priority

Recommendations

- use of the fibrous material including those arising out of agricultural residue. A techno-economic feasibility study to set up units with a daily capacity of 30 m.t. is recommended.
11. I For loss minimisation in the distribution, the possibility of special transport containers of 7 ton capacity from Assab to other nodal points of consumption may be rewarding. A pilot/experimental haulage in containers is recommended for edible oils, hi-fi equipment, T.Vs, electronic instruments.
- Many of the industrial enterprises suffer from a wrong notion of cost reduction and economy in expenditure. In pursuit of the official directives issued in this regard, quite a majority of them have made reduction in the use of packaging material irrespective of the fact whether their action lead to product losses and damages in the distribution.
12. I A national plan for the development of the packaging industry is an integral part of the planning process. Data on packaging materials used and their value should be incorporated in the industrial and agricultural statistics of the country to facilitate formation of

	<u>Priority</u>	<u>Recommendations</u>
		plans for future growth of this industry.
13.	I	Lack of skilled manpower prevailing in each of the areas of warehousing, transportation, handling and packaging constitutes the KEY PROBLEM AREA, Short-term training programmes of basic nature for workers are recommended in each of the sectors outlined above.
14.	I	A well trained packaging specialist be positioned in every industrial corporation.
15.	I	Development of packaging specifications for product needed for meeting the requirements of armed forces require a special emphasis and treatment and therefore should be more deeply looked into. A department for stores preservation and control with a packaging specialist is recommended.
16.	2	Packaging subjects should be introduced in the curriculum of the technical colleges and schools at the graduate level particularly in mechanical, electrical, business administration, food technology agricultural engineering disciplines.

Priority

Recommendations

(ii) Corrugated Boxes

17. I The corrugated box industry is likely to play a more important role in the domestic distribution system and export of products in the immediate future. Demand exists for setting up two/three additional units of 100-150 tonne per month capacity each to meet the potential needs of the growing markets. In addition, the existing manufacturing facilities should be augmented with the production of 5 resistant ply corrugated board; moisture resistant board and boxes.
18. I Quality testing of corrugated board and boxes for characteristics such as strength shock absorption, shock transmission, compression strength, stress resistance (against crush, bend, twist, puncture) is more often absent in the box manufacturing units. It is essential to make arrangements and train persons in quality testing and improvement and control. Full support should be provided for procuring testing equipment.
19. I Suppliers should be made to attach a certificate of specification and strength characteristics for every consignment sent to the end users. Technical staff of end user industries should be trained and equipped to get their supplies tested on a

<u>Priority</u>	<u>Recommendations</u>
20.	I sample basis from packaging material testing laboratory proposed elsewhere. I Facilities for the manufacture of 5 ply corrugated boxes should be created immediately. Accordingly, there is a need to add an additional single facer to each of the plant. Pending the same, double walled board can be made by manual pasting (guidelines provided to paper and pulp unit at Weinji).
21.	I Technical teams for box designing and structuring are weak in both the units. The team in Asmara unit is a shade better skilled than that at Weinji. A team of two persons each should be trained in the use of composite materials i.e. wood and corrugation, bitumenised paper and corrugation, plastic and wooden fitments for box strengthening etc. A great deal of complaints received from the customers can be overcome by improving the compression strength of the boxes.
22.	I Wax coated boxes can be produced in the existing units by providing them wax coating facilities. Two coaters should be purchased. These may cost around 30,000 to 40,000 \$.
23.	2 The scheme of box certification should be considered to minimise the incidence of box failures.

	<u>Priority</u>	<u>Recommendations</u>
24.	2	The quality of printing of the board should be improved. Smudged printing and poor quality of ink need to be looked into.
25.	2	The application of corrugated boxes for packaging of grapes, pineapples, mangoes and certain varieties of fresh vegetables should be encouraged. This, among other things, will reduce dependence on wooden and plastic crates.
26.	2	A large number of industrial units use second hand boxes for distribution of their produce. These boxes are devoid of required compression strengths, and endanger the product's safety in the distribution system. Cigarettes, shoes, leather products, stationary items; wine bottles, are some of the products using second hand boxes. To economise and compromise on poor quality of the packaging material is in the least interests of the economy. Pending improvements in the supply of new boxes, the industrial units desiring to reuse boxes should be trained in their reconditioning by improving their compression strength. They should be equipped with certain corrugated components to carry out the necessary reconditioning of boxes.

- | | <u>Priority</u> | <u>Recommendations</u> |
|------------------------------|-----------------|--|
| 27. | I | Box manufacturers produce only one or two types of boxes and the users are forced to accept these as the only available alternative. A great deal of material savings and improvements in packaging can be obtained by introducing other designs. In certain cases, product protection can be improved by double walled boxes with a marginal rise in packaging material cost. |
| 28. | 2 | Side glueing of boxes is no doubt ideal but is an expensive proposition - as imported PVA material is used. A selective approach of using side stitching could be practiced for certain application areas. |
| <u>(iii) Folding Cartons</u> | | |
| 29. | I | The carton systems that require high skills in the manufacture and involve additional costs should be replaced by simple systems, particularly when their erection and filling and closing are done by manual operations. INTER-locked side closures, for biscuits and battery cartons are illustration in view and can be replaced by side gluing. |
| 30. | I | Substitution of U.V. ink by water soluable ink in the printing of cartons for cartoning of products of every day use should be considered. These can at the most be given a varnish coating. Cost saving could |

Priority

Recommendations

- be more than 50 percent in the ink-use and consequent reduction in the outgo of foreign exchange spent on their import.
31. I Carton manufacturers should have a graphic design service of their own. A number of 4/5 colour printed cartons for essential products can be replaced by 2/3 colours without any possible reduction in the sale of these products. Cartons for detergents, biscuits, ready made shirts are some of the examples.
32. I It is in country's interest to pack its products in plastics and plastic laminated bags, pouches and sachets - with due improvements in the sealing features. While assessing suitability of cartons for different products, this fact should be borne in mind. Market for folding cartons can be expanded by creating a packaging development cell at the manufacturer's end. Powdered soups, seeds, dehydrated vegetables, snack foods, could be the prospects for domestic and export markets.
33. I Exposures to technical persons working in the industrial establishments and factories on technical aspects of production processes, is extremely inadequate. It is recommended that these persons should visit the

Priority

customer's factories and be familiarised with their operations and simultaneously offered opportunities to upgrade their technical skills and knowledge.

34. I Cost and quality control consciousness are very much lacking. The entire emphasis seems to be centered around physical output. A balanced approach of quantity with quality in the output would yield better results.
35. 2 Carton manufacturers should be trained in the marketing strategies of their converted material. The linkages between customers and suppliers should be further strengthened and improved.
36. 2 The use of metal (Tin) cans for packing of tablets is an expensive medium. Composite containers - fibre board with top-bottom metal can be easily developed. Facilities for doing so exist in a paper converting factory. Nearly 40 per cent reduction in cost of packaging is expected with such a switch over.
- (1v) Plastics Containers and Films or Laminates
37. I There does not appear to be any standard on print adhesion and leak resistance of plastic containers, bags, bottles. These should be formulated and introduced.

	<u>Priority</u>	<u>Recommendations</u>
38.	I	The suppliers of plastic containers, films, pouches, bags and sachets should be asked to certify that the materials supplied by them particularly for food and pharmaceuticals products do not contain any harmful ingredients.
39.	I	The use of plastic laminates for packaging of food, processed food, and pharmaceutical products should be encouraged. This change over can substantially substitute the metal can usage in food; meat and meat concentrates, fruit juices, tomatoe paste and a variety of other processed food products resulting thereby in achieving significant packaging economies.
40.	I	Evaluation and introduction of packaging material like glassine-poly laminates for pharmaceutical tablets, change over from bulk metal - (Tin) containers to plastic bottles PET Bottles for powders and tablets or to poly lined solid board/duplex board cartons can be a promising substitutes functionally well suited and less expensive than those of the packaging material currently in use.
41.	2	Facilities for undertaking chemical analysis to determine the monomer content in the plastic material should be introduced in the Ethiopian Standard Institute.

Priority

Recommendations

42.

3 HDPE blow moulded containers are suitable for a wide range of edible liquids and chemicals. Their production in the country should be encouraged.

Recommendations

(v) Glass

43. I The needs of the pharmaceutical industry can be met through indigeneous production. Its dependence on imports of glass jars, bottles, phials, ampules should be continuously reduced. Technological and technical possibilities do exist in the glass factories to accomplish the task.
44. 2 The capacity of production of soft drinks bottles can be doubled by doubling the capacity of gobs and press and blow/or blow/blow equipment. Efforts should be made to produce broad mouth jars; bottles of various sizes for use of by the processed food industry.
45. I Small scale cap and closure making units for glass bottles, jars, tumblers should be considered as part of the glass industry and efforts should be made to bring better coordination between the glass and closures manufacturing units. Economical equipment for making pilfer and leak proof polypropylene and pvc caps are available and can be introduced more effectively in the country.
46. I In Addis Glass Factory, abilities of the technical personnels working in the manufacturing plant need to be continuously improved through further exposures. In view of the notion, that all cullets are recyclable, there is near indifference to control the breakage of bottles and tumblers in the production process. The efforts to control breakage percentage in the

manufacture of bottles and containers during annealing process are extremely inadequate. This is harmful and should be stopped.

47. I Varnishing of labels for glass bottles and containers should be made a statutory obligation.
48. I Handling, transportation losses of finished glass bottles are very high and may average around 3.5 million Birr every year. In one of the factories, this loss is estimated to be 2.8 million Birr annually. Palletised loads of filled sacks or handling in returnable wire bound cages particularly during sea journey - is expected to reduce these losses substantially. The switch over is recommended.
49. 2 There is a need to produce light glass bottles for single trip use. Bottles meant for export of wine, and other beverages are the prospective areas for consideration.
50. 2 Standardisation of glass bottles and containers in the context of the existing end uses and bottling plants available in the country should be attempted.
51. 2 Recovery of cullet for glass bottles should be improved. Instances have come to the notice in Meta Beer Factory, where cullet is turned into the soil. Similar features may be obtaining in other end use establishments.

52. 2 There is an immediate need to educate potential users of glass containers on suitability of glass in packaging. The indigeneous industry can play an effective role in reducing the import bill by import substitution of 'metal can' provided the end users could perceive the merits and total economies resulting thereof. Organisations like the Horticulture Development Corporation, Ethio Me. Corporation, Ethiopian Dairy Development Enterprise, Epharma etc. are the possible outlets for glass containers.

(vi) Metal Containers
Cans

53. I Use of Tin free steel and second quality plate in the local manufacture of 'cans' should be encouraged. This would result in substantial savings of foreign exchange.
54. I Local Expertise should be developed to analyse lead and tin content in canned foods. Particularly for acid fruits, the presence of tin salt is extremely harmful.
55. 2 The incidence of bulged containers during incubation period seems to be more than the tolerance limits - (reported to be around 4-5 percent in one of the canning factories). This could be due to liberation of Hydrogen on account of reaction of product and tin coated Steel-Lacquered coatings need to be looked into.

56. 2 Sale of rusted and dented cans should be discouraged as it is building up an image of inferior quality for the domestic product. These 'cans' may be supplied to bulk consumers at a discount.

Collapsible Tubes

57. 2 Collapsible aluminium tubes, which have many merits like non-porosity, light in weight, versatility, allow a long shelf life-useful for dispensing cosmetics, medicinal creams and ointments, spread type food products, tooth paste, dyes, inks, etc. should be manufactured in the country - with simple equipment. Many of the products presently imported in retail tubes can be imported in bulk and packed in tubes in the country. This may facilitate the production of products tooth like paste, formulation of inks, adhesives, spread type food products, medicinal creams within the country.
58. 3 Pending commencement of a large-scale food can manufacturing unit, the feasibility of having a mother metal printing unit, with satellite 'can' making units may be examined. This may serve the best interests of the country due to limited size of the market, extensively spread, consuming centres and difficult terrain. The can making units - with an investment ranging 100,000-160,000 US\$ each, may serve the needs. Many such small scale units are functioning well in other developing countries including India.

Metal Cans

Recommendations

59. I The quality of canned meat, pre-cooked vegetables, on sale in Ethiopia and those meant for institutional uses should be got analysed by at least two reputed food laboratories outside Ethiopia. The standard of food hygiene should be radically improved.
60. I National standards for food cans should be developed.
61. I Staff of the Ethiopian Standard Institute should be trained in the testing of cans.
62. I Nearly half of the wastages accounted in the reforming of the cans can be avoided by training of workers and better maintenance of the reforming equipment.
63. 17/18 Litre Tin Containers
- I Large quantities of local butter currently with wrapped-in polyethylene sheets and banana leaves - can be converted into oil, and distributed in 17/18 litre rectangular tin containers. The spoilage rate will be reduced and shelf life improved by more than 12 months. Localised small units with an investment of 10,000US\$ can be started to manufacture 17/18 litre containers. The same capacity can also be utilised for packaging of other types of edible oils produced in the country.

Drums

64. I A mild steel drum 205 litres manufacturing unit should be set up for bulk packaging and distribution of edible oil/lubricants. The same plant can manufacture 20/40 litres drums as well.
65. 2 Demand for canned food with the improvements, in the production of processed meat, fruits and vegetable may rise to 70-80 million cans every year. This does afford justification for setting up a food can manufacturing unit preferably with welding technology. As a forerunner, welded containers for canning of meat and other food products procured through imports should be introduced in the domestic and export market.

(vii) Wood

66. I Conservation of wood in packaging should be attempted by the introduction of wire bound crates.
67. 2 No dimensional standards exist for the manufacture of crates, their absence introduces diseconomies in the utilisation of transport and storage space. Standardisation of sizes should be attempted.
68. 2 Manufacturing facilities for the production of standard sized shipping containers and pallets need to be augmented further. Palletised loads of cement bags, glass bottles, can be effective in reducing distribution and storage losses.

Recommendations

(viii) Printing Industry

69. I Facilities for creative graphic and surface designs should be created for cartons, poly bags, wrappers, etc.
70. I Technical personnels in the design, production and quality control departments of the printing presses need further exposure to the advancements made in printing technology.
71. I Printing inks used on polybags meant for edible items should be non-obsorbant in nature.
72. I Quality control of the print surface is done by visual observations and in many printing presses, quality control and inspections aspects are missing. Equipment support for recording quality standards achieved and their analysis should be introduced.
73. 2 A constant search for achieving production economies is missing. Many of the operations can be value engineered and result in reduction in total cost.
74. 2 All labels with the exception of those which are to be fixed on re-usable containers and bottles should be varnished.
75. 2 Inventory accumulation of raw materials, printing inks in some of the units visited is too high and storage standards thereof are unsatisfactory. A better inventory and storage management will greatly reduce the high rate of wastage, and obsolescence.

76. 2 Facilities for training of personnel in printing technology under the Printing Corporation should be upgraded. An audio visual training programme with due emphasis on project work should be introduced immediately.

Recommendations

(ix) Hessian Sack and Cloth

77. 1 Hessian Sacks for flour, sugar, teff, sesame, coffee, cotton seed, cereal, castor oil seeds, salt, etc. are already specified in terms of sack size, cut length, total warp and weft. A review of these specifications in the context of performance of sacks should to be undertaken immediately.
78. 1 A majority of the sacks manufactured for cereals, afford a maximum of three trips each. With marginal improvements in specifications and quality of raw jute used the sacks are capable of giving 5-6 trips each. It is suggested that technical expertise should be sought to achieve better performance standards of Hessian Cloth & Sacks.
79. 1 In process quality control measures do exist in the fibre factories in theory and bear a limited or no relationship with the performance of sacks and hessian cloth by the users.
80. 1 Due to prevailing scarcities of certain types of sacks, the users accept any quality of sacks offered to them. This creates an in built for increasing commodity losses in transit. An independent inspection agency to examine the quality of sacks is called for. It is hoped that rigid inspection over a period of time, may bring about a Qualitative Change in the entire production phenomenon.

81. 1 Efforts should be made to identify and serve new application areas for hessian sack and eliminate those where these are proving to be less suitable. Cement losses can be substantially reduced by packing cement in hessian instead of paper sacks. Paper sacks are perhaps the least suitable medium of packaging on account of multiple manual handlings involved.
82. 1 Facilities should be created to produce sacks made of composite material viz. poly-lined hessian sacks for highly hygroscopic products like salt, and sugar. Laminated hessian sacks with polyethylene and bitumen can be used for fertiliser packaging and distribution.
83. 1 Discussions with the users be held to review the size of the sacks for coffee. There is a possibility of reducing its dimensions and the material savings could be of the order of 15 percent. Similarly the dimensional specifications of salt 50 and 60 kg. sacks should be reviewed.
84. 2 Contacts between the sack manufacturing units and major jute research laboratories in the world are very weak. These should be strengthened and technical persons should be given the opportunity to visit them.
85. 2 Cost control systems in the manufacturing units are conspicuously absent. For better management of resources, it is essential to introduce these systems and establish standard costs.

86. 3 Contacts between and sack users and suppliers should be improved. The end users should have the option to reject the material as and when not satisfied with its technical specifications. However, with the prevailing shortages, even the sub-standard materials are being accepted out of compulsions.
87. 3 Jute and dust waste generated in the fibre factories can be used for making felts, table mats laminated with PVC, hessian board and a few other products.
88. 3 A part of the capacity should be reserved & utilised for the production of fine hessian cloth which after printing can be sold as curtain and furnishing fabrics.
89. 3 Product mix of the factories should be expanded to produce laminated hessian cloth with PVC and or polyethylene. This material can be used for outer covering of crops stored in the open.
90. 3 In the commodity producing sector, hessian sack is considered to be more suitable. Storage of cereals, and other agricultural produce is concurrently being done in goat skin, which is highly vulnerable to infestation hazard injurious to grain safety. Promotional campaigns to popularise hessian sacks should be attempted through agricultural marketing corporation and extension services of the Ministry of Agriculture.
91. 3 Branding of sacks meant for packaging of odour sensitive commodities like coffee should be further improved and the re-use of these sacks for other uses be banned to avoid odour contamination of coffee.

Proposal for further Technical Assistance to
Socialist Ethiopia

The need to prevent losses through improved packaging need not be over emphasised. It is estimated that every year the country has painfully to suffer a minimum loss of at least 400 million Birr. in the form of distribution losses. While it is difficult to quantitatively apportion the responsibility of such losses singularly on the inadequacy of either storage, or transportation or handling or packaging, It is felt that a sizeable reduction in these can take place by effecting improvements in packaging.

There is a fair prospect of reducing the import bill of the various corporations by attempting loss preventions in the distribution channel by advising the exporters on appropriate specification of packaging material and designs. Simultaneously, it is possible to achieve a sizeable reduction in the import bill approximating to 15 to 20 percent for certain items like stationery, garments, footwear, edible oil, automobile spares, processed food, cereals, wool, lubricants, soaps and toileteries nuts and bolts, cutlery, optical goods, etc. by changing the composition of imports from unit to intermediate and bulk packaging, with facilities for repacking to be done within the country. Moreover, imports of goods in bulk, should prove to be more economical to reduce freight, insurance and handling charges and be useful in economising the storage and warehousing

costs. This compositional change should result in value addition that would remain within the country.

At the other end of the scale, attempts should be made to diversify exports and change its composition from bulk to unit/consumer packs - some of the more promising products are powdered coffee, embroidered textile items, fancy baskets, shoes, leather goods and hand bags; gold and silver jewellery, flowers, fresh fruits, processed meat and meat products.

Packaging Technology

For upgrading the packaging technology in the country, it is important to create a sound infrastructural base for packaging education and training; package evaluation and material testing, packaging research and development; collection and dissemination of packaging information, package standardisation and certification. Experience in other developing countries supports the contention that such an infrastructure should be in the form of a nucleus centre, which is capable of addressing itself to diverse and complex problems of packaging for domestic and international marketing. Of paramount interest is to have packaging research and testing laboratories preferably as a part of the Development Projects Study Agency. However, its organisational attachment to one or other governmental agency can be matter of discretion by the Government.

It would suffice to mention, such a nucleus centre shall also undertake developmental work in respect of agricultural commodities, products of animal husbandry, horticulture, poultry, forestry and fisheries and manufactured products; and will have to be interfaced with transport and handling agencies, legal and regulating bodies, custom and Civil-aviation Departments, Chambers of Commerce and Health Department and environmental control organisations; Import and Export Trade Corporations; Domestic Procurement and Distribution Corporation. In addition, this centre will also be responsible for public education and awareness campaigns intended to orient the target audience on methods to prevent national losses and damages.

Technical assistance is urgently needed in the form of financial aid and expertise through UNIDO to accomplish the centre proposed above. The itemised details of the proposed aid programme should be confined to training of local professionals, deputation of Experts and provision of equipments. These details are summarised below:

Training of Local Professionals

1. Training of local professionals is one of the key areas for upgrading packaging technology and should be accorded the highest priority in the aid programme. It is proposed to train at least 16 specialists in the disciplines outlined. The training of personnels should be at the packaging

institutes and be integrated with a short spell of orientation on attributes and problems of specific packaging material producing industries.

<u>Training of Trainers</u>	<u>No. of persons</u>	<u>Man-months</u>
(a) Packaging aspects relating to agricultural products, meat and meat products, milk and milk products and fresh fruits and vegetables, flowers, etc.	1	4
(b) Packaging of chemicals and pharmaceutical products, processed food, jams, jellies and	1	4
(c) <u>Packaging for Exports</u> Coffee, hides, skins, leather and leather products; handi-crafts and jewellery items etc.	1	4
(d) Packaging and loss prevention - handling, warehousing transportation	1	4
(e) <u>Packaging Material Testing and Package Evaluation</u>	4	12
(i) Paper and Board and laminates	1	3
(ii) Plastics and fibres	1	3
(iii) Wood, metal	1	3
(iv) Chemical Testing	1	3
(f) <u>Packaging Research, Testing and Development</u>	8	24
(i) Packaging design, specification structure and processes	1	3
(ii) Corrosion prevention and cushioning	1	3
(iii) Transit Package Testing and Development	1	3
(iv) Packaging for fresh product, fruits and vegetables, meat processed food fruits and vegetables.	1	3
(v) Packaging economics, cost		

(v) Packaging economics, cost effectiveness in the system	1	3
(vi) Packaging of chemical and pharmaceutical products	1	3
(g) Packaging Standardisation, Laws & Regulations	1	3
(h) Packaging Information-collection, collation and dissemination.	1	3

2. EXPERTS: 63 Man Months (M/m)

A. Chief Technical Advisor: 42 Man Months
with broad terms of activities as:

- (i) Help set up a centre for packaging training and education; research and development, information collection, retrieval and dissemination.
- (ii) Provide basic training to 5 local experts one each on packaging specifications and requirements for export packaging; training and education; packaging research and development with a special emphasis on achieving total packaging economies and minimisation of product losses.
- (iii) Locate and co-ordinate the work of other international experts in the fields of:
 - (a) Packaging Training and Education 6m/m
 - (b) Packaging Research and Development 3m/m
 - (c) Packaging for Export 3m/m
 - (d) Packaging Standardisation laws and Regulations 3m/m
 - (e) Material Testing and Analysis and Setting up of Laboratories 3m/m
 - (f) Transit Package Testing and Development 3m/m

- (iv) Identify and help locate and procure testing equipment for material and transport worthiness testing laboratories.
- (v) Examine the feasibility of introducing shipping containers upto 7-8 tonnes capacity for loss prone products for domestic distribution of products procured through imports and/or procured locally to various distribution centres in the country.
- (vi) Undertake and organise orientation seminars/symposia for loss prevention and packaging. Industry based workshops such as packaging for food; packaging for coffee; packaging for fruits and vegetables, etc., for creating packaging consciousness.
- (v) Help prepare an integrated plan for packaging material development in the context of national plans for the development of agriculture and industry and exports.

B. Packaging Training and Education 3m/m

- (i) Identification of Training needs of packaging persons by product and Industrial Group.
- (ii) Train at least two counter part experts in planning, organising and executing training programmes.
- (iii) Prepare training curriculum, background material and audio visual aids for at least two training programmes of 4 to 5 days duration each on certain vital aspects like packaging principles and fundamentals; packaging design and costs.

C. Packaging Research and Development 3m/m

- (i) Train counter part staff in the methodology of research and development work in packaging particularly in the context of the compatibility and environmental requirements.
- (ii) Undertake at least two projects for packaging development and guide research on some selected products which are more vulnerable to losses in the domestic distribution system-say cement and fruit and vegetables.
- (iii) Develop specifications for imports of certain items - so as to achieve total packaging economies.
- (iv) Identify testing equipment and set up package performance and material testing laboratories.

D. Packaging for Export 2m/m

- (i) Evaluate in depth the export packages for coffee both bulk and retail, ready made embroidered garments fresh fruits and vegetables.
- (ii) Train at least two counter part professionals in developing packages for exports.
- (iii) Assist in compiling a compendium on packaging requirements for exports including packaging laws and regulations and other non-technical barriers to international trade.

E. Packaging Standardisation 3m/m

Laws and Regulation:

- (i) Involve a methodology for formulating packaging standards, laws and regulations. The formulations of standards should take into account the level of technology available in the country at a given time.
- (ii) Develop code of practice for specifications for corrugated board and boxes including their sizes and characteristics, as a fore-runner to the formulation of packaging standards.
- (iii) Train at least two local professionals in the field of packaging standards.

F. Material Testing and Analysis 3 m/m

- (i) To set up a material testing laboratory and also carry out shelf life and stability tests on packaged retail goods.
- (ii) Train counter part staff in the planning, storage and performance analysis of a wide range of packaged foods.
- (iii) Elaborate on techniques for determining the comparability of packaging material and product, objectively assess the migration of toxic and other undesirable ingredients from the packaging material to the edible items.

G. G. Transit Package Testing and Development 3 m/m

- (i) Train two counter part professionals on the evaluation of and development of transit packages for selected products.
- (ii) Develop techniques for simulated journey tests and use the tests results as correlates to predict actual performances.

- (iii) Advise on the formulations of specifications, code of practices for transit packs for selected products with a special emphasis on loss minimisation.
- (iv) Undertake discussions on transport handling and storage methods, markings and conduct orientation seminars to orient the target groups.

3. EQUIPMENT FOR LABORATORIES

- (i) Material Testing Laboratory
 - (ii) Chemical and Microbiology Laboratory
 - (iii) Transport worthiness and Environmental Hazard Testing Laboratory.
 - (iv) Workshop and Prototype development Laboratory.

* Details of equipment are enclosed at Appendix III.

4. LIBRARY AND DOCUMENTATION CELL

It is imperative that the centre should be well equipped with relevant and related literature, books, reports periodicals on packaging and allied systems and should have a documentation and library cell. It should also be facilitated to offer reprographic services to its various users.

FINANCIAL RESOURCES

The entire development programme for the proposed centre should be spread over a period of 42 months after allowing for a period of six months for the preparatory work - a prelude to the launching of full scale operations. During the preparatory period, the chief technical adviser may prepare a blue print for a time bound action plan, under-

take a budgeting exercise along with a local project co-ordinator. His services can also be utilised to initiate programmes for enlisting the support of the user industries, departments and agricultural enterprises. The financial outlays envisaged through international commitment could be of the order of:

<u>Component</u>	<u>Man Months</u>	<u>Amount in US\$</u>
Experts	63	441,000
Training of local professionals	52	104,000
Laboratory Equipment		200,000
Library - including Photo Copying Machine		80,000
Travel of Experts		50,000
Contingency		50,000
	Total	925,000

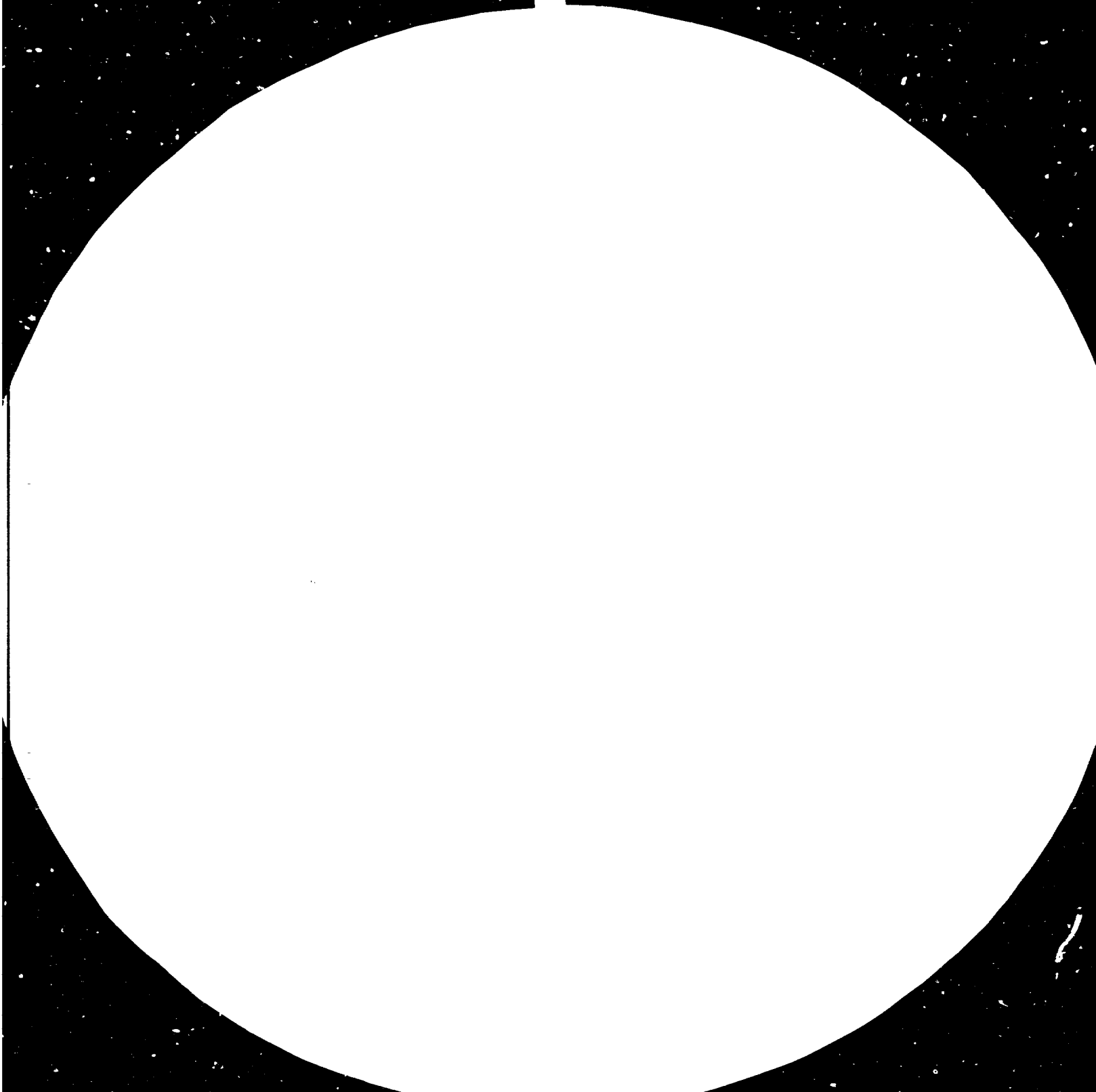
NATIONAL INPUTS

(a) Financial Obligations

National input is to be provided in the form of investment for building, office space certain types of equipment, and for the employment of scientific and support staff needed for the packaging centre.

(b) National Staff/Scientific Personnels

- Director or General Manager Packaging Centre
- Head Material Testing laboratory (counter part to the expert on Material Testing and Analysis.
- Head Package Testing Laboratory-Transport and Transit Packs (counter part to the expert on Transit Package Testing and Development.





28

2.5

32



36



MICROSCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1963A
ANSI Z39-18 TEST CHART NO. 2

- Head Training and Education (counter part to expert on Training and Education.
- Head Packaging Research and Development (counter part to expert on Research and Development)
- Head Packaging Standardisation Laws and Regulations (counter part to expert on Standardisation Laws and Regulations)
- Mechanical Engineers (2)
- Chemical Engineers (Chemistry Graduates) (2)
- Economist (1)
- Librarian (1)
- Secretary (2)
- Driver for Project Car (1)

National Staff - Support Staff

- (i) Chief of Administration - (1)
- (ii) Accounts Assistant - (1)
- (iii) Typists - (3)
- (iv) Messengers - (2)

Benefits

The benefits expected from the creation of such a centre are likely to accrue to the national economy from third year onwards, after the knowledge acquired by the local specialists fructifies to flow to the users viz. agriculture, industry, trade and commerce. The benefits could be in the form of a sizeable reduction in the import bill, minimisation of losses and damages suffered by products in the

domestic distribution and expansion of market: reduced packaging cost for products which are over packaged and by way of increase in unit value of exports and expansion of markets. Besides, the indirect benefits accruing from better utilisation of aircraft space, transport vehicle, and storage space; reduction in freight and insurance and handling costs would be substantial. These can be quantitatively estimated after a gestation period of two years.

Project Profile on Pulp and Paper Production
in Ethiopia

Paper is deemed as a vital component of any economy. In Socialist Ethiopia the importance of producing pulp and paper has long been recognised but the country is yet to establish an indigeneous industry, although it produces paper from the imported pulp. On a long term basis, the country must produce certain varieties of paper particularly those to meet the requirements for packaging use. A sizeable reduction in the outgo of foreign exchange spent on imports of KRAFT paper is possible. Reliance on foreign resources for the supply of paper, particularly in the context of increasing uncertainties in the international market for paper, rising freight costs, difficult surface transportation terrain and intense balance of payments problems should be progressively reduced. The country imports every year about 17,000 tonnes of packaging and wrapping paper including articles made of paper pulp, and paper or of paper board. The requirement is likely to be doubled with an increased emphasis on packaging of industrial products and fresh produce of agriculture in corrugated boxes.

Technological Choice

To establish paper production capacity based on modern conventional technology involves staggering capital investment and infrastructure particularly to exploit hard wood resources. This may not be viable to match and meet the

small and dispersed nature of the domestic demand in Ethiopia.

The choice of technology for the production of paper and pulp will have to be such as to be with in the realism of accessibility of capital costs involved, the cost of the product, the domestic availability of raw material and technical skills. In the final analysis, the operations must confer advantages of price, income and employment on the domestic economy. It is therefore considered advisable to concentrate on raw materials originating out of agricultural residues like wheat and maize straw, elephant grass (sudan grass), banana stalks, bagasse, bamboo (to be grown - at commercial scale) as the primary source for making pulp. It is conceded that the pulp thus manufactured would need to be blended in certain proportions with coniferous wood pulp and other long fibre pulp to improve their machineability features and attain the desired strength properties of light weight paper such as KkAFT paper. However, it is essential to investigate quantitatively the availability of these raw materials for use in a mini pulping plant based on non-wood fibre. The successful operation of such plants in India, Egypt and Brazil deploying processes based on soda and lime cooking and with a capacity ranging between 15 to 30 tonnes per day provide enough guidelines for achieving success in Ethiopia.

A small scale paper unit based on surplus bagasse originating from sugar cane crushing in the vicinity of a sugar mill is certainly feasible. In general, the fibrous constituent of bagasse is an excellent material for pulp and paper. However, there appears to be a keen competition in the requirement of bagasse for captive use of sugar mills needed for generation of process steam and its release for paper production. A broad policy decision on the allocation of raw material resources for paper and other uses is called for. It is of utmost relevance that as a pulping raw material, bagasse is free from impurities mainly associated with many other fibre sources. Based on heat requirements of sugar mills with good furnace, an efficient sugar mill should be able to spare a third of its bagasse as surplus for other uses.

Paper Making Machinery and Processes

In a number of developing countries, technologies and machinery have been developed that use process know-how designed specifically for small, low-cost mills using agricultural residue to produce paper making fibre. The fabricated machinery for pulp and paper making is available from some of the developing countries including India. Such plants and equipment are capable of producing paper ranging between 15 to 100 tonnes per day. These processes are:

- (i) employment oriented
- (ii) fit into the skill infrastructure of the developing countries as these are simple in operations.

- (iii) able to use the fibrous agricultural residue and these are linked with agricultural development programmes.
- (iv) facilitate optimum use of material which is otherwise washed away or burnt or is bereft of any other economic use.
- (v) amenable to modular installation and capacity expansion can take place as the demand expands.

Suggested Programme of Action

(i) It is advisable to commence indigeneous manufacture of wrapping and kraft pulp and paper in Ethiopia with an installed capacity of 30 tonnes a day. This may call for an investment of \$3 million on a turn key basis. It is felt, that the financial resources can be generated from within. Otherwise a joint venture can be a possibility but sufficient incentives will have to be offered to attract foreign capital for the purposes.

(ii) Undertake a techno-economic feasibility study for manufacture of KRAFT and wrapping paper in Ethiopia and seek technology for its manufacture in the medium scale sector.

(iii) Formulate and implement crash programmes for collection of agricultural fibrous residue and simultaneously initiate strategies for plantation of bamboo, production of coniferous and other long fibre species in the afforestation programmes.

(iv) A team of technician 15-20 specialists can be deputed under UNIDO assistance/fellowship programmes for an inplant training in small paper mills in India, or Egypt or in Brazil for a period of 18 months each. These specialists when trained, should undertake training of workers in Ethiopia. KEYNIA's experience of getting her 28 technicians trained in India had yielded good results and a similar approach can be followed by Ethiopia.

(v) It is stipulated that the medium scale paper and pulp unit could have a recovery of chemical necessary in the digester house to the extent of 75%. There is a need to adopt that technology which can at least ensure 75 percent recovery of chemicals for transfer back to the process. Such technologies are available.

Project Profile for a Corrugated Box Making Unit

1. Amongst the need based industries in the field of packaging, corrugated box making industry occupies a pivotal place in the country's economy. In days to come, its demand is likely to increase at least three folds from that of its present consumption pattern. This industry is highly localised in its character and composition and its location near the places of use equally benefits the users and the suppliers alike. Additional demand of nearly 6,000 tonnes of boxes and board is estimated and thus justifies the need to set up at least two additional units in the country.

2. There is only one unit in the country which manufactures double walled board and boxes at a very low economic scale. Any newly built unit, must have full fledged capacity for manufacturing double walled board and subsequently boxes there of.
3. The newly built units should have facilities for printing upto two colours.
4. Financial and other details are worked on the basis of the current price of plant and equipment obtaining in the Indian market. The rated capacity of each of the plants proposed is proposed to be 200 tonnes per month.
5. A five ply heavy duty corrugated board making plant complete with printing and box making would involve a financial out lay of 320,000 US\$. It can operate efficiently to produce 200 tonnes of boxes every month and would provide direct employment to 60 persons besides employing indirectly persons engaged in transport and handling agencies, paper and ancilliary suppliers. The machinery and other equipment details are as under.

- Covered area - factory space	1000 sq. meter
- Single facer	2 units
- Mill roll stand	5"
- Pre-heaters	3"
- Overhead bridge	1"
- Glue unit	1"
- Double baker	1"

- Creaser slitter	1 units
- Cut off	1 "
- Control panel	1 "
- Rotary creasing and cutting machine with creasing dies and cutting knives	1 "
- Rotary creaser and other with creasing dies and cutting knives	1 "
- Two colour board printer with slitter and conveyor	1 "
- Stitching machine	1 "
- Heavy duty platen punching and embossing press	1 "

The unit outlined above is a completely automatic corrugated board making one with facilities for printing and box making and is capable of turning out quality jobs. Its capacity can be expanded as per requirements. The power requirements are of the order of 70 HP; 440 volts and 50 cycle.

Installation of two plants would call for an investment in plant and machinery of \$640,000, other inputs needed are expenditure on personnel, electrical installation and factory construction.

Project Profile on HDPE or Polypropylene Sacks

On the basis of the status survey of packaging and end use industries undertaken during the present mission, a number of gaps in the packaging material availability have come to light. A large quantity of fertilizers amounting to nearly 70-75 million Birr worth is being imported every year. The import of the fertilizer is in bulk with facilities of repackaging it in 50 kg HDPE sacks at the port of entry, the sacks are provided by the suppliers. In quantitative terms, about 75,000 tonnes of fertiliser is packed in 1.5 million sacks of 50 kg capacity each. Since the import of fertiliser is likely to grow further as an essential input to promote the modernisation programmes, of agriculture, the demand for sacking would correspondingly increase. Besides, there are other products like animal feed, flour, agricultural commodities, produced indigeneously which may require woven sacks for storage and distribution.

It is advisable to take full advantage of the captive demand for HDPE woven sacks and manufacture these indigeneously. Among other things, the pursuit of such an approach would result in generating income and employment within the country and provide opportunities to satisfy the demand for sacks from national sources. Besides, other users of these sacks would also have an access to supplies from locally built units in the country. It is to be borne in mind that all foreign exporters build into their costs

the expenses incurred on the packaging material and saddle these with their overheads. It is recommended to set up at least one unit for the production of HDPE/Polypropylene sack making unit immediately at Assab. The port is the main receiving centre for fertilisers and is ideal for setting up an HDPE woven sack making unit.

Capacity and other details

A unit with a capacity of 2 million bags per annum for HDPE monoaxially oriented tapes for the manufacture of woven sacks, with printing facility should suffice to meet the demand for bagging of fertilisers. Keeping in view the direct material cost of HDPE granules and printing ink for 1.6 million bags, approximating to 0.60 million US\$, the value added within the country for fertiliser sacks alone is estimated to be of the order of 1 million US\$ after duly taking into account, the freight cost, handling, and other charges.

An extruder with a capacity of 32-40 kg per hour complete with single screw drive and control, barrel, drive, frame, hopper, water pump, die set, air cooling rings, air compressor, vertical take off tower, nip rollers, slitting unit, stabilising and stretching oven, scrap drum winder, 80 station cheese winder, control cabinet with a set of spares etc. - would around 120,000 US\$. This plant can produce 1 million bags every year, well equipped with semi-automatic branding facilities. For unit with a capacity 2 million

bags per annum, the likely investment would be of the order of 240,000 US\$.

Summary details of the plant are as:

- (i) Capacity of the plant - 50-80 kgs. per hour
2 units - 2 million sacks per annum
- (ii) Investment - 240,000 US\$
- (iii) Manpower required including supervisory personnel. - 30
- (iv) Floor space - 50m x 40m x 5m
= 10000 C meter.
- (v) Electrical load required- 300 HP

This unit is expected to reach the break even point in the very first year of operation at a capacity utilisation of 2 million sacks per annum. Approximate calculation are set out as under:

<u>Fixed Cost</u>	<u>US \$</u>
(i) Cost of structure/Electrical installation 18000 sq.ft. area	360,000
(ii) Plant and Equipment	240,000
(iii) Pre-operation expenses	5,000
	<hr/> 605,000

<u>Variable Expenses in US \$</u>		
(i) Direct Material	748,000	2 million sacks
(ii) Salaries/Wages	30,000	
(iii) Fuel	24,000	Sales Income:
(iv) Interest	90,750	1.5 million for
(v) Depreciation	24,000	2 million sacks.
(vi) Building maintenance	18,000	
	<hr/> Sub-Total .. 994,750	

Sub-Total B/F	994,750
<u>Less: Selling Expenses</u>	<u>30,000</u>
	1024,750
<u>Add: Other Miscellaneous Overhead</u>	<u>51,237</u>
Grand Total	1075,987
Surplus ..	\$1.50 - 1.07 = 0.43 million US\$

In the above calculations import duties have not been considered - as it is presumed that these would be much lower on the machinery/raw material imported for a vital sector of the economy. In any case, this would get neutera-
lised particularly for raw materials with those of the imports of sacks.

Source of Funding

It should not be difficult to fund the unit from national resources. Or else it should not be difficult to locate suppliers from India, Japan, UK, Italy for joint ventures.

Project Profile on Paper and Board
Film Coating and Lamination

The developments made in the advanced countries and even in some of the developing countries have great relevance to the packaging industry Ethiopia. System's packaging viz. form - fill - seal - collate - and assemble the unit packs in transport packs, is being followed in many countries in the fields of pharmaceutical, processed foods, and chemical industries. Many of these developments have and are centering around coated and laminated board and paper. A tremendous range of form - fill - seal machines are available for system's packaging in carton and laminated pouches and sachets for various products. Since bottles are in short supply in Ethiopia and are endowed with fragility and high freight costs, and the tin containers are not only expensive but are import oriented medium of packaging, the introduction of laminated pouches both for liquids and solid food items could fill to some extent the gap created by glass and metal containers.

The facilities for extrusion coating of low density polyethylene on paper, hessian cloth, cotton cloth do not exist in the country. Nor such facilities for coating on paper board with sandwich lamination are available. A wide range of possible combination to suit the requirements of different products and markets - particularly to meet the demand for hygroscopic powdered product, highly viscous

food and pharmaceutical products, coffee (powdered), tobacco, frozen products - meat and beef; detergent soap powder, spices and fruit juices, other liquids and pastes. The substrates so constructed can and offer a variety of advantages in the form of total packaging economies.

An extrusion coating cum lamination plant of low density polyethylene (LDPE) on various substrates is recommended. The plant consists of 'T' die, unwinder, laminating equipment and a winder. It is desirable to have a plant suitable for substrates like cotton and hessian cloth, high density polyethylene/polypropylene woven cloth, paper tissue, glassine, printing paper and kraft of 50 gsm to 150 gsm quality, paper board, straw pulp century and duplex of 200 gsm. to 350 gsm. quality; aluminium foil of 0.015 mm to 0.040 mm thickness. A plant with extrusion coating width of 900 to 1250 mm, with coating thickness of 0.0225 mm to 0.100 mm on various substrates mentioned in the foregoing and with a speed varying between 10 to 75 meter/minute depending upon the substrate used and coating thickness and width required should suffice. The rated capacity of the extruder is assessed to be approximately 90 kg. per hour. The plant will have a sandwich (lamination) provision with L.D.P.E. working as a boulder of paperto paper, paper to hessian; paper to HDPE cloth, paper to cotton cloth, paper to aluminium foil; aluminium foil to aluminium foil, cotton cloth to cotton cloth. A complete plant with single screw extruder, 75 mm screw diameter, barrel, drive motors, hopper,

die adapter with heaters, control console, unwinding unit, laminating winding unit would be in the investment range of \$290,000 to 300,000 and is likely to be adequate to meet the requirements of laminated material for the time being. The advantage of having such a plant lies in the fact that its capacity can be expanded with the increase in demand.

Other features of the plant are:

- (i) Plant capacity : 2.25 tonnes/day or
57.0 tonnes/month
- (ii) Investment in plant: 290,000 - 300,000 US\$.
and equipment
- (iii) Covered space : 17m x 12m x 6m = 1224 cubic
required meters
- (iv) Manpower required : 35 including supervisor level
on a three shift personnels.
basis
- (v) Electrical supply : 3 phase in the neutral 50
cycles AC supply 400/440volts.

Sources of Finance

The amount of investment needed to instal at least one coating/laminating unit amounting to \$300,000, can be met from internal resources or else could be through a small scale joint venture or through the technical assistance programme under a bilateral agreement between socialist Ethiopia and some other country including India. The possibilities of financing it through UNIDO could also be expored.

User Industries

The production of laminates and coated material also presupposes the existence of facilities to use these laminates effectively. In the end use industries producing pharmaceutical, processed food and fruit juices, milk and milk products, edible oils, etc., back up facilities may have to be created for forming, filling and sealing the product in the pouches and sachets made out of the laminates and coated flexible material. The types of equipment required for the purpose are simple and a medium speed forming, filling and sealing unit with provision for gas insertion would cost around \$100,000 to 150,000.

PACKAGING LAWS AND REGULATIONS

1. Efficiency of the distribution system in Ethiopia depends, inter alia on the arrival of goods safely at the various consuming centres. Empirical evidence gathered through field visits, observations and discussions reveals that valuable products in different proportions are damaged leading to either total loss or partial damage to goods. Both these factors adversely affect the well being of country's economy. Insistence upon the adoption of an acceptable pattern of packaging can be extremely useful in minimising these losses. The need to have sufficient legislation to ensure product safety is so obvious that it hardly needs any specific emphasis. In certain cases, it is the package which has to instruct the user on its proper use and also warn him of the side effects that the consumer should expect.

2. The need for more trade between Ethiopia and rest of the world has become and will further become a new economic necessity. The essentiality of expanding exports and earning valuable foreign exchange has assumed a fresh urgency. The compliance by all concerned with existing and future regulations on packaging and related matters obtaining in the countries traded with or to be traded with, becomes a basic obligation to fulfil.

3. It is felt that the stage is now well set for organising, guiding and directing future growth of the packaging industry by initiating and coordinating research and development on the one hand and providing regulatory and legislative support on the other. Factors such as identity of manufacturers - producers, information about weights and measures, listing of ingredients, product description, information positioning, date of packaging and expiry wherever relevant, information on side effects of product's use - (if any) etc. are some of the factors that may qualify to be covered through legislative means. In substance, various legislations and regulations may broadly fall into the following categories:

- (i) Product Quality
- (ii) Public health and hygiene
- (iii) Safety
- (iv) Export promotion
- (v) Transportation and handling
- (vi) Consumer protection.

(a) Among the legislations for product quality, rules must relate to the quality specification and needs of a product to be eligible for certifications. These rules should also highlight, among other things, instructions with regard to marking and labelling, which are relevant aspects of packaging.

(b) Public health and hygiene based legislation and regulations in many countries are covered by the Drugs and Cosmetics Act and Fruits Products order. These laws are concerned with the integrity of the products and therefore deal with packaging - the show window to afford visibility to assess the product. The laws do not necessarily insist upon the type of packaging but provide requisite guidelines for the adoption of an acceptable packaging standard.

(c) The safety regulations are aimed at safety in handling, storage, transportation, warehousing, etc. The laws relating to packaging of explosives restricted articles of IATA, etc. are examples of regulations that aim at public safety and therefore the packaging needs that must be satisfied to facilitate movement from one place to the other.

(d) There are packaging rules for export of non-hazardous goods that should conform to the certain standards so as to ensure export promotion and acceptance of goods exported.

(e) Regulations connected with transportation are all a product of the concept of insuring the carrier from the avoidable risks. Sometimes, they also deal with the dimensions with regard to the system of movement involved. The IATA regulations, postal codes, railway regulations, dock safety and shipping regulations are examples of rules either for the acceptability of rules either for the acceptability of cargo by these agencies or to cover the risk.

The legislations for consumer protection are intended to make it obligatory for the producer and manufacturer to provide necessary information to enable the consumer to identify and compare the products with each other. They are also intended to assure the consumer of the quantity of product contained and can be regarded to be a step, however inadequate, to mitigate the incidence of deceptive packaging in the methods of merchandising. In some countries these regulations also require that the price of the product with batch number and date of packaging and expiry (if relevant) should also be indicated to protect the consumer further.

Some of the countries, have also made regulatory and statutory provisions to cover problems of pollution created by the packaging adopted or the lack of packaging where it should have been adopted and the problems of litre.

Of utmost relevance to socialist Ethiopia, are not only the pieces of packaging regulations relating to product quality, public health and hygiene, safety, export promotion, transportation and consumer protection, but the need exists for enumerating regulatory packaging standards for packaging of agricultural produce and some essential commodities with a view to preserve and protect the scarce resources.

Legislations for dangerous/hazardous goods do operate alongwith the regulations of Port/Dock Safety, and those formulated by the International Air Transport Association; but

their observance in letter and spirit is a matter of discretion rather than a basic obligation. More often than not these regulations are not observed as the human nature is such that it often does not exercise the right discretion.

PACKAGE DESIGN AND GRAPHIC ARTS

A well made product if not well dressed in a functional package often remains on the shelf of the seller. There are instances in the Ethiopian Market, where poorly dressed packages fail to move into the hands of the target customer groups. Devotion of care in the selection of designs and decorations enables the product to exhibit its distinctive features in competition with other products on the shelf. Good surface design also is a courtesy and consideration shown by the manufacturer to the product.

Surface design must satisfy the ego of the consumer and be enough to convey to him/her aspects of vital information for the correct use of the product. The designer must exert himself to constantly improve the surface design to express product attributes which are integrative with the change in the tastes and preferences of the consumer. Where exports are concerned, the colour design, lettering, style and size of the pack, methods of handling and dispensing, may make or unmake a product howsoever good it may otherwise be.

In Ethiopia, package design and graphic arts are yet to be at the level that could be considered to express the socio-cultural attributes of the Ethiopian Society. On many consumer products, the graphics are those similar to the West European human faces and portray a strange blend of Ethiopian products with Western users. The graphics and

claims made are at variance with the all matching product attributes. In addition, the print surface treatment leaves much room for improvement.

With a renewed emphasis on literacy campaign and around education, demand for packaged consumer goods is expected to show a further rise in the immediate future. This would need a greater efficiency in the production of consumer goods, introduction of new packaging material and proper utilisation and improved methods of presentation. Particularly in the field of exports, a great deal of attention will have to be devoted to package embellishment and its effect and influence on the products distributed in the domestic market is considered to be inevitable.

The need to augment the facilities for training of artists to create appropriate graphics and surface design for the various types of consumer goods produced or going to be produced in the country assumes a fresh urgency. The existing facilities under the Ethiopian Printing Corporation should be expanded and updated to serve the demand for improving packaging graphics.

Packaging for Exports: MINERAL WATER

In the foregoing presentation, a number of products have been identified to qualify for being included on the export map of Ethiopia. Among the non-conventional products, the exploration and cultivation of market for mineral water packed in 1 to 2 litre bottles, particularly for sale in the Middle East market should be given a high priority.

From various accounts available about the mineral water sold in the Middle East Market, it is learnt that the consumers are brand loyal and attached to a couple of brand names. Products of a Fresh firm with a local partners are very well entrenched in the market. Any possible entry in to this market, will demand intensive and creative in marketing strategies and may involve enormous financial outlays for publicity and promotion. One of the two probable course of actions are:

- (1) To arrive at an arrangement with the market leader engaged in the distribution of mineral water or better still with the second largest distributor of mineral water and use the already existing infrastructure for introduction of Ambo or an appropriately selected brand name.
- (2) To enter into a contract with a local firm to adopt the product and introduce it under an entirely new brand name.

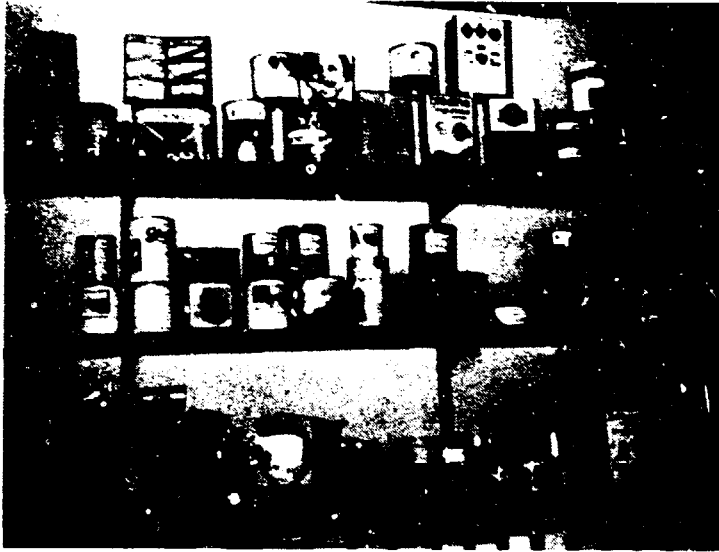
In the long run, second alternative proposed above is apt to be more promising but in the immediate future, the first alternative, appears to have better merits.

The packaging consideration for bottling of the mineral water and its freighting to various destination weight more in favour of PET (Polyethylene terephthalate bottles) vis-a-vis glass bottles. These bottles are light, unbreakable and uni trip bottles. However, the buying habits of the target group will have to be studied before a decision was taken in favour of one or other type of packaging material.

For carbonated mineral water, a plain PET bottle of sufficient density is sufficient to retain carbonation. However, it was decided to cultivate the export market with the supply of still mineral water without carbonisation, the density requirement would be much lower than those for the carbonated drinks. The feasibility of making these bottles in Ethiopia will have to be examined in details.

In order to have a valuable commercial advantage in production, the export of mineral water in light glass bottle produced in the country is recommended. The technical feasibilities of manufacturing light glass bottles available in the country and the capacities for glass containers with the augmentation are sufficient to undertake the production of light glass bottles for export of mineral water.

It has also been ascertained, that the consumers in the Middle East markets, prefer to purchase mineral water in high clarity transparent bottles. As such, bottled mineral water in amber colour may not be conducive to achieve a success in these markets. Transparent and high clarity bottles may thus become a necessity to be in line with the predisposition of the consumers and their prevailing buying habits.



DISPLAY OF
BABY FOOD
CONTAINERS
AVAILABLE
IN



OTHER
COUNTRIES



BISCUITS
IN
WRAPPING
PAPER

USED PACKAGING MATERIAL WASTE DISPOSAL

Currently, in the packaging category, the country does not pose any problem of pollution. The industry's products are so scarce that the population finds it useful to re-use these over a number of times. In the garbage dumps, consisting of solid waste and that arising out of packaging material - the proportion of packaging waste is too low to pose any immediate threat to cause any environmental outrage. Some aspects concerning the disposability of different types of packaging material in the country are charted below.

Glass Bottles

Availability of glass is scarce and the used bottles are easily re-saleable both to the primary bottles as well as for use of any other producer. The broken glass in two of the principal cities is collected as cullet and sold for recycling purposes. The broken glass bottles dumped into the garbage drums do pose a problem causing human injury at the time of loading of the garbage into the Municipal trucks.

Wooden Packages

Wooden Packages are seldom thrown out in the street. There is always some collector who would make use of these in one form or other. Most of the unserviceable wood waste as and where generated, is ultimately used as fuel.

Jute/Hessian Sacks and Cloth

Jute fibre sacks, hessian cloth are used and reused, till these can no longer hold any product. In the final form, these are reduced to cut pieces and used as floor mats in the households. Smaller and otherwise non-usable pieces after being meshed and blended with mud plaster containing wheat straw, are used for plastering of walls.

METAL (TIN) CANS

Like the practices prevailing in many other developing countries, the tin containers/cans are seldom thrown away in Ethiopia. Their re-usability for various purposes is maximum that incorporates a variety of uses viz. storage of liquids, powders, granules, as dispenser of liquids and powders, as pots for growing plants. The re-usability is, however, limited in the case of closures and completely dilapidated cans. These as part of the solid street waste are collected and dumped at various places situated within 4/5 K.M. of the city limits. Since the density of population per square km. of land, is low and the chemical industrial base is practically non-existent, the problem of environmental pollution caused by litre disposal or disposal is not very acute.

A variety of uses of m.s. 205 litre drums are being made of in the country. These drums are obtained through the imports of chemicals, are re-used for filling of indigenously produced chemicals, edible oil. In the water scarce pockets and in some of the households, the empty drums are used for storage of water. The drums that become unserviceable due to rusting and leaking of base/surface, are sheared, and converted into troughs and trays for washing of clothes and storage of solid products and produce.

A sizeable majority of these drums are used as material handling containers in a number of factories. Used drums are also a familiar sight for collection of garbage dumps.

Paper/board, Paper Carton, Bags

Paper and paper based litter is an important part of an aesthetically displeasing environmental problem. Though endowed with an extremely visible form of pollution, there is no anti-littering laws designed by the municipal authorities to control littering. With the sole exception of the city of Asmara, other city fathers and officials of health authorities appear to be oblivious of any measure to control litter and thus to keep the environment clean.

Particularly in the case of paper and plastic bags, crushed cartons, paper grass, cuttings, there is a need to modify human behaviour in a manner that would make littering recognised as a anti-social activity and create a favourable public climate to control litter.

Most of the paper based packaging litter in the country stays at the littered sites for a few hours. Either it is scavanged or the dry waste is collected to be used as fuel. The facilities for recycling of paper waste into pulp do not exist. Elsewhere, a proposal to set up a paper and pulp making unit has been suggested; which among other things, would effectively be able to utilise the paper base litter generated in the factories, house-holds, hotels, offices and other establishments. Pending the inception of a paper and pulp making unit, the waste generated can be hand pounded and pulped and mixed with suitable bonding agents and resins to manufacture articles of art and craft, hand made pulp trays for eggs and other for fragile products.

Corrugated boxes/duplex board cartons

Most of the corrugated cartons though originally considered to be weak in strength characteristics, are reused at least three to four times before these are discarded. There is a parallel trade which deals in the sale of used cartons and thrives at it. In fact, many of the traders tend to mend these cartons to make them resaleable. Some of the manufacturers of products insist on receiving empty and used cartons from their distributors/agents for re-packing their manufactured products. Manufacturers of tobacco and cigarette, hosiery products, readymade garments and leather goods and shoes, utensils, are typical users of used cartons. producers of handicrafts, wooden and leather goods, hand stitched embroidered dresses, bakery products, countrysweets, have been observed to be transporting their products in reused cartons. Similarly duplex board cartons readymade shirts seem to be re-used for packing of dolls. Even when the box/carton is completely unserviceable, its separated flaps and sides are used for wrapping of crocker, and other Products. Finally, either the waste generated is used as fuel or is turned into land filling for degradation.

PLASTICS

Waste generation of plastic material based packaging is due to a variety of reasons. These originate from (i) plastic containers, (ii) Plastic wrapping films (iii) single trip or throw away pouches and sachets, (iv) pouches used for sticky and oily liquids (v) defective HDPE/Polypropylene woven sacks, (vi) plastic based closures, plugs, tags, ropes, straps, (vii) pvc, HDPE/PE bottles, jars, (viii) HDPE drums, jerrycans, etc.

A distinct feature of plastic bags and containers in country is that most of these are re-used by the consumers, vegetable vendors, pavement shop keepers. A segment of the trade is engaged in organising collection and sale of these products to small traders and manufacturers.

Recommendations and Future Strategies

Legislative Measures: The need to protect the environment from getting polluted demands the existence of legislative measures. Although the enforcement agencies may wink their eyes in a majority of the violations committed, an occasional and demonstrable punishment accorded to the offenders could prove to be a deterrent factors for others.

Source reduction: Source reduction (Waste Reduction) can be a potent and effective instrument to control and prevent waste generation through package redesign, use of materials so that the reusability could be enhanced and also to ensure

optimum use of packaging material leading to less material quantity used per unit of product. Use of lighter cans, glass bottles, shrink wrapping, co-extruded films, laminates, wire bound wooden boxes and crates, etc. are examples of packaging industry's attempt at source reduction. Similar attempts should be made in Ethiopia.

SOURCE RECOVERY

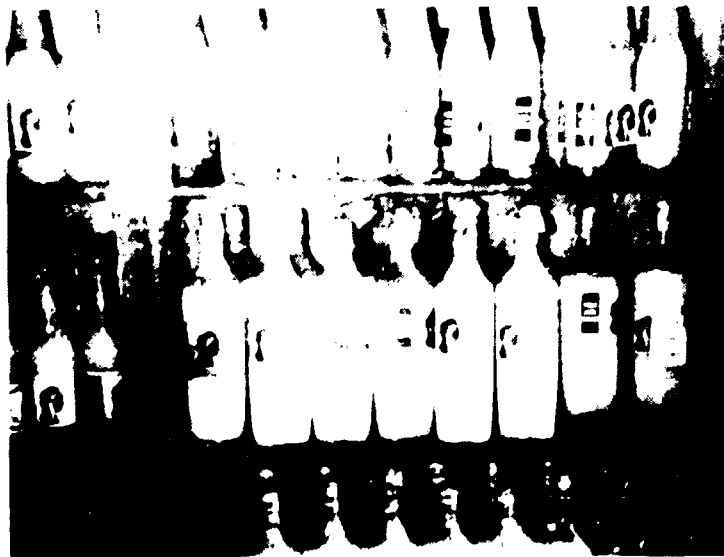
Resource recovery is a vital aspects of the packaging industry both from the point of view of conserving material by direct recovery, conversion of waste materials to new or different products. As pointed out in the foregoing, by and large, paper and paper based packaging material are salvaged before entering into the garbage drums. Similarly, glass cullets are being recycled. However, it is in the area of metal cans, plastic bags, and containers that the resource recovery by way re-cycling is less remunerative.

It is worthwhile to explore the ways and means of recovery of tin and use it to manufacture textile covered buttons for garments, stationery boxes, electric fittings, cylindrical rings - etc. Small and economical units for recovery of plastic materials and its subsequent use in the manufacture of soap cake boxes, kitchen hangers, stools, buckets, trays, waste paper baskets, etc. are the necessary lines to pursue.

REUSED POLY BAGS FOR PURCHASE
OF FISH



RE-USABILITY - PARAFIN IN WINE BOTTLES



INTEGRATED PLAN FOR THE NATIONAL PACKAGING INDUSTRY

The packaging material producing industry in the country mainly consists of glass bottles, jars and closures; paper and board converting industry - duplex board cartons and corrugated boxes, metal can (tin) plastic films, bags and crates; wooden boxes and crates; jute/hessian sacks, cloth and twines; wrapping paper and in the unorganised sector - animal skins, baskets, tree leaves. With the exception of glass and wood, the basic raw materials for all other packaging material are in the organised sector obtained through imports. Jute, HD and LD polyethylene granules, tin plate paper and pulp and board, packaging ancillaries like adhesives, straps, printing inks, staples, rayon yard, strapping tools, etc. are all imported.

The preparation of the blue print for the growth of the packaging industry is linked up with the blue print for the end use industry. The country is already engaged in a serious exercise to formulate a ten year plan for the growth of the various industries and agricultural commodities. Besides, the emphasis on exports is acquiring a new sense of national urgency. Once the programmes for prevention of product losses and expansion of markets are accorded a national priority which these deserve, the packaging and related industries will have to be included on the planning map of the country. Any plan for the growth and development of the packaging industry must take into account, in the parameters of transportation, storage, handling climatic

other non-controllable factors and the spatial and time utilities of the products from the centres of production to the consumption packets. Besides, the choice of packaging materials will be governed by the nature and composition of the distribution system, buying habits of consumers, units of purchase, the purchasing power and last but not the least the level of packaging consciousness obtaining at a given time.

In order to have a forum for examining various problems and progress of the packaging industry with all its ramifications, there is dire need to plan the industry's growth at the national level. Since this industry is basically a service industry, required to cater to the interests of every other production and commercial activity in the country, it is desirable that the industry's bearings and planned growth are guided under the charge of a high powered committee representing various interests in the Central Planning Supreme Council.

Demand Forecast:

The data on consumption of packaging material by end use for the country as a whole is lacking. In the agricultural commodity producing sector, the country's organised procurement and distribution activities hardly touch approximately 25-30 percent of the total production. A great deal of trading activities is channelised through the small traders. Besides, a sizeable portion of the produce remains with the

farmers, whose storage and preservation practices are traditional and outmoded. Although, an effort was made to collect data on consumption of packaging material consumed by various end use industries through a sample survey of some of the units in the country, but surprisingly, the data released - (except few cases) was so scanty and incomplete that it could not be used to enable the formulation of norms of packaging material consumed vis-a-vis the production output.

The absence of cost control system by factor inputs further aggravated the situation, and contributed to the malady of lack of information on various types of packaging material used for different products. Accordingly, the end-use approach for estimating the demand had to be kept in abeyance and abandoned - as it would have been based on a series of assumptions without any means to validate these. As a strategy in future, it is suggested that detailed data on the physical consumption of various packaging material, with respective related information on the quantities packed, value of output should be collected from each of the corporations in the organised sector in future. This data would provide a sound base to work out the norms of packaging material consumed vis-a-vis the output distributed. This mark data can also serve to project the future end use related requirements of packaging material in different sectors in the country. Thereafter, a search can be made to identify sources of supply and assess qualitative and quantitative capabilities to meet the requirements of the country.

This exercise should facilitate to identify gaps and provide a fairly adequate and reliable estimate of supply of packaging material vis-a-vis demand, and help plan strategies to overcome the gaps in the short and long terms through imports and inception of the packaging units respectively.

Perforce, the forecast of future requirements, have to be worked out by pooling the forecast of supplies of various material producing units. These when related to the value and composition of imports of packaging material, their trip frequencies and rise in demand originating from new projects did provide directional guidelines to work out minimum estimates of packaging material from the supply side.

The country's current consumption pattern of packaging material reaffirms the existence of shortages of various types of material - be it be the jute sacks, tin containers, glass bottles, wooden and plastic crates, plastic jerry cans and films, bags, printed cartons, corrugated fibre board boxes, wrapping paper, paper sacks. The market development for used m.s. drums, corrugated fibre boxes, tin containers, plastic jerry cans, glass bottles and even plastic films, etc. confirms the nature and intensities of the shortages of vergin materials in the country. It can, therefore, safely be deduced that the supply side does provide the minimum guidelines for tht quantity of material demanded in the country. The demand estimates based on projected plans of the suppliers of material and in the context of the new projects likely to emerge and commence operations are shown

at Appendix V. The gaps in demand and supply quantities are quite visible from a look at the table.

To bridge the gap between the demand and supply of various types of packaging materials, it is envisaged that the country would need one additional fibre sack manufacturing unit, two corrugated box manufacturing units, two HDPE/PP woven sacks-making units, one OTS can manufacturing unit together with upgradation of facilities in some of the existing units.

While working out the above referred to estimates, the demand for paper and paper based material has been stepped up in the context of the advantages that the corrugated fibre board boxes offer for protection of a variety of consumer goods and prevention of losses. Moreover, the prevailing scarcity of wood and the need to conserve forests of the country, are apt to bring about a switch over to alternative means of packaging, more particularly for products like fresh fruits and vegetables, frozen meat, beef, poultry, eggs.

The ancillary packaging materials like adhesives, cushioning materials, strapping, wire nails, printing inks, additives gum tapes, are no doubt important. In the absence of any past on their consumption pattern, these have to left out of the purview of the demand estimates.

The country is yet to formulate its plans and direction for the development of exports. Although, the exports of coffee, hides and skins, fresh vegetables would continue to pursue conventional pattern for some more times, it is hoped that a change in the composition of exports together with addition of other products such as leather garments, hand embroidered cotton dresses, shoes and ladies sandals, leather handbags, gold and silver jewellery, frozen meat - beef and shrimps, handicraft items would require far different emphasis and marketing thrusts than those being followed currently. Packaging requirements for exports no doubt will accordingly assume a fresh urgency and the demand for non-conventional packaging materials and related technologies to convert these materials may become a well sought after activity.

Elsewhere in the report, it has been recommended that a complete review of Ethiopia's imports should be undertaken. The products which qualify to be imported in bulk should not be imported in retail or intermediary packs. It would be much more beneficial to undertake repacking operations within the country for products meant for distribution to the institutional and other users. The proposed action may bring about a saving amounting to 25-30 percent in the import bill of these products.

PACKAGING FOR PRODUCTS FOR ARMED FORCES

The packaging goods meant for armed forces calls for a higher standard of packaging in matters of functional qualities and performance. The quantum and the variety of products needed for defence purposes are not known. However, the defence requirements will and should continue to be catered to by the domestic packaging industry. The packaging specifications for products needed by the defence forces, may have to be different and as much the exercise for demand assessment is left out of the purview of this study. It would suffice to mention that the consultant is deeply concerned and worried about the manner in which some of the food products meant for the use of the defence forces are being packed. For instance, consignments of biscuit packaging, canned vegetables, pre-cooked beef that should be looked into.

Price Elasticity of Demand

The demand for packaging material in particular for non-conventional ones is highly price elastic, and any strategy to practice austerity makes packaging as the first and foremost casualty. Ethiopian end users of packaging material demonstrate the manifestation of a similar trend and often are ignorant of the adverse impact which their actions in endangering product safety in the distribution.

The demand for packaging materials along with newer materials, is likely to multiply manifolds, once the cost escalations aspects in the production of these materials are held in check. The conventional and non-conventional packaging industry, would need fiscal reliefs in terms of import duties on packaging machinery and materials. Rationalisation of fiscal levies would greatly promote the development of the packaging industry for protection and marketing of domestic products and produce and for the promotion of exports. With the spurt in the production of the packaging industry, overall collection of revenue through indirect levies of turn-over tax, it is hoped would generate enough as to compensate for the loss of revenue through import duties.

USE OF SOFT DRINK AND
BEER BOTTLE FOR PARAFIN



RE-USABILITY OF READY MADE
SHIRT CARTONS FOR DOLLS.



APPENDIX I

TERMS OF REFERENCE

1. Elaborate, discuss and agree on the work plan for his mission with DPSA, on the basis of the activities described in the relevant project.
2. Carry out a survey and evaluate the main types of packages which are, at present, used in the country with specific recommendations for their improvement, particularly with regard to food packages.
3. Elaborate a short and long-term forecast for the consumption of packaging in the country and related study on the existing manufacturer capacities as well as the possibilities and conditions for their expansion in the future according to the opportune requirements.
4. Prepare an integrated development plan for the national packaging industry, establishing specific types of packaging materials for national production, according to the demanded manufactures, availability of the required raw materials and pertinent national conditions.
5. Prepare draft terms of reference for individual techno-economic studies which would be advisable for the development of specific packaging materials or package producer industries.
6. Elaborate an outline of the main technological assistance services required by the packaging user and manufacturer industries in Ethiopia with a sketch of the institutional structure required for their availability in the country.
7. Prepare a short draft programme and provide information on methodology for used packages disposal or recovery with particular emphasis on the non-degradable plastics.

APPENDIX II

PRODUCT AND PRODUCE LOSS IN
THE DISTRIBUTION SYSTEM
(1982)

Commodity Product	Estimated Value Production (million)	Estimated Loss (Conservative)	Estimated Loss (Optimal)
Cereals and Pulses	3572	250.06	321.46
Fruits and Vegetables	40	12.00	12.00
Animal Husbandry Products	224	22.00	22.00
1. Coffee			
a) Export	497		
b) domestic	29	20.00	20.00
2. Oil Seed	77269		
Cotton	95260	6.00	6.00
Selected manufactured items	1210	40.88	40.88
TOTAL		350.94	422.34

NOTE: Distribution loss for coffee is estimated to be 2% for export and 3% for the portion domestically consumed.

Distribution loss for oil seed and cotton is assumed to be 4% and 3% respectively.

ETHIOPIAN INSURANCE CORPORATION
NORTH EASTERN BRANCH

LIST OF SENSITIVE ITEMS
FOR DAMAGE DUE TO POOR OR INSUFFICIENT PACKING

- | | |
|---------------------------------------|--|
| 1. HYDRATED LIME..... | M/S A.A. WATER & SEWERAGE
AUTHORITY |
| 2. EMPTY FLATTENED CANS..... | " ETHIOPIAN MEAT CORPORATION |
| 3. DEFATTED SOYA FLOUR..... | " ETHIOPIAN FOOD CORPORATION |
| 4. PARAFFIN WAX..... | " SUNLIGHT INDUSTRIAL &
DIST. CO. |
| 5. a) NEWS PRINT PAPERS..... | " ETHIOPIAN PRINTING CORPN. |
| b) TOILET TISSUE PAPER... | " " " " |
| c) DUPLEX BOARD..... | " " " " |
| 6. a) ENGLISH CHINA CLAY ... | " ETHIOPIAN PULP & PAPER |
| b) UNBLEACHED SOFTWOOD...
SULPHATE | " " " " |

N.B. : Not only due to poor packing that damage or loss
could be sustained, but also due to rough handling
and improper storage in the port area.

List of items/commodities which are highly susceptible
to losses due to rough handling and mainly due to
improper packaging

Central Branch

CONSIGNEE	TYPE OF GOODS	NATURE OF PACKING
Ethiopian Amalgamated Limited	Sanitary Wares	In wooden crates
Investment Goods Import Enterprise	Raw materials for plastic shoe	In plastic bags
" " " "	Buckles & Zippers	Cartons
" " " "	Shoe Soles	"
" " " "	Cement	Paper Bags.
& Ethiopian Building Materials		
D.L. Mehta	Elastic webbings	Cartons
Ethiopian Amalgamated & Tea Devpt.	Loose Tea	"
R.H. Mehta	Paraffin wax	Plastic wooden bag
Egip Eth. Co.	Lubricants	In cartons
National Defence	Flyer's Jacket & Socks	In cartons
Zenebe Simie	Dishes (earthen ware)	In cartons
Marie A. Gulleserian	Household Equipments	In cartons
Paul Ries, Lancia & Frexpo	Windshield glasses	In wooden crates
Wonji Sugar	Spare parts	In cartons
Akaki Textile Mills	Chemicals (powder)	in paper bags
Eth. Rubber & Canvas Shoe Factory		

List of items/commodities which are highly susceptible to losses due to rough handling and mainly due to improper packaging.

<u>Consignees</u>	<u>Type of Goods</u>	<u>Nature of Packing</u>
1. Eth. Import/Export Corpn.	Laundry/toilet Soap	In cartons
2. Eth. Import/Export Corpn.	Window/figured glass	In wooden cases
3. " " " "	Floor/shoe polish in tins	In cartons
4. " " " "	Ghee substitute in tins	In cartons
5. " " " "	Milk powder in tins	In cartons
6. " " " "	Tea	In cartons
7. National Chemicals Corpn	Chemicals	In paper bags/ In drums
8. Pharmecor & B. Kurzweil	Pharmaceuticals	In cartons
9. Eth. Import/Export Corpn	Stationery materials (Ex-books, paper, etc.)	In cartons
10. " " " "	Flourescent tubes	In cartons
11. " " " "	Sanitary ware	In wooden c/s
12. Supreme Agency	Roofing materials	In cartons/ rolls
13. ERTC/Spare Parts Ent.) Mitchell Cotts & Co) Moenco)	Spare parts	In cartons
14. Eth. Import/Export Corpn	Dry cell battery	
15. National Leather Corporation Anbessa Shoe Factory	Soles	

ETHIOPIAN INSURANCE CORPORATION
NORTH WESTERN BRANCH

Marine Claim
 Section

<u>Consignees</u>	<u>Types of Goods</u>	<u>Nature of Packing</u>
M/s United Abilities Company	Hostyrene	Poly bags
" " " "	Carbon Black	Paper bags
" " " "	Glue	Poly bags
M/s Addis Tyre Co., S.C.	Vulkanox	Paper bags
" " " "	Talcum	Plastic Bags
M/s Bahr Dar Textile Mills	Spare Parts	Cartons
M/s Kelemework Assressu	Caster with rubber wheel	Cartons
M/s Yunis Paki & Mohammed Nur Faki	Baby Nipple & Bottles	Cartons
M/s Tadesse Teferra	Car Batteries	Cartons.

APPENDIX III

LABORATORY EQUIPMENTS
- UNDP ENVISAGED SUPPLIES

	US\$
1. Vibration Table	16000
2. Tear Tester	18000
3. Compression Tester	19000
4. Conditioned Cabinets upto 38°C - 95 RH	30000
5. Drop Table Electromagnetic Capacity upto 100 kg	4000
6. Strapping Equipment	
7. Dynamic Friction Tester	2000
8. Heat sealer	4000
9. Thermohygrographs	1000
10. Vacuum packaging apparatus	5500
11. Mullen Burst Tester	2000
12. Diaphragms for mullen burst tester	100
13. Calibration foil for mullen burst tester	100
14. Closure torques tester	1500
15. Shrink gun - electric hot air type	500
16. Stretch wrapper handheld type	300
17. Guillotine bench type	650
18. Gas permeability tester	
19. Stiffness tester board and crease type	3000
20. Glass container side wall distribution analysis	1000
21. Density column for plastics	3000
22. Seam scope projector for can seam examination with sample saw	2000
23. Glass bottle profile projector	12000

APPENDIX III
(Contd...)

	US\$
24. Rub resistance tester	1500
25. Plybond adhesion tester mullen attachment	400
26. Impact test falling dart type	3000
27. Inclined impact tester	3000
28. Shower test	2000
29. Closing machine for round tins 1 set	7500
30. Electronic tensile and compression tester instron	50000
31. Corrugated Media Tester	7500
32. Vibrating table for Retail Packages	2000
33. Hydrostatic Pressure Tester for Glass Bottles	6000
34. Water vapour permeability tester	10000
35. Psychrometer (Moisture Measurement) I	300
36. Camer/Flash	300
37. Gas Pressure Tester for Glass Bottles	3000
38. Puncture Tester	2500
39. Books/periodicals, journals	65000
40. Project car	7000
41. Pick up Van	6000
42. Photo Copying	2000

ASMARA SACK FACTORY
FABRIC & BAD SPECIFICATIONS

T Y P E	BAG SIZE		CUT LENGTH		SHOTS PER		REED PORT ER	TOTAL WARP THRE	TOTAL WARP WEI./NT	% WARP	TOTAL WEFT WEI./NT	% WEFT	YARN TOTAL WT/NT	YARN WEIGHT (FOR
	INC	METRIC	INC	METRIC	INCH	METER								
FLOUR	45x29	114x74	93	2.36	8x2	315x2	7	250	0.159	34.9	0.298	65-1	0.455	0.021
SUGAR	44x29	112x74	91	2.32	7.5x2	295x2	7	250	0.159	35.5	0.277	63.5	0.435	0.020 .21
TEFF	44x29	112x74	91	2.32	7.5x2	295x2	7	250	0.159	35.5	0.277	63.5	0.436	0.020 .31
SESAME 100 KG	46x30	117x78	98	2.42	7x2	275x2	7	250	0.162	37.9	0.266	62.1	0.425	0.021 .67
SESAME 50 KG	26x36	91x66	75	1.50	7x2	276x2	7	227	0.144	38.4	0.231	61.0	0.375	0.015 .67
COFFEE 100 KG	44x30	112x76	91	2.32	6.5x2	265x2	7	256	0.162	39.6	0.247	60.4	0.021	0.021 .70
" 50 KG	40x26	102x66	83	2.12	5.5x2	256x2	7	227	0.144	40.2	0.214	69.8	0.358	0.017
COTTON SEED	46x30	117x76	95	2.42	6x2	236x2	7	255	0.162	41.6	0.228	58.5	0.350	0.021 86
CEREAL	44x29	112x74	91	2.32	6x2	236x2	7	260	0.159	41.7	0.222	58.3	0.361	0.020 .04
CASTER	50x30	127x76	103	2.62	7x2	276x2	7	258	0.162	37.9	0.265	62.1	0.428	0.022 .43
OIL SEED	50x29.5	127x76	103	2.62	6x2	235x2	7	253	0.160	41.6	0.225	58.5	0.365	0.022 .031
SALT 50KG	33x20.5	84x52	44	1.12	0.5x2	256x2	7	280	0.178	39.5	0.273	60.5	0.451	0.015 .620
SALT 60KG	46x23	91x58	49	1.24	6.5x2	256x2	7	301	0.191	39.3	0.255	60.7	0.466	0.016 .619
COTTON PACK	65x42	168x107	135	3.44	5x2	197x2	11.5	292	0.185	40.9	0.257	69.1	0.452	0.30 .568
HESSIAN CLOTH	45	114	-	-	5x2	197x2	11.6	309	0.195	40.7	0.285	69.3	0.481	- -
HESSIAN CLOTH	42	107	-	-	5x2	197x2	11.5	292	0.166	40.9	0.287	69.1	0.452	- -

YARN WEIGHT ARE : 17.81b x 17.5
WARP AND WEFT

NB. ARE PACKED MAXIMUM ± 2%

QUICK ESTIMATES OF DEMAND FOR PACKAGING MATERIALS AND
PROPOSED SOURCES OF SUPPLY

MATERIALS	NO.OF UNITS	MEASUREMENT	CAPACI- TY IN EXIST- ENCE	DEMAND			EXPANSION	REMARKS
				1984-85	1985-86	1986-87		
Jute, sacks, cloth and twine	3	Million kg	14	17	19	20		1
Corrugated board and boxes	3	tonne	5500	7000	8000	10000		2
Glass Bottles, Jars, etc.	2	No. of bottle jars (000 tonne)	18	25	28	70*	Through better utilisation of capacity and expansion.	- *A new beer Factory may be on the stream with additional demand of 50-60 mill, bottles.
Tin contain- ers, General cans, O.T.S.	1	Million (240 gm each).	IMPORTED	2.5 90	2.8 94	3.0 100	-	- 1
Plastic crates	1	Number	400,000	700,000	800,000	1000,000	Expansion of capacity	-
HDPE Sacks	-	Million	Nil	2.0	2.5	4.0		2
Plastic Film	4	Tonne	1,400	1,100	1,300	1,400	-	-
Lamination of Film	-	Tonne	-	250	300	400	-	1

FIELD INVESTIGATIONS

INTRODUCTION (PART II)

The Ethiopian Packaging Industry is still in its infancy and suffers from various shortcomings. Through a survey of the packaging material producing units and their users, certain features of the industry's dimensions have come to light and these have been highlighted in Part I of the report and necessary recommendations, in order to place the industry on a firm footing, have been made.

The field investigations covered 63 establishments including market places. The attributes and shortcomings of 51 units have been analysed and presented in a summary form. It is expected, that the treatment presented would enable the respective units to take corrective actions specifically related and relevant to serve their individual interests. A set of suggestions/recommendations have been made for each of the units.

1. Establishment visited : Livestock and Fisheries Corporation
Poultry Development Enterprise
Addis Ababa
- Date : 28-3-83
- Officials contacted : Ato Assefa Bogale, Manager

The respondents are of the opinion that about 35-40 percent of the eggs produced in the country get broken on account of the absence of adequate packaging. The poultry development enterprise, is a producer of chicken and eggs. Its annual production of eggs is 18 million. Frozen chicken is delivered in poly wrapped/or at time unwrapped form to various retail outlets in and around Addis Ababa. The unit faced real problems in the packaging of eggs.

The current mode of packaging of eggs is in egg trays placed one above the other, and 360 eggs are packed in a corrugated box 60 cm x 38 cm x 30 cm. Flaps of the box are closed by the application of water soluble gum tapes. Many times, the corrugated fibre board boxes collapse and a heavy loss in terms of breakage of eggs is experienced.

The egg trays are not locally produced but are imported from Kenya. Eggs are also packed in corrugated fibre boxes, with grey board partitions and a separator between the two layers of eggs. The partitions are made of very poor quality grey board.

Recommendations:

1. The poor quality of the board and box is a matter of general complaint phenomenon. It is time that the technical persons working in pulp and paper making units were trained to improve the quality of board produced in the unit;
2. The product line of Ethio-Plastic Addis Ababa should be expanded to manufacture and supply polystyrene trays for eggs, or else, pulp based trays can be made in the paper and pulp unit;
3. For procuring supplies from the rural areas, wooden boxes with a cushioning of straw can be an interim arrangement.
4. The Corporation can have a captive unit for producing pulp trays for its own use.

2. Establishment visited : Dairy Development Enterprise
Officials Contacted : Mr. Ayalew Melesse
Production Manager
Mr. Girma Haile
Purchasing Manager
Date : 28-3-83

Dairy Development Enterprise, Addis Ababa is a major source of supply of pasteurised milk; cheese, butter and yoghurt to the city's population. Equipped with a production capacity of 30,000 litres of milk per day on a single shift basis, the unit's dispensation of milk is in 1/2 litre polyethylene bags, formed and filled, and sealed on a high speed (3000 bags/hour) French Pre-Pack machine. Polyethylene rolls received from Ethio-Plastic, Addis Ababa in unprinted form are used for the purpose. 20 half litres filled bags are placed in a returnable plastic tray for distribution to various outlets. Butter weighing 200 gms is wrapped in grease proof transparent paper - glassine paper.

Packaging and Problems Encountered

- (1) No facilities exist for checking the quality and the specifications of the film supplied. Neither the film is certified for its quality and specifications and harmless effects by the suppliers.
- (2) The specifications for various packaging material are not readily available with the purchase department.
(At least the efforts to trace these on the day of the

- (3) 200 gms of Butter is wrapped in one colour printed glassine paper. Printing quality is good. Storage of paper used for butter is under unhygienic conditions. Accordingly, the effects of precautions taken in the production of butter are neutralised. No date of packing is mentioned on the wrapper.
- (4) Yoghurt is packed in plastic (polystyrene) tumblers and is covered with 40 gms wrapping paper folded at the top and is banded with a rubber band at the top position. Paper odour in Yoghurt due migration of paper properties when in contact with the product is a possibility. No date of packing is mentioned.
- (5) Cheese (Ayeb) - 1/2 kg of Ayeb is manually packed in polyethylene small bags printed in a single colour and hand sealed. Excess packaging material to the tune of 20 percent (oversized bags) is being used. This was brought to the notice of the authorities concerned. Aged cheese cakes duly waxed are delivered without any outer transport packages.

Recommendations

1. Testing of the packaging material for assessment of the right specifications and quality standards and compatibility tests of product and packaging materials should be carried out regularly.
- 2- Storage conditions for packaging material require better hygienic conditions. Sterilisation of packaging material is recommended to avoid any incidence of contamination
3. Each plastic tray can accommodate 12.5 litres (25 half litre milk filled bags) instead of 10 litres (currently in vogue) of milk without any problem. Cost of handling and transportation can be reduced by 25 percent (Demonstration given on the spot).
4. Plastic tumblers for yoghurt should be closed by heat sealable duly printed glassine poly or foil-poly covers.
5. Certification of the suitability of the packaging material by the health authorities and periodic testing of material by an independent agency are recommended.
6. No mechanism exists to carry out stability tests of products - like milk, yoghurt, butter, and the packaging under ambient conditions. In-house testing facilities should be created.
7. Economies in the use of packaging material can be introduced by reviewing the size of the milk pouch in vogue. Experiments with smaller pouches may be conducted. The prospects of success appear to be high. Reduction in the size of the pouch may result in 10-15 percent savings in material cost.

3. Establishment visited : Ethiopian Spice Extraction,
Addis Ababa

Officials Contacted : Mrs Debre Melaku

Date : 29-3-83.

Crude Oleoresin a spice extract from red chillies is the principal product of the unit. It is packed in 205 litres used drums and exported to U.S.A. The present price paid to the unit is \$6000 per tonne. The unit may consider to produce refined Oleoresin, where by its revenue can go upto \$15000 to \$16000 per tonne.

Recommendations:

As and when the unit commences production of Oleoresin in refined form, it is desirable to ship the product in unused m.s. steel drums. There are other users of these drums and a unit to manufacture these drums can be set up in Addis.

The incidence of impurities in the used drums is very high. The unit does not have any feedback from the users - perhaps, the price paid by the importer is too low to complain against the presence of impurities.

4. Establishment visited : United Oil and Soap Mills,
Addis Ababa
- Date : 30-3-83
- Officials contacted : Ato Getachew Woldesadik
General Manager

This unit produces 3400 tonnes of soap in the form of cakes and 3000 tonnes of edible oil every year. 200 soap cakes are packed in a printed corrugated 3 ply box, 38 cm x 18 cm x 30 cm with over lapping flaps, which are closed by PVA adhesive. The fatty acids marks were visible on the outer surface of almost every box. About 80 percent of the edible oil is packed in used mild steel drums with screw type closure and 20 percent are bottled in multi trip bottles of 0.75 litre capacity each - and bottleneck is capped by hand pressed crown cork. Each bottle is labelled. As a byproduct, oil cake is collected for export and packed in used hessian sacks, but the cotton seed husk waste is distributed among the workers at a nominal rate.

Problems Encountered:

- (1) The cleanliness standards of used drums are extremely low. Presence of rust is an obvious hazard. Pressure wash with rust removing chemicals is recommended. Often, oil is filled in drums with moisture. This should be avoided.
- (2) The storage of flat corrugated boxes needs radical improvements. These are stored at a place with too much of humidity. Delamination of the plies of the

board and weakening of the box due to moisture absorption were evident.

- (3) At the receiving points, even those situated in Addis Ababa, the conditions of the soap cake and the packages were not satisfactory.

Recommendations

1. Use of 20 litre mild steel drums, 220 litre plastic jerry cans for bulk transportation is recommended in addition to the used mild steel drums;
2. 1,2 & 4 litre high density polyethylene blow moulded containers are recommended for retail distribution of edible oil;
3. Packaging of oil in 17 litre multi-trip square cans should be considered;
4. Cleanliness standards of 205 litres mild steel used drums should be improved and samples of oil transported in these should be examined by a food laboratory;
5. 200 soap cakes should be wrapped in a Bitumen laminated kraft paper or polyethylene wrapper to avoid migration of fatty acids to the outer surface;
6. Oil cakes are sent in poor quality used sacks. It is advisable to use better quality used sacks, otherwise the emergence of the problems of handling and storage at Assab Port are not ruled out. A high incidence of wastage was recorded by the consultant at Assab Port;

7. Storage conditions of the packaging material need to be improved. A couple of technical persons should be trained on the subject of store planning, stacking and control. While the offices are well maintained, the stores are very poorly maintained.

5. Establishment visited : Faffa Manufacturing Plant
Date : 30-3-83
Officials contacted : Mr Belete,
General Manager

Faffa Manufacturing Plant enjoys good image for its various types of branded products - and has a turnover of 13 million Birr every year. About 1-2 million Birr is spent on the purchase of packaging material like poly printed and unprinted poly bags, duplex board cartons, corrugated fibre board boxes, hessian sacks, tin cans, printed labels, and other packaging components and ancillaries.

Packaging and Filling Problems

Almost all products are manufactured in powdered form. The sealing of poly bags is poor. Accordingly, in some cases a bag within a bag is used to overcome the product's leakage/spillage problems. It is further observed that more than 50 percent of space in the poly bag is kept empty for sealing and settlement of the product. Similarly, four one 1 kg. packs are double packed into another poly bag. The same element protection can be achieved by eliminating outer poly bag and improving the sealing characteristics and each primary packs of 50 units can be packed in a poly lined jute sack. Savings expected could be of the order of 30 to 40 percent in use of material.

Baby food is packed in poly bags and repacked in lever lid cans. The labels on the cans are printed and unvarnished.

Recommendations:

1. The labels should be varnished to ward off the hazards of dust accumulation and spoilage of Graphic's on the wrap around labels. (already explained to the management).
2. Size of the poly bags should be reduced by 25 per cent. (A sample bag of reduced size was filled, sealed was dropped from a height of 6 feet, 5 times by the consultant to demonstrate its effectiveness).
3. Nearly 10 kg of additional material can be packed into jute sacks to afford an economy of 20 percent in packing material used and costs of handling, transportation and storage.
4. Concept of using a poly bag in a 425 gsm duplex board rectangular carton for baby food is recommended as a substitute for the metal containers. Cost reduction to the tune of 40 percent is possible. An introductory offer on a pilot basis is recommended could be tried.
5. The possibilities of introducing paper, poly laminate heat sealable soft pouches as a refill pack for baby food should be explored.
6. Two technicians for packaging development should be trained.
7. The entire packaging materials should be evaluated from the point of view of total packaging economies.

6. Establishment visited : Artistic Press
Addis Ababa
- Date : 30-3-83
- Officials contacted : Mr Mulushoa W/Mariam
General Manager
Mr Hastemariam Tadesse
Technical & Production Manager

Artistic Press - Addis Ababa is one of the few major suppliers of printed duplex and grey board cartons, and multi-coloured labels needed in the country. Every type of printing ink and a majority of the board required for printed cartons are imported through international tendering. Both the printed cartons and labels are unvarnished.

The unit is well equipped to produce high quality labels and cartons but maintains that due to pressure of work, the quality of work suffers. The printed cartons are handled into labels by a paper band and are despatched to various users after being wrapped around by a wrapping paper of 80 gsm.

9 Miedelberg 2 colour offset, and 19 letterpress machine are the main support of the press. Besides, one Rolland offset 2 colour printing, SOLANA offset machines are also in operation. Colour separation and plate making are done in the unit.

Problems Encountered

The art work for various printed cartons is supplied by the customers. The contact with the customers is one of the weakest links of the entire operations. Letter press

machines are used for cutting and creasing of flat carton.

Quality Control

The entire quality control process rests on observational features. No testing of material, print surface, bursting strength, crease resistance of the board, rub resistance and absorption levels of ink are tested. The aspects of quality control on the production line need to be radically improved.

Three to four colour labels are press cut manually, introducing thereby a very high incidence of variation in the exact size of the label. Such variations in size create intense problems on the automatic labelling machines at the users ends. In fact, some of the automatic labelling machines in the Ethio Pharmaceutical factory are lying idle because of registration problems due to variations in sizes of the labels.

Recommendations:

1. In process quality control measures should be introduced and technicians trained accordingly;
2. Facilities should be created for polyethylene coating and lamination. A variety of products such as detergent (poly coated board); toilet soap (poly coated poster paper), tea (poly coated carton), dehydrated vegetables, biscuits, etc. could be good products for use of material. Similarly, wax coated paper can be produced for wrapping of soap cakes, biscuits and other

3. Advisory services by the printing press particularly for the development of packages should be strengthened;
4. Facilities for web printing and film treatment should be created so that printed plastic rolls for sachets and pouches could be produced to meet the market requirement;
5. Technical persons should be exposed to witness the advances made in the printing industry elsewhere in the world.

7. Establishment visited : Fishery Development and
Marketing Enterprise
Distribution Outlet

Date : 30-3-83

Ethiopia's landscape contains a number of natural lakes and a few rivers but surprisingly its water resources have not been exploited for fisheries development. In a country, endowed with pollution free, sweet water fish, fisheries could have been one of the important foreign exchange earning industries. Many countries are cultivating shrimps, prawn, and different varieties of fish and exporting these in processed, frozen and a dried form to the various users. The same could be done in Ethiopia. One of the reasons of the under development could be the habits of the people of consuming fish during the fasting season.

During the fasting seasons long queues are observed outside the distribution points and the shoppers bring their own bags, mostly used poly bags and baskets for receiving the purchased and dressed supplies. Fish is brought in refrigerated vans and delivered in plastic drums in the distribution centres. A 5-6 percent spoilage rate was observed at the point of distribution. It was learned, that nearly 30 percent of the fish caught get spoiled due to lack of refrigeration or ice cooling facilities. Fish was sold at 1.20 Birr per kg.

Recommendations:

1. The distribution outlets should be supplied with unused polyethylene bags for delivery of the products sold. This would prevent contamination of fish received in various types of used poly bags;
2. Fishing may be developed as an organised activity at least for exports and other uses till the time the consumption habits of the people undergo a change;
3. Production of wax cartons will become a necessity for sale of frozen fish/prawns once these are processed for export;
4. Fish as a protein food can have excellent prospects of consumption in Ethiopia, provided it is promoted by the concerned agencies and its catch and outlets for distribution are radically improved from its current operational status.

8. Establishment visited : Ethio Plastics (Film and Bag Making Unit)
- Date : 31-3-83
- Officials Contacted : Ato Temesgen Megnaka
Manager

There are three factories under Ethio Plastics, engaged in the production of various types of plastics goods and copper cables. Among the packaging material suppliers, this unit is the principal source of supply of polyethylene film, printed pouches and bags, injection moulded poly bottles (for liquid detergents) and milk pouches. The maximum width of the extruder for a blown film is upto 40" in diameter. There are also two colour flexo printing presses, automatic bag making machines equipped with an Italian extruder. The unit can serve the various end users very well, provided it exercises strict quality control. All raw materials are imported.

Problems Encountered:

In process quality control is extremely weak. No quality control checks are exercised on the various types of raw materials, pigments, additives and inks used, nor are the bonding characteristics of the sealed surfaces are tested for sachets and bags. There are numerous customer complaints about the quality of printing and sealability.

Recommendations:

1. Strict quality control measures - for testing the quality of film should be introduced together with the analysis of any harmful effects of the additive mixed with the raw material for reducing the impact of static charge;
2. The unit is capable of manufacturing better quality plastic bottles - it should procure necessary dies and commence production of bottles needed for various other uses in the country;
3. No facilities for lamination of film with other materials exist - adhesive lamination can be attempted by the unit;
4. Technical capability of the personnel should be upgraded through further training;
5. Process waste of raw material is of the order of nearly three percent and no doubt, a major portion of this is re-cyclable. With a better process control it can be brought down to one percent;
6. No cost control system exists in the unit. It should be introduced immediately;
7. Facilities for extrusion and treatment of polypropylene film should be created at the unit;
8. Customers contact is one of the weakest areas of the unit, and needs to be improved.

The unit can produce films for use as under lay in cement, concrete road, canal bank, building construction and other heavy duty films. The possibility should be explored.

9. Establishment visited : Ethiopian Pharmaceutical and Medical Supplies Corporation
Addis Ababa
- Officials contacted : Mr Million Abebe
General Manager
- Mr Djereгна Kanea
Manager - Procurement & Distribution
- Mr Teye
Production Manager
- Date : 1-4-83 and 5-4-83

The company a fully owned government enterprise produces a number of formulations and with a product mix of:

Injection powdered	5-7 million vials per annum		
Syrup	100,000 litres	"	"
Tablets	350 million	"	"
Ointment	120 tonne	"	"
Capsules	200 million	"	"
Liquid Injection	7 million ampoules per annum		

Packaging Material

The packaging material requirements include empty hard gelatine capsules, Ampoules (neutral glass), vials - hydraulic glass type, aluminium caps with a central tear off, rubber plugs, glass bottles 15 ml., 30 ml., 640 ml., bakelite cap closures, cork closures, labelling glue, polyethelene pouches tin containers, duplex board cartons, corrugated fibre board boxes and black, white inks for printing ampoules; printed labels, paper gum tapes.

Operations:

Except for liquid filling operations, strip packaging of tablets, and capsule filling, most of the other packaging and labelling operations are carried out manually.

Supplies

(i) Imports: Most of packaging material requirements are being met through imports originating from various countries and international tenders floated once a year. On account of unusually long order lead period, the management carries stocks of material, for a period of 6 months. Thus the inventory carrying cost is too high; besides the accelerated aging of material in storage is not ruled out.

(ii) Indigenous Supplies: For supplies procured locally, an inventory of material to meet future requirements for a period of four months, is maintained for corrugated boxes, tin containers, bottles, poly bags, duplex board cartons, and labels. Such a high built up of inventory particularly when the source of supply is within a few kilo meters from the unit is considered too expensive. The system of procurement needs improvement and should at the most be hold INVENTORIES upto 2 months only.

Packaging Specification:

No specifications for packaging material are formulated by the users, neither any facility exists for testing these for reconfirmation or validation.

Strip Packaging: Aluminium foil strips are used for packing of 8 tablets. Similarly, 8 capsules are strip packed in Al-foil, cellophane combination.

250 such tablets and capsules are packed in duplex board cartons and repacked in CF Boxes cartons for dispatch.

Comments

The alternative of glassine poly laminate and which can easily be used on the wrap ADE (strip packing - currently installed machine) needs to be examined for strip packaging of tablets. Size of the intermediary carton used for packing 250 tablets can be reduced. A 20 percent saving in material cost is stipulated.

Ampoules: Ampoules are packed manually in hand formed duplex board trays, and 100 ampoules are packed in an outer duplex board carton of 350 gsm.

Comments

Packing of ampoules in fluted trays of 10 compartments, placed in 5 layers, one above the other and packed in duplex board carton is recommended.

Vials: 100 vials weighing above 1.5 kg closed with aluminium caps, with centre tear are packed in duplex board carton - flaps closed by tape. Each vial is labelled on an automatic labelling machine New Man of United Kingdom origin. No serious problem is reported.

Specifications followed are mainly those drawn by the suppliers. No separate packaging standards are followed for packaging of pharmaceuticals as reported by the respondents. Specifications currently in vogue are enclosed.

Current Practices and Comments:

Tablets: 1000 tablets packed in poly bags, open end heat sealed are inserted into a tin container 115 x 95 mm closed by a lever lid. A printed label is invariably inserted into poly bag as an insurance against mutilation or delamination of label pasted on the tin container. Containers are packed in CF boxes, flaps closed and despatched to various places.

Comments:

Tin container is a very expensive medium of packaging. Besides, size of poly bag is 33 percent more than what is required. This was demonstrated at the spot. The possibility of replacing tin container with an E flute carton will greatly reduce packaging cost and ease pressure on foreign exchange needed for purchase of tin. The practice of introducing a label in each bag (pouch) should be stopped and replaced either by a pre-printed poly pouch or by a sticker outside. Paper and ink are in physical contact with the tablet. This is not a safe practice and should be discontinued.

Liquid Filling: Bottles of sizes 125 ml., 30 ml., 15 ml. with amber colour are imported along with bakelite closures. These are supposed to be labelled on JW - 4 labeller of West Germany origin. Due to variation in size of labels supplied by the Artistic Press and other local suppliers - automatic label release is not possible. The labelling machine has become non-operative due to variations in label sizes. Bottles are filled on an automatic line for capping operations. Liquid syrup is filled semi-automatically into bottles of 640 ml. and capped manually. A high incidence of leakage of liquid is reported particularly in respect of 640 ml. bottles.

Comments:

Matching of the caps/closures, with the neck size of 640 ml. syrup bottles should be looked into. Use of a rubber plug before capping may be considered to minimise the incidence of leakage. Insistence on the right size of label for better machine ability is a must. The matter should be taken up with the suppliers.

General Improvements:

1. Basic facilities for verification of monomer content in the poly-bags should be created and in its absence, periodic testing from overseas laboratories should be introduced.
2. Training of at least two technician in the field of packaging is essentially needed.

3. Specifications for packaging material should be formulated on the basis of simulated trials.
4. Insufficient - cushioning is provided to glass bottles of syrup. Corrugated - single poly wrap around is recommended for cushioning.
5. Performance standards of CF box should be radically improved. The unit producing this box has already been advised by the consultant.

SPECIFICATION-PHARMACEUTICAL PACKING MATERIALS

1. Empty Hard Gelatine Capsules		
a) Black/Red size No. 0, opaque		5 Million
b) Black/Red size No. 2, "		20 "
c) Green/White " " 2, "		20 "
d) Blue/Pink " " 2, "		5 "
e) Red/Yellow " " 2, "		40 "
2. Ampoules, Made of neutral glass, 1st hydrolitic class, stemcut, flat base, large stem diameter, dust free, for struck filling machine		
a) 5 ml capacity, Amber	...	2,500,000 pcs
b) 2 ml capacity Amber	...	1,500,000 "
c) 2 ml capacity Colourless	...	1,300,000 "
3. Vials, hydraulic glass type III		
a) 6 ml filling capacity	...	1,700,000 "
b) 15 ml filling capacity	...	2,200,000 "
4. Aluminium caps, ϕ 20 x 7.3mm with central tear off		
	...	2,600,000 "
5. Rubber stoppers, brick colour		
	...	1,000,000 "
6. Bottles of 125 ml, Amber, Round		
	...	100,000 "
7. Black Bakelite caps for above		
	...	105,000 "
8. Bottle of 30 ml, Amber, Round		
	...	800,000 "
9. Black Bakelite caps for above		
	...	810,000 "
10. Bottles of 15 ml, Amber, Rectangular		
	...	20,000 "
11. Black Bakelity caps for above		
	...	21,000 "
12. Glue for labelling machine		
	...	1,000 kgs
13. Black ink for batch numbering machine		
	...	100tubes
14. Black ink for Ampoule printing		
	...	30 "
15. White " " " "		
	...	50 "
16. Duplex Board Coated white black 300 gr. sheet size 70 x 100 cm		
	...	40tons
17. Duplex Board Coated White Black 500 gr. sheet size 70 x 100 cm		
	...	40 "

9. Establishment visited : Tobacco Monopoly and Cigarette Corporation
Officials contacted : Mr Taye Bekele
Production Manager
Mr. Wubisheh
Quality Control Technician
Date : 2-4-83

The manufacturing activities are confined to cigarettes and blended, scented and treated tobacco.

Packaging considerations relate to packing of oriental tobacco in bales and packing of cigarettes. Bulk tobacco packed in bales of 30 kg pressed and wrapped with hessian on three sides, with top bottom and one side uncovered; and the sides of hessian cloth held in position with jute twines on top and bottom.

No wastage is reported. Virginia tobacco is received in pressed and stitched hessian sacks. Stacking in storage is satisfactory and no problems are encountered.

Tobacco in bulk is imported in wooden boxes in weights varying from 175 kg to 200 kg. These are stacked four high by use of fork lift truck. Most of these get damaged by fork arms of the truck, which in a majority of the cases appear to have been applied on the box surface. Hazard of wood particles getting into tobacco are high and has been reported.

Packaging Materials:

Materials required include wrapping paper, single colour printed corrugated fibre board boxes, new as well as reused, paper laminated aluminium foil, gum tapes, glue, printed labels. Aluminium foil laminate is imported in reel forms. Packaging specifications for some of the material are in the section that follow:

		<u>Annual Consumption of Packaging Material</u>
Offset Paper	..	27600 kg
Kraft Paper	..	30000 kg
Gum Tapes	..	3600 Rolls of 100 metres each
Labels	..	138 million
C.F. Boxes	..	156600 Nos.

Operations

Cigarettes: Nayala brand is packed in machined formed soft packs on offset chrome paper al. foil/laminate - adequately printed with the brand name. Ten such soft packs are packed into Blue Kraft paper and machine glued for closures. 50 packs or 10,000 cigarettes are packed in CF Boxes mainly used ones, flaps closed by paper based gum tapes. A certain proportion of new CF Boxes of 61 x 47 x 26 cm are also used for despatches meant for long distances.

Problems Encountered and Comments:

The quantum of machine rejects packs is very high - and ranges between 20 - 25 percent. These are manually collected in boxes and rectified for label, improper closures and other defects.

Boxes containing 10,000 cigarettes are stacked 5 high and those meant for long distance despatches are cross strapped with jute twines. Most of boxes were bulging due to poor compression strength evidently due to repeated re-use. Gum tapes in 70 percent of closed boxes had delaminated.

No quality testing of packaging material except for ascertaining the thickness of paper and foil laminates is done. Instances of pin holes in the foil laminate were observed by the consultant and brought to the notice of quality control manager. Layout of the factory in the packaging section is extremely congested. Production Manager was advised to improve the layout plan and given a practical demonstration on the floor. Lack of trained manpower is the biggest problem of the unit.

Recommendations:

1. The compression strength of the boxes used should be improved.
2. Aluminium foil paper laminate should be replaced by poly coated paper for certain brands of cigarettes. This would result in cost reduction by nearly 50% or

else a laminate of metalised polyester paper may be considered.

3. Strapping of boxes by heat sealable polypropylene straps is recommended. Or else strapping by jute twines should be improved by a method improvement in knot formation.
4. Improved Quality gum tapes should be used or else, closure of boxes by gluing the flaps should be introduced.
5. Operators should be given training in the use of fork-lift and provided with pallets for handling purposes.
6. Quality control of packaging material should be introduced on a sample basis.
7. Training opportunities should be provided for packaging development and material testing.

TOBACCO MONOPOLY AND CIGARETTES — CORPORATION
SPECIFICATION OF MATERIAL

Offset chromo paper woodfree unglazed	: Thickness	0.09 mm to 0.10 mm
	Length	184 mm
	Width	91 mm
	Weight	90 gm/metre ²
Aluminium foil/paper laminate	: Width	88 mm
	Thickness	0.08 to 0.09 mm
	Weight	60 gms ² and above.
Kraft paper	: Grammage	86.6 gm
	Thickness	0.14 mm

11. Establishment visited : Addis Cement Factory
Addis Ababa

Officials contacted : Mr Engineer Lemma
General Manager
Mr Essa Legne
Production Manager

Date : 2-4-83

Every year, the unit produces 70000 tonnes of cement and purchases 1.6 million paper sacks. The filling of three ply Kraft paper sacks with self closing side valve is done automatically and filled sacks placed on a conveyor for onward loading onto a truck or for storage. These sacks are manually handled for forming a stack load on the truck platform. The empty sacks are imported from Kenya and each cost 0.60 Birr.

Problem Encountered

The bursting loss due to manual handling in the loading and unloading operations at the factory site is estimated to be 3-5 percent. It is further learned that the filled sacks are generally subjected to 8-10 handlings before their final use. During each handling operation, these are dropped from a height of 4-5 feet. An additional loss of cement estimated to be 10-12 percent is reported during these operations. Moreover, further loss of 1 to 2 percent is reported due to moisture absorption and caking of cement. Even with a conservatively estimated loss of 10 percent, the unit every year loses about 7000 tonnes of cement.

Testing of Material

No tests - drop test, vibration test, puncture resistance test, stack load test (compression test), moisture absorption test are carried out on the filled sacks.

Handling Characteristics

The manual handling of cement is harsh and is accompanied by tramping of a few sacks used as stacking platform. It is worth emphasising that 3 ply paper sacks are more adequate for palletised cement with mechanical handling.

Recommendations:

1. Keeping in view the manual handling operations, and existing storage conditions and hazards of journey, it is desirable that cement should be packed in jute/hessian sacks of 50 kg each. Each sack may cost 1 to 1.10 Birr but with a possibility of reuse upto 5 trips, that may prove to be far more economical. Thus, the cement loss may be reduced to 5-6 percent from its present incidence of 10-15 percent.
2. The efficacy of recommendation 1 above, should be tested by importing 500-1000 sacks. These should be filled with cement and field trialed with those in paper sacks. The merits of one vis-a-vis other should thereafter be evaluated.

12. Establishment visited : Anbessa Flour and Macaroni Co
Addis Ababa

Officials contacted : Mr Gudeta Nedesa
General Manager

Date : 4-4-83.

Annual production and marketing mix of the factory consists of 2,50,000 quintals of macroni, 180,000 quintals of flour and 2500 quintals of spaggetti. Annual consumption of packaging material is in the neighbourhood of 1.5 million celluphane pouches for 1 kg flour in each; 200,000 jute sacks, new and reused and 3000 reams of wrapping paper.

Packaging and Problems Encountered:

Flour

(i) Unit packs of 1 kg flour in celluphane pouches, duly labelled and 50 of these are packed in sacks for distribution in the market. Bursting of celluphane packs and consequent spillage of flour is reported. Celluphane pouches are imported from West Germany about 1.5 million every year.

(ii) 100 kg of macroni is packed into hessian sacks for bulk distribution and no problems appear to be encountered.

(iii) 1 kg of spaggetti - about 55 cms in length is wrapped manually into wrapping paper of 40 gsm, shaped into a triangular form, folded at ends and glued. 50 such packs

are packed into a used sack by two workers. Packing operations in sacks are severe in nature and completely unsuitable for spaghetti packing. Nearly 25 percent breakage at the filling and weighing stations in the factory itself is noticeable. No figures are available for transit losses and quantum of broken spaghetti.

Recommendations:

1. Replacement of cellophane pouches with heat sealable polypropylene or even with polyethylene will be more advantageous and economical. The changeover would afford a better protection against moisture and infestation hazards. Moreover the film has better strength and clarity characteristics and would be cheaper and economical. Nearly 30 percent savings in material cost is expected.
2. Single colour printing on bags is recommended instead of label pasting on the top. These labels get removed in distribution. Some indication about date of packing should be given to ward off the danger too old a material.
3. Improvements in handling of spaghetti are called for. The reduction in length of spaghetti could reduce breakage and spoilage rate. Bulk packaging of 25 kg (1 x 25 packs) in cartons even with 1 kg wrapped packing may prove to be more beneficial in the overall interest of the product and its safe delivery. A change over from 100 kg (100 x 1 kg packs) in jute sacks to 25 kg in CF Boxes is recommended.

13. Establishment visited : Augusta Shirt Factory
Addis Ababa
- Officials contacted : Mr Getachew
- Date : 4-4-83

The factory manufactures 400,000 shirts from fine synthetic fabrics mixed with cotton yarn every year. Its products are popular throughout Ethiopia. In addition, the unit manufactures uniforms for Army, Factory workers and work overalls. The unit has fairly modern machinery and equipment.

Packaging:

Shirts Fancy Grade: The entire packing is done manually. Pre-formed top and bottom flats with top printed in two colours on cast bleached board 350 gsm shirt cartons and top flat having a display window pasted with celluphane - are used. Nearly 250,000 cartons are used every year for packing of shirts and each top with a dimension of 61 cm x 47 cm, bottom 60 cm x 45 cm. Material is procured locally at the rate of 0.60 Birr each. Each carton (telescopic when fully erected) is manually formed, shirt packed and top placed in position. 64 shirt cartons are placed in a CF box for distribution. In addition to the brand name, each carton has an identification place to indicate size of the shirt and other details.

Less expensive types of shirts and uniforms are individually packed in poly bags and 64 of these are further packed in a larger poly bag for despatch.

Overall:

Two overalls are packed in a poly bag of 61 cm x 41cm - 150 gauge with top folded and tagged in for closures. These, at times are repacked with hessian cloth wrap and delivered to the users.

Problems Encountered:

(i) Each of the carton top with cellophane window is deformed due to shrinking of cellophane on account of variations in temperature.

(ii) Opening of poly bags due to static electricity charge at times becomes very difficult.

Recommendations:

1. Size of the carton for shirts can be reduced by 10 per cent in length, by rearranging the shirt folds during heat pressing. Material saving of 10 percent are assured without any adverse effect on distribution and marketing.(Demonstration given on the spot).
2. Use of cellophane could be dispensed with and replaced by either transparent pvc or poly propylene film - the latter is recommended. This would minimise the incidence of deformation of the cartons and assist speed in packing operations.
3. 30 percent saving in costs can be achieved by changing the arrangement of packaging of 'overalls' from length-wise to width-wise placement in the poly bag and closing it by a single fold with staple.

4. The possibilities of packing relatively less expensive shirts in a lot of 12 shirts in each poly bag instead of one shirt in each can be looked into. For institutional purchasers, these can be bulk packed and distributed. For instance in the case of uniforms, bulk packing of uniforms with a polyethylen wrap around; packed in corrugated boxes for despatch can result in substantial savings.

14. Establishment visited : Mega and NCI Paint Factory
Addis Ababa

Officer contacted : Mr Leyikum Mulugeta
Manager
Mr Hailu
Production Manager

Date : 7-4-83

Major products include paints, varnishes, synthetic enamels, and lacquers. The factory produces 1.6 million litre of paint currently. On demand, it also produces varnishes, synthetic enamels and lacquers.

Packaging Problems Encountered

Packaging of paints, varnishes, synthetic enamels and lacquers are in liver lid tin containers mainly of 4 litres and 1 litres size as per requirement. Each container is manually filled and the top of the container is press closed. Each container is fixed with labels printed in two colour 4 containers of 4 litres each are placed in a CF box size 380 mm x 190 mm x 380 mm, flap closed by P.V. adhesive and a label printed in two colour is flued on the carton. The problem of leakage of contents in 4 litre container filled with a handle has been reported from the paints where hinges are fixed to hold the handle.

Recommendations:

1. Use of Tin free steel containers is recommended. This would reduce the material cost by half.

2. Sizes of CF Boxes are oversized and a reduction in size by 15% in dimension is possible.
3. Use of rectangular containers for varnishes and lacquers, instead of the cylindrical type is recommended.
4. Single colour labels would suffice both on the cartons as well as on the tin containers.
5. Redesigning of the handle and its method of fixation are called for. Instead of punching the handle ends and rivetting the possibility of holding it with two flattened hooks duly soldered to the body of the can should be examined. Or the handle can be completely eliminated with a substitution of a nylon string formed into two loops one at each end and held in position from the hooks. The possibility was explained to the suppliers, M/s Crown Cork.
6. P.V.A. glue is expensive, flap closures by good quality gum tapes is recommended.

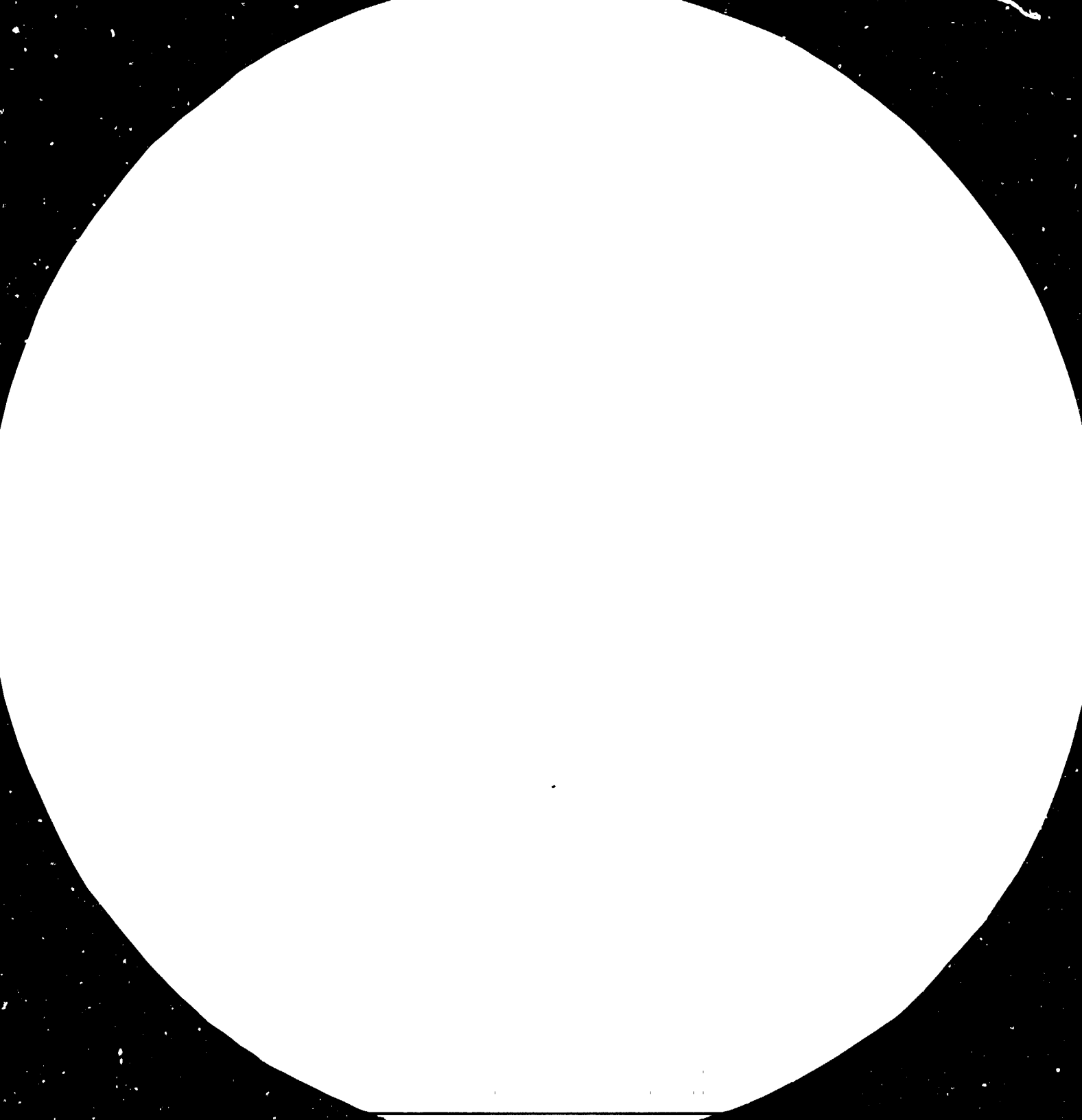
15. Establishment visited : Awash Winery, Addis Ababa
Officials contacted : General Manager
Mr Worku Teffera
Marketing Manager
Mr Mulugeta Bayou,
Production Manager
Date : 7-4-83

The wines produced in Ethiopia enjoy a reputation for quality both in the domestic and export markets. The product mix consists of Sarris - 90 percent; Dukam 2 percent; Soave 3 percent, Gonder 3 percent, Amba - 1 percent and Abadic 1 percent. The distribution of wines is in heavy glass bottles - normally averaging 8 trips in the domestic market. The bottles meant for exports markets are of the same weight and dimensions as those used in domestic market. One dozen of filled bottles of different brands are packed in C.F. box of size 35 cm x 26 cm x 33 cm for export markets. The distribution of bottles particularly "Sarris" in the domestic market is in non-partitioned wooden crates 53 cm x 53 cm x 53 cm.

The empty bottles are collected from the distributors, washed with water and their labels are removed manually. Some of these are buffed on an automatic high speed buffer and labels are removed thereof.

The wine is filled into bottles on a semi-automatic liquid filling machines, and corked on a corking machine.

Printed aluminium foil labels, printed in green colour are twist wrapped manually on the bottle necks. Locally





28



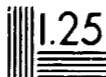
32



36



40



MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS
1963-A MICROFILM REFERENCE MATERIAL
NBS 1963-A MICROFILM REFERENCE MATERIAL
NBS 1963-A MICROFILM REFERENCE MATERIAL

printed labels in four colours are glue pasted by hand.

Problems Encountered:

1. Delamination of labels in the distribution system to the tune of 15 percent is reported.
2. Factory breakage of bottles is estimated to be 2.5 percent. Nearly 7.5 percent are broken or rendered unfit for use and or in the distribution system not returned.
3. Flasks which account for bottling nearly 25 percent of the "Sarris" production have to be straw supported for display in the market and for use at the point of consumption. The straw padding and its cleaning are difficult and expensive processes.
4. Due to shortage of wooden crates, the filled bottles have to be transported without these and are stacked into trucks in rows and columns 7 to 8 feet high, leading thereby to higher incidence of breakage.
5. Label sizes are not punched uniformly - the advantage of an attractive label is lost and no precision is maintained in respect of the surface area available for labelling.
6. There is a heavy overcrowding in the section for washing of bottles - 45 workers. Labels are removed by scratching the soaked surface by finger tips.
7. Straw padding at the bottom of the flask is generally in broken form and not easy to wash. Generally it is given

a water both. In a number of cases, the soiled surface remains uncleaned.

Recommendations

1. Standardisation of bottle size is recommended. Brand differentiation can be attempted by the use of different types of labels - (Demonstration given at the spot to the General Manager, Marketing Manager and Production Manager).
2. Use of light glass bottles for exports is likely to be more economical.
3. Continuous use of flask type bottles is uneconomical and unhygienic. These should be phased out.
4. 10 percent breakage rate (including non-returnable bottles) is too much of a strain on the resources of the unit - wooden crates/plastic crates (preferably) should be procured and used. The despatch of filled bottles in rows and columns raising to a height of 7 to 8 feet should be discouraged.
5. Export type CF box is oversized - its size can be reduced to afford economies in cost of material.
6. Foil labels can be replaced by labels of metallised polyester of the same colour to maintain brand image. Additional paper label (Sarris) on the neck of the bottle can be eliminated altogether.

7. Pre-glued (coated) labels after printing will be more economical and save a lot of glue which is being imported. This would also reduce the incidence of delamination of labels.
8. Dukam/Gonder Brand are finding export markets. A much larger part of the production should be diverted to these two brands to earn foreign exchange.
9. There is need to introduce 325 ml bottles for domestic distribution of "Sarris" side by side with the 750 ml bottles. This can lead to market expansion.
10. The workers can be given steel wool for removal of water soaked labels - the operations will be fast.
11. Dukam & Gonder brand wines should be introduced in gift packs/carry home packs of two or three bottles at the duty free shops at Bole and Asmara Airports and attempts should be made to export these in these packs to the different markets (suggestion was conveyed to the Marketing Manager).

16. Establishment visited : Ethiopian Fibre Factory
Akaki

Officials contacted : Mr Eifle Seyoum
Manager

Mr Asmelash
Technical Manager

Mr Niaker
Material Manager

Date : 8-4-83

The unit is a major supplier of jute sacks and hessian cloth for packaging of grain, sugar, salt, flour, oilseeds, coffee, textile, garments, etc. It is required to produce eight different specifications for packaging of various types of produce and products'. These specifications are enclosed. Jute fibre imported from Bangladesh and Kenaf from China are mixed in certain proportion with jute cuts and recycled fibres to produce yarn, that is subsequently used for hessian cloth. The proportions used are 40% Kenaf, 40% jute and 20% recycled fibres and njute cuttings.

Problems Encountered

The management is fully aware of the complaints made by the customers but are willing to attend to these only if higher prices were paid for the sacks. In the opinion of the consultant, it is not the low price recovery that is said to be responsible for poor quality, there are other causes associated with it. A visit to the weaving, stitching and branding sections has revealed a great apathy towards quality control of its achievement. Almost every

loom's production is defective hessian cloth - the defects which are avoidable with operator's care. The entire operations seems to be concerned only with turning out higher production irrespective of its being of the right specifications or not. What so ever may be the merits of turning out higher production, its being fully divorced from the specifications is a dangerous tendency and need to be checked. Similar tendencies persist in almost every section. This was brought to the notice of the General Manager, the technical manager and the procurement manager.

Quality Control

The quality control department conducts two basic tests on the finished fabrics viz. (i) the tensile strength test and (ii) puncture resistance test - (the department could not be visited as it was closed). There is hardly an evidence of any rejection taking place in the production department. Since sacks are in very short supply, the production of quality sacks does not attract the attention of the organisation as every thing produced is sold off.

Cost Control

Cost control system is extremely weak and practically non existent. Similarly, there is very little control to keep in check the wastages. A dominant consideration is that every waste and rejected processed material can be recycled, but it is forgotten in the process that machine time lost, labour spent, energy consumed etc. are non recoverable inputs.

Recommendations

1. A system of inspection of specifications laid down by an independent inspecting body, on behalf of the users industries is recommended.
2. Quality control measures must be strengthened and implemented.
3. A phased programme of replacement of very old looms should be attempted.
4. Branding operations need to be improved by replacing the printing rollers.
5. The stitching section is too over congested and the quality of stitching for at least 40 percent of sacks produced is far below the desired levels.
6. A fresh look at the dimensional and other specifications of sacks is should be attempted.
7. Technical personnels should be trained preferably in some technical institute of jute research.

17. Establishment visited : Adei Ababa Cotton Factory
Addis Ababa

Officers contacted : Mr Ephraim Zemichael
Manager

Date : 8-4-83

The unit is engaged in the production of cotton yarn and blanks. Its annual production is 4700 tonnes of yarn and 390,000 of blankets of various types. Production of yarn is through a modern and completely automatic plant. The unit serves as a source of supply of yarn in hanks to small weavers and occasionally sells its supplies to other factories as well.

Packaging Problems Encountered

Raw Material: The basic raw material viz. cotton is received in hessian bales of size 3.5' x 2.5' x 3.5' weighing about 220 kg and are pressed and held in position by 8 steel wire straps. These straps are twisted and bent at the ends. The loading and unloading of bales are done manually. The open ends of the steel wire pose a threat to the workers who are required to handle these bales. Use of steel straps duly joined by a seal is desirable.

Yarn in Cones: 50 'Yarn Cones' weighing 90 kg are packed into sacks without any individual wrap around, open top closed by hand stitching and despatched to various destinations. Unwinding of of yarn with deformation of cones is the reported damage. Although part of the damage is recoverable by retrieval of yarn from the cones, but is considered

to be too labourious and time consuming process.

Yarn in Loops: 4.5 kgs of yarn in loop form and de-hanked is pressed and bundled with 5 rounds jute twine straps. Each bundle is wrapped in a Kraft paper 40 gsm, ends folded and glued, cross strapped with jute twine and label pasted. 36 such bundles are piled one above the other in 6 x 6 rows and columns, hessian wrapped, ends stitched and despatched to various destinations. No serious damage to yarn reported. Each individual bundle of 4.5 kg is said to be a setting unit.

Blankets: 75 Blankets are pressed into a bale of hessian cloth and ends are stitched while in pressed form.

Recommendation

1. Two coloured labels presently pasted on each bundle of (4.5 kg) yarn is considered extraneous and can be eliminated or replaced by a rubber stamp on the outer wrap. 5 rounds of jute twine strapping is considered to be over strapping two or three would suffice. There is no need to put an additional across strap with jute twine on the wrapped bundle, gluing of ends of the wrapping paper would suffice. (All these were demonstrated on the factory floor.
2. Yarn loss in cones is much more serious. This can be minimised by avoiding the mobility of cones in transit, by despatching these in CF boxes with an arrangement in rows one above the other - each alternate cone with upside down. With a total of 16 cones in each box. Or else, each cone

should be tightly wrapped with a poly film sheet, ends inserted into the cone's narrow end, placed in jute sacks and despatched. The loss of yarn may substantially be reduced.

3. There is no protective wrap around blanket to ward off the incidence of damage caused due to moisture and water hazards. A polyethelene wrap of 100 gauge is recommended. The bales can be strapped with used steel straps available in the factory or with steel wire (recovered from unbaling of cotton bales).

4. The steel wire strap ends on cotton bales should be covered by an aluminium strip duly pressed on it by a pressing tool to avoid injuries to human being.

18. Establishment visited : Crown Cork
Addis Ababa

Officials contacted : Mr Geremew
General Manager
Mr Hiwot
Printing Master

Date : 9-4-83

The unit has a semi-automatic line for manufacturing tin containers mainly the cylindrical ones upto a maximum capacity of 4 litres each. Its principal customers are establishments manufacturing paint, pharmaceutical and food products. The entire quantity of tin is imported. Tin free steel is being used for the manufacture of crown corks on a fully automatic plant. The unit has single colour metal printing and drying line which is said to be more than 60 years old.

The plant has a capacity of 2.5 million cans and 3.3 million gross of crown cork and its product mix in cans is as under:

1. 4 litre paint cans 176 mm x 190 mm with handle (All with lever lid closures)	800,000
2. 1 litre paint cans 115 mm x 120 mm (feamed and cemented sides)	800,000
FAFFA cans 100 mm x 120 mm with foil lining inside.	350,000
3. Cans for Pharmaceutical units	
1) 115 mm x 130 mm	300,000
ii) 90 mm x 78 mm	75,000
iii) 90 mm x 50 mm	25,000
iv) 90 mm x 95 mm	75,000
v) 115 mm x 95 mm	75,000

Problems Encountered:

No facilities exist for testing the thickness of tin coating and the temper of tin plate. Temper 2 and 3 are mainly in use. The plant has certain inherent problems relating to tooling, maintenance and quality control. The possibility of using TIN FREE STEEL for certain applications has not been considered. This could reduce the material cost by half; but may require modifications in tooling and addition of certain capital equipment. The proposition is worth exploring. There are customer complaints about the quality of PVC was in the crown cork and its printability characteristics.

No outside help is available to seek solutions to technical problems encountered in the plant.

Quality Control:

No in-house facilities exist for ensuring quality control.

Cost Control:

No Cost Control system is in operation. The entire emphasis is on production. The rate of scrap generated can be reduced by careful planning and selection of the right of tin plate.

Printability Characteristic of
Crown Corks:

The printability characteristic of crown corks are poor and can be improved. Customers arrange for their own graphics and tin plates are made in single colour on Dawson and Payne and Elliot machine. A re-run is taken for printing the second colour. Printing inks and varnishes are procured from the overseas markets.

Packaging:

Most of output of cans are locally consumed. Despatch of tin cans is in- re-used CFB boxes and there are no serious complaints.

Despatch of crown corks are both in new and used CFB boxes. About 7200 crown corks weighing 19 kgs, are placed in a poly bag of 150-200 gauge and of size 83 x 70 mm size, top folded (closed). The box flaps are closed by gum tapes.

Recommendations:

1. The crown corks are said to be used in a period of 15/20 days. The use of poly bag is considered extraneous and can be eliminated and replaced by a poly coated or waxed paper with coated surface not in contact with crown corks on the top and bottom and sides to afford moisture protection demension can be reduced by 20 per cent; and can be closed by stapling.

2. The compression strength of the 3 ply CF box is very low. A poly lined sack with twice the capacity will do the job. The possibility is worth exploring from cost reduction point of view.
3. Substitution of Tin Plate with tin free steel should be looked into on a priority basis. This may result in a tremendous saving in the cost of the material.
4. The unit can produce pressed top and bottoms of fibre tubes. The possibility of a composite container with metal top/bottom and body of paper spiral (fibre) could prove to be advantageous for certain uses particularly for packing of pharmaceutical tablets. Facilities for making fibre tubes do exist with paper converting unit.
5. A few customers of crown cork require coated crown corks. It is worth while to find out whether others can be persuaded to change over to particular coated colours. A printed crown cork, perhaps, does not serve as a vehicle for brand promotion, nor of brand identification at the point of sales. Its role in protecting the consumers from substitution or spurious products is equally limited.
6. Revetting of handles to paint cans of 4 litres, is also causing leakages of paint in 15 to 20 percent of the filled containers. The possibility of replacing the handle with poly propylene straps with a buckle for tightening should be explored.

7. Training of technical personnels to effect design changes from cylindrical to rectangular and also to solve the intricate plant problem are most desirable. Due exposures should be organised.

19. Establishment visited : Addis Ababa Glass Factory
Addis Ababa

Officials contacted : Mr Mebrato
General Manager
Mr Tadesse
Technical Manager
Mr Tsegaye
Quality Controller

Date : 11/4/83

The unit is a modern glass bottle making and tumbler manufacturing factory with a production mix of 500 tonnes of bottles per month and 250 tonnes of tumblers and glasses. The unit proposes to install a new furnace by January 1984, whereby, it hopes to step up its capacity by another 25 per cent. The products are well demanded and there is sufficient demand for heavy glass returnable bottles. As a major suppliers of bottles to soft drink manufacturers such as coco-cola, fanta, pepsi and mirinda, the selling costs are the lowest. The product mix also includes manufacture of wine bottles, bottles for mineral water and beer.

Problems Encountered:

The delivery of bottles is in full height plastic crates to the users. A sizeable quantity is stocked in the open in rows and columns 8 to 9 ft high due to shortage of crates. The breakage and sub-standard production account for nearly 25 percent of the total production. A high percentage of breakage occurs at the end of the annealing line.

The annealed bottles totalling 2300 in each batch are manually assembled in rows and columns in a caged crate, fork-lifted and drive to a distance of 15 ft and positioned near the decorating line. These after decoration are manually fed to the seasoning chamber. A realignment of plant layout can eliminate one handling or else the wheeling of the material on a hand trolley would yield better results.

Quality Control:

A limited quality control of raw material is being attempted. The laboratory for quality control is fairly equipped with (i) Thermal Shock Tester, (ii) Impact Tester, (iii) Hydrostatic Tester, (iv) Glass durability Tester, (v) Glass Polarity Tester for testing the intensities of colours in glass. Samples drawn from the production line are mainly tested for thermal shock and hydrostatic test. In process quality control by undertaking other tests is equally important and should be attempted.

Packaging of Tumblers:

The glass tumblers are packed in lots of 4 or 6 dozens in rows one above other in corrugated 3 ply fibre board box with top/bottom flaps closed by gum gapes. The tumblers are packed in compartments in corrugated partititons with a separating layer placed in between the rows. No feedback on breakage was available. The tumblers can be placed in inverted form with a single play wrap around on part of

tumbler surface, the capacity of the box can be increased by 50 to 75 percent without much of breakage or loss.

Problem Solving:

Many of the day to day problems are solved by mutual consultations between general manager, technical manager and the quality controller. However, they greatly felt the need for consultation with certain outside technical agency. Some of the problems are occasionally referred to M/s Rockwell International for their Technical Advice.

Outside Exposure:

Further exposure to the technical persons is very much needed. Three basic areas of further training are identified.

1. In process quality control
2. Mould Repairing
3. Bottle Making
4. Cost Control

Cost Control:

It will suffice to mention that there is no cost control system operating in the corporation. The efficiency factor is worked out on the basis of yearly installed capacity and the total production achieved during the year. It is essential to have a more reliable system that could be capable of providing frequent data for control and correction periodically without waiting till the end of the year.

Increase in Production:

- (i) The annealing loss coupled with the loss due to sub-standard bottles of nearly 25 percent is too high for economic viability of the unit. This area requires the highest priority. Either a glass consultant or a specialist from SAVA Glass Factory Asmara should be deputed to correct the malady.

- (ii) With due expansion in the tank capacity, the capacity for bottle making can be doubled with provision of additional job formation. This should be looked into.

20. Establishment visited : Ethiopian Coffee Marketing Corporation
Addis Ababa

Officials contacted : Mr Amsalu
Manager

Date : 11/4/83

The corporation manages a modern plant for storage, sorting of impurities, segregation coffee seeds by colour by electronic eyes and is responsible for coffee exports. Coffee seeds conforming to export specifications are packed in 60 kg jute sacks and are double stitched at the open end of the sack. The plant exports around 26 thousand tonnes of coffee and uses 675,000 sacks every year for exports and domestic distribution.

Problems Encountered:

The inspection of sacks is done by observations only. The quality of the hessian cloth used for sacks is poor. During long distance operations, the hazard of punctures and the breakage of jute yarn is not ruled out. The percentage of defective sacks was counted to be 30 percent. No dialogue is carried out with the manufacturers to improve the quality of sacks.

- (i) loss of Aroma
- (ii) excess moisture absorption
- (iii) loss of weight due to busting/spillage of produce
- (iv) infestation

The plant's responsibility for the adequacy of packaging and safe delivery is considered to be over as soon it delivers the filled sacks against a particular certificate number to the port.

They usually replace the defective sacks with due markings on receipt of complaints from the port. The emphasis on preparing the entire quantity for the total journey appears to be lacking and should be corrected.

Storage Conditions:

Coffee when received is stored in silos and when these are full, is kept in the store. No records are available in the store to identify the date of arrival of various lots. Stacking of coffee sacks need a radical improvement. No space is left on sides and in the rear for circulation of air. The incidence of excess moisture was brought to the notice of the manager. The possibility of quality deterioration under storage conditions is not ruled out. All types of used sacks even the unrepaired ones, were in use endangering the safety of the produce. A few used sacks of sugar, cereals were noticed to contain coffee.

Recommendations:

1. Elongation and tensile strength testing of the sacks on sample basis should be attempted at the point of purchase.

2. Sacks found to be defective on visual inspection for poor weft and waft should be returned to the manufacturer as rejects - and should not be used for exports at all.
3. Strait line stitching on the top should be attempted instead of the ZIG-ZAG manner of stitching currently in vogue.
4. The size of the sack can be reduced and its top corners redesigned to facilitate sack handling. The material saving could be of the order of 15 percent.
5. The packing of coffee in sacks having been used for other commodities should be forbidden.
6. Storage and stacking operations at the factory site should be improved immediately.
7. Mending of defective sacks should be done before their use for coffee.
8. It appears that the regulations for coffee harvesting, packing, handling and transportation exist. The machinery for the enforcement of regulations should be reactivated.
9. The manufacturers should be requested to improve the quality of sacks. A pre-despatch inspection by the users at the point of production of sack may prove to be an effective instrument of improving quality of sacks.

21. Establishment visited : Ethiopian Domestic Distribution Corporation
Addis Ababa

Officials Contacted : Ato Shiferaw
Head, Commercial Division
Sister Wubeth
Manager, Food Division
Mr Arya Haile
Manager, General Goods

Date : 12/4/83.

The corporation is the largest single organisation engaged in the distribution of a variety goods and products procured through internal and overseas sources in Ethiopia. With its annual turnover exceeding 600 million Birr and 54 distribution outlets spread throughout the country, the corporation's obligation to ensure that the products reach the destination points in use worthy conditions, is vital. The problems highlighted during the discussions pertained to products originating from domestic manufacturers, the quality of packaging material. Some of these are summarised below:

1. Deformation of packages is a usual phenomenon at the first point of receipt by the corporation and their subsequent deterioration in storage handling and transportation is a foregone conclusion; examples quoted include canvass shoes in CF board boxes; umbrella; washing (laundry) soap, detergent powder, ready made garments, etc.

2. Elliptical shapes of textile bales and readymade garments create storage and stacking problems. Improper markings lead to misdeliveries and or excess deliveries to the distribution outlets. Case in point - Markings showing mixed lot of blankets - but contents being of a single colour blanket. Assorted woolen garments - containing one colour and mostly of one size garments.
3. Torn and deformed packages - pose hazards of pilferage and loss in transit.
4. The manufacturer do not feel their responsibility to prepare the product for the total journey but consider the termination of their obligation once these goods are handed over for transportation.

Observation Made

A visit to the warehouse for storing imported food products revealed the following:

- A) 5 to 7 percent of 18 kg special oil containers (Tin) Star Brand imported from Norway were dented and some of these were leaking.
- B) 10-15 percent of the glass jars containing jams from Bulgaria were found leaking.
- C) 10-15 percent of tomato paste containers from Bulgaria were dented and rested.
- D) Over bulged CF boxes containing 40 kg of tea (4 x 10 kg) packs in an outer container.

- E) An extremely unsatisfactory way of handling of filled tea boxes - by sliding these on a sloping ramp from a height of 16 to 18 ft. These on touching the ground invariably performed a sommer-sault and bursted in 8 out of 10 cases. The manager incharge was appraised of the incidence and a demonstration given by the consultant on the method of handling. Provision of necessary cushioning effect even by a used tyre would reduce the force of impact.
- F) Condition of Nesle Baby Food - lactogen tin containers packed in 5 ply CFB boxes was observed to be very good.
- G) No indication about the date of receipt of various consignments in the store was displayed. As such it could not be ascertained whether the principle of first come first go is being followed. An absence of this principle, can lead to unnecessary aging of products under storage conditions.

General Goods Stores

Domestic products: Rubber Shoes: Each carton containing 12 pairs of shoes was stacked 8 to 10 high. Almost 50 per cent of the cartons with a cross strapping by jute twines were bulging out due to poor compression strength and excessive empty space within the boxes. The boxes are supplied by Paper and Pulp Factory Weinji. Till the time the compression strength was improved - it was suggested that stacking height of the filled boxes should be reduced.

Umbrella: All the oblong cartons were deformed and bulged. The sharp edges of the umbrella were protruding through the boxes sides and posed a hazard in handling. 8 dozens full length, men's umbrella weighing about 35 kgs packed in the box is too heavy a weight for the carton to bear. 4 dozens umbrella, with due cushioning to cover the sharp edges would be a better alternative to pack.

Recommendations:

1. Packaging development work for loss sensitive items should be taken up by the manufacturers and the packaging material producers immediately.
2. It is vital to train the workers in methods of handling and stacking.
3. Product losses should be assessed for various products periodically.
4. The manufacturers should be given training in markings. A standard needs to be developed for markings.
5. Top and bottom surfaces of elliptical bales can be made more rectangular by providing side support during pressing operations.

22. Establishment visited : Sugar Factory, Shoa
Officials contacted : Ato Tegene
Production Manager
Date : 19/4/83

Annual production of the plant is 440,000 quintals of sugar, 100 kgs of sugar is packed into a hessian sack and mouth stitched with rayon yarn imported from overseas. No pre-use inspection of the packaging sacks is done. On account of quality variations in sacks, the unit faces problems of sugar loss. Poor side stitching and broader weave characteristic are the major complaints particularly in the case of 100 kg sacks. For the export markets, 50 kg sacks are used. At times sacks with capacity of 100 kg are used to pack 50 kg of sugar - particularly when the stocks of 100 kg sugar sacks are low.

Storage

Storage of sugar is done in pyramid form each pyramid going as high as 23 ft and full advantage is taken of the vertical and horizontal space. It was learned that sugar is held in stores for a period of 4/6 months.

Recommendations

Sugar, is an essential item for the masses and needs protection against moisture and attacks by rodents. It is important that no wastages of the commodity should be allowed. Sample testing of sacks for failures due to bursting and tensile strength of the fibre should be carried out and feedback conveyed to the manufacturer. Care taken at the user's (sugar producers) end would go a long way in preventing/minimising sugar losses.

23. Establishment visited : Desta Confectionary Works, Wonji
Officials contacted : Ato Asfeha Manager
Date : 19/4/83

On a forming, filling and sealing line, 1 kg of sugar is automatically filled and sealed into poly bags of 28 cm x 22 cm dimensions. 90 such bags are packed into a jute sack, top stitched and sent for despatch. The unit has 12 automatic machines for this purpose. On the day of visit only 6 were working on account of shortage of packaging material and spare parts. Chocolate and sweets are individually twist wrapped into cello-wrap and one kg of these are packed manually into polyethylene bag of 33 cm x 18 cm. 30 kg of sweets are packed into 2 colour printed corrugated fibre board PVA.

Problems Encountered:

1. The sealing of the poly bags is very poor and a great deal of spillage and seepage of sugar is reported by the distribution agencies. Sealing characteristic of the poly bag should be improved. A 1-2 mm gasketting at the top is recommended.
2. The size of the poly bag can be reduced by 20 percent in length, with improvements in the thickness of the bag.

3. Printability characteristic of the poly bag is too poor. It can do without it rather than having such poor printed bags. Sugar is well identifiable and printing can be dispensed with;
4. Each of the jute sack can take another 5 kg without any difficulty, this should be attempted;
5. Idle capacity of machines is too high to permit viability of the unit and should be reduced;
6. Storage conditions for the packaging material are very poor and can lead to the degradation of the material. On the spot suggestions were made to improve it;
7. The use of heat sealable polypropylene bags for confectionary is recommended in view of better clarity of the film and higher yield per meter;
8. 30 kg confectionary is too much for the 3 ply corrugated cartons. Frequent instance of bulging of the box under stacking were noticeable. It is recommend to use a 5 ply box in which 35 kg can be easily packed, or selse, 25 kg of confectionary may be the optimum weight to be packed into the corrugated fibre board box with reinforced corners;
9. Inventory of finished goods stocks is too high. About 13 tonnes of pre-packed sugar is lying in the store for more than a year and 330,000 kg (11600 cartons) of confectionary were lying in the store for more than 4 months. A better coordination between production and marketing is called for.

24. Establishment visited : Ethiopian Pulp and Paper
Wonji

Officers contacted : Mr Gebre Kiros Habtu
General Manager
Mr Alemayehu Kebede
Plant Manager
Mr Takele Arage
Production Incharge

Date : 19/4/83 & 20/5/83

Corrugated Fibre Board

The unit is the largest of three units in the country engaged in the production of KRAFT paper board and boxes. The raw materials viz., Kraft Liner, Test Liners and Fluting media are imported. At times the test liner is produced from the paper factory out of the re-cycled pulp. The annual capacity of the unit is 3000 tonnes of board/boxes every year on a three shift basis and it produces only 3 ply board and boxes both printed and unprinted as the case may be.

A single face automatic corrugating machine supplied by Schneider Cre-Usot N. York, with rollers of B and C Flute is in operation. The unit has P and M creaser slotter - (Italian); Martin - Printing Slotter, Speck Bottel Hanburg stitching machine and automatic P and M Rotary Die Cutter. The unit uses maize starch for making the board with a maximum width of 62 inches.

Problems Encountered:

The steam pressure required for smooth operation of the plant is erratic and needs to be corrected. There is a high incidence of warping and partial creasing of the board, leading to excessive wastage. The box becomes weak due to creasing of its surfaces. There is also a heavy wastage encountered on account of fanciful dimensions specified by the users. No proportionate relationship between length, height and width of the box are observed and one comes across an array of sizes with disproportionate dimensions thereby the economics of board utilisation. Trimming waste of the board is very high. A practical demonstration to reduce the trimming waste and how to avoid warping and unnecessary creasing of the board was given. It is important that moisture content of the medium, test liner and the outer liner should be as close to each other as possible. Too much variation in moisture content is the cause of warping. After the demonstration, about 300 meters of board was produced without warping.

The synchronisation in the speed of the conveyor belt and the speed of the rotary cutter on the line helped in eliminating the extra crease on the board.

Recommendations:

1. No developmental work on design and structure of boxes is being done. It is vital to undertake developmental work immediately.

2. Customer's complaints are maximum about the bulging of the boxes in stacking and storage operations. Insufficient compression strength of the boxes, coupled with improper and excessive stacking heights and loads, high incidence of moisture absorption, packing of excessive weight are some of the causes responsible for bulging of the boxes. A great deal of care should be bestowed to the production of boxes for specific bulk densities and introduction of structural improvements by reinforcing the edges of the box. A proper proportion between length, height and width in box dimension can be helpful in improving the stack stability. (A demonstration to this effect was given).
3. Manufacture of 5 ply boxes should be taken up for certain end users. The production can commence with the addition of another gluing roller that can initially be semi-automatic. ISA factory Asmara is already producing such boxes provision and similar approach can be adapted for the unit as well.
4. A minimum of two technical persons should be exposed to paper and board testing and relate these to box performance in the field.
5. There is no compression strength testing equipment available in the factory. It should be provided.
6. In process quality control is missing. The conditions of rollers is much below the desired standards, accordingly.

There is no uniformity in flute heights, causing quality problems of the board.

7. Heavy dependence on imported paper for liners and 'medium' can be reduced by exploring the possibility of producing paper out of agricultural residue. A majority of the agricultural residue accruing as a by-product in the agriculture sector viz. wheat straw, maize straw is not put to higher economic uses. The pulp prepared out of it and mixed with pulp out of coniferous wood could be an excellent source of making Kraft Paper in the country. Experience of India, Brazil & Egypt in setting up mini paper mills with a capacity of 10-30 tonnes a day and based on agricultural residue are instances to illustrate the possibility.
8. Selling price of the finished box is too high - presumably due to the cost of Kraft paper and import duty of 49 percent thereon. The burden of import duty is too high to promote the use of CF Box. Reduction in incidence of duties is called for.
9. With a limited investment of 25,000 - 30,000 Birr, a small wax coating equipment can be installed to provide water resistant board for the manufacture of wax coated boxes. Such boxes are ideal for use in frozen beef, meat, chicken, fish and certain types of vegetables and are extremely economical in protecting the products these contain.
10. Cost control system is conspicuously missing and should be put into operation.

11. The finished goods stores stocks heavy inventory of boxes. These are more likely to degrade under storage conditions. A high turnover of inventory should be attempted.

Multi Walled Paper Sacks:

Paper and pulp making unit has plans to recommence the manufacture of paper sacks. A brief outline of the production processes appears to have been prepared. With the increase in cement production, the country it is estimated that would need about 10.2 million 3 ply paper sacks for cement/lime distribution. About 4.2 million sacks would be needed for the existing plants, viz. 2.0 million for Addis Ababa unit, 1.4 for unit in Massawa, 0.6 million for Dire Dawa and 0.2 for Senkelle Lime factory. Mugar Cement Factory is likely to be on the production stream by July 1984 and may require 6.0 million sacks every year. Besides, there may be other end users, such as flour mills and manufacturers and distributors of powdered chemicals.

It is proposed to import the pulp and to manufacture 80 gsm extensionable creped or Clue pack paper in the factory. The move appears to be well intentioned but fails to take into consideration the distribution hazards for filled paper sacks. Already, 15 percent of cement produced by one of units in Addis-Ababa is said to be lost in the distribution system due to bursting of bags, caking due to moisture absorption. The proposition calls for a realistic re-appraisal from the long term point of view.

The multi-walled paper sacks are more suitable for mechanical palletised handling and much less for countries where manual handling in loading and unloading and stacking operation is a way of life. Moreover, these are single trip sacks. Their suitability from the total economics of packaging need to be reviewed and evaluated. Jute sacks - which offer multi trips upto 4 to 6 could be good substitute for cement packaging for domestic distribution. It is possible that for export of certain products, paper sacks may provide a good packaging system.

25. Establishment visited : Air Port,
Domestic Warehouse &
Bonded Warehouse

Officials contacted :

Date : 20/4/83.

Domestic Cargo Warehouse:

A. The warehouse presents a picture where all types of mixed cargo is placed in conjunction with each other. There are no racks to stack the small parcels. A few examples are - furniture pieces wrapped in Kraft Paper lying on the top of fragile cargo cartons, sharp edges of Ladder (aluminium) without any cushioning on their pointed ends resting on corrugated cartons. Reused and often bulging corrugated cartons, cross strapped with jute twines cutting deep into the carton surface itself are accepted for air freight.

B. There does not appear to be enough inspection to ensure that the cargo is well prepared for air journey and inter-modal journey. The cargo receiving officials regard their responsibility to culminate with the endorsement wherever applicable, that cargo is accepted at owner's risk. This may absolve the airlines from the risk of bearing any loss or paying compensation but surely is no guarantee to minimise the loss of products in country's interest and improper use of air space.

Bonded Warehouse:

C. Most of the general cargo is kept helter and shelter as and how received, without any segregation of hazardous cargo. For instance, highly inflammable and corrosive cargo is observed to be lying side by side with textiles and radios wrapped in polyethylene sheets. International laws and regulations for storage of hazardous/dangerous cargo are not being observed.

D. No fundamental and elementary principle of stacking is being observed. The stack loads are made at random and in certain cases are highly unstable. Instances abound where light weight boxes or cartons are kept at the bottom to support the heavier ones on the top. Accordingly, accident proneness due to sudden and accidental drop of valuable and sensitive cargo is high. Similarly, no particular attention is paid to the stacking of fragile cargo on racks or at safe places.

E. Layout of the entire warehouse needs to be radically improved. There are very few storage racks for small parcels. A separate provision for storage of dangerous cargo is immediately needed.

F. Store keeper incharge of the warehouse, has extremely inadequate exposure to storage and protection of products during storage.

Recommendations:

1. There is an urgent need to create packaging consciousness among the industries, cargo handlers, airline officials and freight forwarders on certain vital aspects of preparation of cargo for inter-modal transport journey. This can be attempted through a series of a half day's seminars with due illustrations and suggestions to improve packaging features.
2. Laws and regulations for packaging, handling and storage of dangerous cargo should be strictly observed. There is a need to display charts showing where and how to handle dangerous cargo.
3. Persons incharge of the warehouse, should, among other things be given training in respect of formation and segregation of stack leads, and use of the storage space. The need to formulate special instructions and observance of these instructions particularly for fragile cargo are called for. (Demonstrations were given at the spot).
4. Regular training programmes for the staff of airport and airlines on aspect such as handling of cargo; pallet formation, storage and use of fork-lift trucks etc. should be conducted.

26. Establishment visited : ROL Soap and Detergent Factory
Officials contacted : Negussie Alame
Finance Manager
Mr Nega Rarfine
Mr Bekele
Quality Control
Mr Melaku
Adm Manager
Date : 23/4/83

The unit manufactures liquid and powdered detergent and has a capacity of 1080 tonnes per annum. More than 90 per cent of its capacity is utilised for the production of powdered detergent and the remaining for liquid detergent. ROL and OMO are the brand names under which the product is sold. The size mix includes junior (50 gms), medium (150 gms), large (400 gms) giant (1000 gms). Of these, junior and medium are the fastest moving sizes, while large is slow moving and the giant - the slowest moving size in the market.

Packaging and Problems Encountered

An automatic carton erection, filling and closing machine ACMA-ITALIA currently in operation is more than 20 years old and has become a source of concern and anxiety in maintenance and performance. No critical spares are available. No doubt, it is a high speed machine, but the carton and detergent wastage is more than 15 percent on the line itself. As such, the unit has more often to resort to manual filling and closing of the cartons.

The weight variations in the filled cartons are to the tune of 10-15 percent and there are a large number of complaints to this effect from the customers. The variation in weight is due to the method of filling and the level to which these cartons are filled. The workers are not equipped with any measuring devices nor the cartons are weighed individually or at random to detect the error in weight.

The cartons after manual filling and closing are pounded by a stone to enable the glue settlement, packed. The printed flaps get smeared with powder due to the pounding operations.

Due to shortage of storage place, one can see the stacking of CF Boxes, 8-10 high around the filling station. This restricts the movement of men and obstructs flow of material. Accidental fall of cartons from height of 8-9 ft. was reported on account of congested storage space.

Detergent is also sold in 3 ply paper sacks of 15 kg each. These sacks are closed by stappling with an office type stappler. The unit has no stitching equipment for closing the open end. It was demonstrated to them to close the open end by stitching (pending receipt of hand stitcher) by joining the open ends with a folded board - with folds extending about 1" on either side and hand stitching it.

Liquid detergent 'lager' is packed into 5.5 litre plastic jerry cans and 200 litre drums as per requirements.

About 7 percent of the 5 colour printed cartons are reported to be discarded during the manual filling and closing operations. This by any reckoning is not a good record. According to the set practices, such a wastage should not exceed 2.0 percent.

Storage Loss of Packaging Material

The packaging materials viz. printed carton and CF floor Boxes, 3 ply sacks are kept in direct contact with the floor surface. It is not surprising that the printed cartons pick up excess moisture from the floor and create erection problem on the filling and glueing station in conjunction with the problems encountered on the equipment. The store is full of 1 kg - giant pack detergent flats kept in the store for more than 6 months. Moreover, finished goods inventories have accumulated for 1 kg (giant) cartons. About 13000 kg of detergent is lying in the store for the last six months. Such high inventory of finished goods are held and there does not appear to be any move to liquidate stock. The aging of detergent and the packaging material that holds it, are not ruled out. It was suggested that even with repacking of the powder into smaller and fast moving packs, the old stock could be disposed off.

The same is the condition of the liquid detergent in jerry cans these are not moving into the market at all.

Recommendations:

1. Pending repairs of the automatic filling machine, the hand filling and packing station should be equipped with suitable measuring devices to fill the cartons. This would ensure required and declared product quantities in the cartons.
2. The pounding of the cartons by a 4/5 kg stone must be stopped immediately. It spoils the print surface and should be replaced by a smooth metal plate for pressing operation.
3. The graphics on the cartons need to be reviewed. The size of lettering on the 50 gms, 150 gms cartons specially on the side sleeve is too small to be easily read.
4. Better production planning and control in conformity with market demand would facilitate faster movement of stocks and avoid unnecessary lock up of capital.
5. The duplex board cartons particularly for 1000 gms (giant) can be replaced by E flute cartons duly printed in two colours.
6. No facilities exist for testing the stiffness, bursting strength moisture content of the board and dimensional specifications of the carton. As one of the major end user of cartons, such elementary tests on board and carton are essential. The suppliers should be asked to give a specification certificate with each lot supplied.

7. The possibility of introducing 1 kg polyethylene bags duly printed with OMO/ROL LOGO should be explored. Clue brand powdere in poly bags with good sealing characteristic produced in Asmara is moving quite well in the market.
8. More than 1/3 of the space in 15 kg paper sack remains empty. The possibility of filling 20 kg in each sack should be explored. The per kg cost of packaging, handling, storage and transportation is expected to be reduced by 30 percent or so.
9. The dialogue between the suppliers of cartons and the factory on is missing. The suppliers should be requested to visit the unit more often to observe the performance of the cartons supplied by them and to effect the necessary improvements needed.
10. A couple of hand stitching machines should be provided for paper sack closing.
11. The stocks of 'lager' in jerry cans should be offered to institutional buyers even at a discount to avoid unnecessary aging of the product and locking up of capital.
12. The corrugated boxes are printed in two colours - their printing in one colour would be sufficient.
13. The CF boxes are flap closed by PVA - a very expensive process of closing. Top and bottom closure by water based gum tapes of good quality should suffice.

14. Smaller packs of detergent in laminated soft pouches introduced in Asmara are proving to be quite popular. This introduction in other markets should be explored.

CONSUMPTION OF PACKAGING MATERIAL

	<u>1981-82</u>		<u>No.</u>	<u>Br.</u>	<u>Unit Br.</u>
ROL Junior	1/144	CFB	28205	56875	2.06
	1/144	Cartons	4809312	245274	0.05
Medium	1/48	CFB	38310	77252	2.01
		Carton	1932100	202106	0.10
Large	1/24	CFB	12217	29222	2.39
	1/24	Carton	311700	70469	1.79
Jiant	1/10	CFB	17850	32039	
		Carton	175500	68701	
Empty paper bags			10566	7870	
Jerricans			33900	207368	
Junior Boxes	1/144				
	Artistics				
	52600				
Large Labels	19500		262.36		
ROL Labels	7600		204		
Essex Labels	3760		<u>226</u>		
			<u>337875</u>		

27. Establishment visited : Assab Port
Officials contacted : Mr Mekonnen, Port Manager
Mr Bayore Mengestu,
Operations Manager
Mr Woldegiorgis,
Chief Inspector
Mr Araya Tsegay,
Jetty Chief
Date : 25/26-4-83.

Assab Port handles almost 90 percent of total imports by sea to Ethiopia and an equal percentage of total exports originating from Ethiopia to various export markets. The products imported include a wide variety of items including cereals, pulses, flour, meat and meat products, edible oils and margarine, tea, tobacco; cotton fabrics, garments, silk and art silk manufactures, agricultural and industrial machinery, appliances, electrical machinery, motor vehicles and spare parts, drugs and medicines, rubber tyres and tubes, footwear, plastic film, parafin and chemicals, fertilisers, building material, sanitary wares, paper and board, hospital equipment, and consumer goods, etc.

Many of these articles are shipped in pallet loads in containers. Depending upon the country of origin, the pallet loads are strapped with steel strap, polypropylene, nylon straps. In certain cases, these loads are shrink wrapped or wrapped with a stretchable film.

The material handling is undertaken by means of 18 cranes installed on two cargo discharging/loading jetties. Besides,

mobile cranes are also pressed into service as and when needed. The stack formation is by the use of forklift trucks wherever feasible, or else, the stacking is done manually.

Packaging and Problems Encountered:

Many of the pallets are of disposable type as such their disintegration and collapsing were obvious. In a large number of cases, the wrapping film, nylon straps had given way, posing a stacking problem. It was observed and reported, that nearly 70 percent of the cargo received had to be stored in the open as the warehousing covered/shed space available was limited.

It is difficult to assess the exact quantum of losses such an open storage system causes to various products, particularly when there is no protection against temperature, moisture and salt vapour hazards. Within the available resources and the limitations of the warehousing space, the port authorities appear to be well in command of the situation particularly during the dry spell of the season. Their problems and consequent losses get aggravated during the rainy season. It is reported that nearly 10-15 percent of various items get totally or partially.

Damaged Items:

Some of the items where the damages were identified are enumerated below:

A. Edible Oil:

Shipments received under the world food programme and in units of 4 litre tin containers packed in corrugated boxes - showed a high incidence of denting and leaking of oil. It was reported that the loss was of the order of 5 percent and an additional 5 percent is further lost during inland transportation.

B. Refractory bricks had snapped straps and are likely to pose a problem during inland transportation.

C. Paper Pulp Bales

Evidently meant for recycling and pulp making were lying in an awful conditions.

D. Nylon Wool

Dyed in fast and dark colours and packed in bales are stored in the open under sun and rain. Already fading of colours was noticeable.

E. Parafin Wax

Imported from China in 200 litres m.s., lid pressed drums - 200 in nos. Stored in the open. Nearly 35 to 40 of these drums had their lids missing or completely damaged. The floor area was completely soiled with spillage of parafin wax.

F. Polyethylene Film

Exposed rolls of polyethylene films were stored in the open.

G. Dyes and Chemicals

Packed in H.D. Polyethylene woven sacks, many of these were already burst open.

H. Cement

50 kg, 6 ply paper sacks with cement stacked under a covered shed; - 3 to 5 percent loss is estimated due to bursting of these sacks.

Goods in the Warehouse:

The storage in the warehouse appeared to be good. The space, however, could be further utilised by nearly 25 per cent. It is a matter of concern that some of the goods lying in the warehouse had not been cleared even after 12-18 months of their receipt. A consignment of medicines received on 22-6-82 was not cleared by the consignee. X-ray films imported in December 1981, were still in the warehouse. Equipment meant for the Ministry of Education and received in October 1982, was awaiting clearance. These are some of the instances, of goods not cleared. Not only these block the valuable foreign exchange spent on their imports but cause a great strain on the space in the warehouse. In addition, they create other problems of destabilisation of medicines, obsolescence of equipment and lead to product losses.

Material Handling

A large number of instances of damages caused due to improper operation of forklift were obvious at the port.

Visible damages suffered by products and packages due to the penetration of fork arms were numerous.

Dangerous Goods

Dangerous goods, hardware sections of steel bars, and automobile spares were stored in the open in an isolated section. The damages and total loss reported were of the order of 3 to 5 percent.

Fertiliser

Fertiliser received in bulk and packed in HDPE woven sacks on an automatic filling and stitching machine.

Recommendations:

1. It is imperative to advise the shippers/exporters on the storage, inland transportation and handling conditions obtaining in Ethiopia, so that, they can suitably prepare the products and design the packages for the total journey. For instance, edible oil could have been packed and shipped in epoxy coated m.s. drums of 205 litres with a screw type plug closure instead of in 4 litre tin containers. The extent of damage and the cost per litre of packaging forwarding and handling would be substantially reduced. Or else, 17 kg square tin containers could be used with proper metal closures.
2. It is advisable to suggest to the shippers to use better quality wood for pallet manufacture. A switch over from disposable to reusable pallets is recommended. This

would reduce damage percentage and help facilitate distribution in Ethiopia.

3. Warehousing capacity at the port should be expanded by nearly two folds. Handling and storage operations need radical improvements.
4. The rate of demurrage charged for delays in clearance of goods is too low to compel the consignees to clear the goods immediately. This needs to be enhanced. The government corporations and departments should be advised to clear their goods within a reasonable time.
5. Training of operators and transportation agencies in material handling should be a regular feature.
6. Some national awards should be given for prevention of losses in ports.
7. All valuable and highly pilfer prone cargo should be kept in the warehouses and preferably in well guarded enclosures within the warehouse as was being done for cigarettes and tobacco items.
8. Many of the crates collapse in the handling operation. The possible replacement of wooden crates with wire bound crates should be considered.
9. It had been observed that some of the heavy equipment viz. electrical equipment was not protected against moisture hazard and as such highly sensitive equipment got rusted. It is advisable to protect these equipments against moisture hazard by a suitable cover of polyethylene films.

10. A number of crates were poly wrapped both within and outside. Invariably the outer poly wrap gave way and failed to serve the purpose it was intended to serve. This redundancy can be eliminated.

11. Instances of dangerous cargo being stock piled in the port for a period exceeding 8-10 months are many. In certain cases, this period is prolonged to 3 years. Exposed to rain, sun and dust, the aging of the cargo is not ruled out. Speedy disposal of the cargo should be ensured.

28. Establishment visited : Maritime Transport Authority
Branch Office
Assab

Official contacted : Capt Engidawork
Head of Branch
Mr Mulugeta
I/c Stores

Date : 26/4/83

A. Maritime transport authority maintains transit warehouses for export of coffee, cereals, cotton, meat concentrates, bone meal, hides and skins etc. in Assab. In addition, it serves as a storage point for imported fertilisers, cereals, flour etc. It is gratifying to note that storage of coffee, cereals, meat concentrates, bone meal, hides and skins, are quite satisfactory, save for few improvements. For instance, coffee sacks are stacked in rows in link chain style, one above the other and after reaching a height of 7 ft. the stack area is reduced to form a pyramid to avoid slippage of sacks. Cross stacking in rows and columns was demonstrated and advantages explained to the supervisor and workers. This would also ensure much better utilisation of the storage space.

B. Coffee consignments meant for jeddah are packed in double walled sacks viz. sack within a sack with the same branding on both. It was stated that the use of double sacks was as per customer's requirements. Customers requirements can be met by producing special sacks to afford better strength - with a possibility of cost reduction in the use of packaging material.

C. The conditions of storage of imported cargo viz. grain, flour and other cereals is not very satisfactory. Nearly 2000 tonnes of wheat presumably received under an aid programme is kept in losse form in a covered shed.

Spoilage by birds and extensive deposits of birds' shit were visible. Besides, there is no protection against infestation, dust and moisture. It was learnt that this consignment had been lying in the shed for more than 5 months.

D. Cotton bales (press wrapped in hessian and strapped by steel wires) are stored in the open and are stacked 4 bales high with the help of forklift trucks. In a number of cases, extensive damage to the hessian used for baling was visible due to the penetration of sharp edges of the fork arms. The open storage is also vulnerable to fire and moisture hazards. An occurrence of an accidental fire to the consignment was reported in the past. Used sacks containing oil cakes were strewn over a large area. Many of these sacks were in very poor conditions and sufficient quantity of oil cakes had spilled out of these sacks.

E. Every cereal sack meant for export contains a 'lead seal' of the Ethiopian Standards Institute. The application of the seal is at the end the jute twine used for stitching the open end of the sack. Presumably, the seal is intended to minimise the chances of substitution of exportable grade cereal with that of inferior grade one and also to convey to

the purchaser an assurance that the products have been inspected by an approved agency. A majority of sacks show puncture marks of inspection carried by obtaining samples of grain by a sharp edged sheet metal insert. These punctures caused during inspection are an open invitation to attract rodents and insects and can cause spillage of grain.

Recommendations:

1. A great deal of reduction in packaging cost is possible by packing coffee exported to Jeddah in a single sack of 60 kg each. However, customer's preferences in respect of coffee packing need to be ascertained before a change over.
2. The practice for storage of grains for domestic distribution in loose form in covered sheds without any protection against moisture, micro biological growth, spillage and spoilage by birds, rodents, is not a healthy one.
3. The extent to which hides and skins get damaged due to excessive moisture absorption and fungus growth could not be ascertained. Although every bale containing these is marked with the instruction 'keep in dry places' but such instructions are seldom followed. It is recommended that a poly wrap around the hides and skins be provided to ward off moisture hazards.
4. Cotton bales should be stored under covered sheds/with necessary equipment for fire fighting. The bales may be handled on the forklift by sliding the bale on 4" dia-

meter round tubes/iron bars under the bale to enable the forks to operate without damaging the bales. Ideally, it would be better to use pallets for loading and stacking operations.

5. Better quality used sacks should be used for oil cakes and loss of product and spillage hazard avoided.
6. Certification for exports for each lot of cereals meant for export can be made simplified without the use of seals. These seals are no guarantee against substitution. A rubber stamp mark by the standard institute could serve the same purpose as that served by the lead seal. A smaller sized sheet metal insert for sampling of grain should be used to avoid puncturing of the sacks.

29. Establishment visited : Agricultural Marketing Corpn
Ethiopian Food Security
Reserve Store
Addis Ababa

Officials contacted : Mr Mulugeta
Manager, Planning
A.M. Corporation
Mr Assefa
Incharge Logistic Operations

Date : 28/4/83

The storage capacity available is of the order of 700,000 tonnes. Mostly grains/cereals are received in the 100 kg jute sacks issued by the A.M.C. to the representatives of the peasant associations in different parts of Ethiopia. Nearly 25 percent of these bags get substituted by poor quality sacks, causing alarmingly high damage to the produce in transit and storage. It was learned that the administrators, deliberately turn a deaf ear to such complaints as they apprehend the procurement process would suffer. Whatsoever may be the merit of this permissiveness, the use of substandard sacks, is extremely harmful to the produce. Particularly for cereals, it is advisable to upgrade the standard of hessian cloth manufacture as to enable sacks to perform at least 4 trips compared to 2/3 trip sacks in vogue at present.

The loss of grain in storage is not being assessed. A procedure to assess the same should be introduced.

The system of first come first go in storage is not being followed. Accordingly, the commodities which enter first are the last to go. The need for reversal of this trend is of paramount importance.

The branding of the sacks is poor. Many of the sacks find their way to the market. It is advisable to indicate on the sack. Not for sale in open market.

30. Establishment visited : Salt Corporation, Assab
Officials contacted : Col Fikru
General Manager
Mr Gezeleogn Belalynen
Admn Manager
Mr Zaban Betaly
Production Manager
Date : 27/4/83.

The corporation produces crystalline salt approximating to 120,000 tonne every year and uses 2.5 million hessian sacks of 50 kg each. These sacks are purchase new and are filled through metal funnels filled manually with shovels. Each bag is weighed and closed by stitching with a jute twine. The size of the sack can easily have another 10 kg reducing packaging cost by nearly 20 percent or a saving half a million sack every year.

Recommendations:

The possibility of introducing 100 kg sacks for salt should be explored in the interest of achieving overall packaging economies.

There is no point in always using new sacks. Reconditioned and used sacks can be pressed into service for a low value product like salt and can be lined with polyethylene/bags. A substantial reduction in packaging cost is expected.

31. Establishment visited : Ethiopian Paper Converting Plant
Addis Ababa

Officials contacted : Mr Mekbeb Solomon
A/Manager

Date : 3-5-83

Ethiopian Paper Converting Plant is one of the leading most units engaged in the production of paper board printed and proformed cartons, carton flats, paper bags, cores and toilet tissue papers. Its major customers include manufacturers of soap and detergent, shoes and shirts/garments, cigarettes etc. Employing a work force of 225 persons, the unit has a 5 colour Shambo French web printing machine. In addition, the unit is equipped with Hobema flexographic machine, Platen Czechoslovakia label printing machine, slitters and cutting machine, Solna (Sweden) Offset single colour machine, Hiedelburg Offset machines (3 units), Holway (France) paper bag making machines and Hobma - converting machine for making face and toilet tissue paper, core thread reel making machines. The unit has its own plate making and photographic facilities.

Problems and Potentialities:

The unit works on a single shift basis and converts annually 500 to 600 tonnes. This tonnage is considered to be too low to make this unit a viable one. One of the reasons advanced for low capacity utilisation is a lack of demand. It was further learnt that the management does not have the basic developmental activities for trouble shooting of customer's problems.

- (i) Raw Material: The entire duplex board used is imported through international tenders. As per current practices, the ink used for printing are special UV grade imported at very high costs. At the same time, gummed KRAFT Rolls weighing about half tonne each, tissue paper rolls and chemicals are imported. On account of procedural delays and ad-hocism in the ordering pattern of the end users (current customer group), the unit suffers from uneven demand and recession and is not able to plan in advance its raw material requirements.
- (ii) Packaging Material and Finished Product Testing: The unit is ill equipped to test the basic characteristics of the packaging material it procures through international tendering and has perforce to rely on the goodwill of the suppliers. A solitary case of receiving duplex board of lower specifications (290 gm in place of 320 gm) was brought to the notice of the Consultant. The use of lower grammage resulted in machineability problems at the customer's end and the converted cartons could not perform well. No facilities exist for quality testing of finished cartons and bags.
- (iii) Technical persons working in the unit have not been exposed to developments that are taking place in the field. For a fast growing and dynamic industry like packaging, lack of exposures to developments brought

about in the world can greatly retard the progress of the industry.

- (iv) The contact with the customers does not seem to be very strong. The aspects of carton marketing are equally weak. No facilities exist for undertaking developmental work for packaging.
- (v) It is reported that the market demand for cartons is declining. A customer making approach and seeking new areas of carton application would be helpful.
- (vi) For delivery, flat cartons are bundled together and are banded by a paper strip. A phenomenon of warping due to wet glueing and inadequate pressure, absorption of extra moisture from the atmosphere are noticeable.
- (vii) 50 Toilet Paper tissue rolls with a two colour wrap around are packed in a polyethylene bags for distribution.

Recommendations:

1. This unit should become market oriented and expand its business by contacting a large number of potential customers. Its marketing side is extremely weak.
2. The system of sending printed cartons in banded bundles with a band particularly those meant for machine filling should be replaced by corrugated boxes. Substantial wastages of cartons and contents in can be avoided by keeping the form of the cartons intact.

3. The use of 'E' flute printed cartons in a number of application areas can be economically more beneficial and would reduce dependence on imports of duplex board and save valuable foreign exchange.
4. The unit should be equipped with trained manpower for testing of packaging material and finished products. Quality control is the weakest link in the unit. Equipment to test the bursting strength of the board, its moisture absorption, rub resistance of printing surface; crease resistance, stiffness testing should be provided.
5. A technical team of at least six persons should be exposed to the latest developments in the design and manufacturing processes and cartons of composite material such as poly lined cartons, poly coated cartons, etc. Sponsored visits of selected personnels to the packaging and printing exhibitions held in various parts of the world viz., in Japan, Düsseldorf, Chicago, Singapore, Paris and U.K. should be provided through UNIDO, UNCTAD may prove to be more beneficial.

32. Establishment visited : Ethiopian Fruit and Vegetable
Marketing Corporation
Addis Ababa

Officials contacted :

Date : 9/5/83

This corporation handles fresh fruits, vegetables, flowers and spices for distribution in the domestic market and exports to various destinations in the Middle East, African and European markets. Most of the fruits such as pineapple, banana, oranges and vegetables are delivered either in wooden/plastic crates or in unpacked form in commercial vehicles from the farms to the collection centres, and stored in the cold storages maintained by the corporation. It is reported that the aggregate loss of fresh fruits and vegetables amounts to 35 percent. Nearly 12 percent loss in value is assessed to occur after the produce is delivered to the collection centres. Absence of refrigerated trucks and cold storages are said to be the main cause of losses suffered by the corporation.

Packaging and Problems Encountered:

Jute sacks of 25 kg capacity, are used for packaging of chillies, onions, potatoes; while plastic and wooden crates are used for handling and delivery of pineapple, mangoes, banana and oranges. Each consignment of banana under controlled conditions is allowed to mature for a period of 21 days before it is released to the market. There are countries who have developed a system of accelerated maturity

of the fruit; perhaps an interaction with them may speed up the turnover and result in other related advantages. The Indian experience is a case in point. The corporation does not have any immediate plans to sell prepacked fruits and vegetables to the consumers.

The stacking of crates, piled one above the other, leads to crushing of the fruits in the lower crates. There was not a single instance where the upper crate load was not directly in contact with the contents of the lower one; and in the process lead to abrasion and crushing of fruits. Shortage of crates is stated to be the reason for the malady.

Stacking in the temperature controlled rooms is highly unsatisfactory and endangers the safety of workers. Any Accidental fall of fruit filled crates from a height of 10-12 ft could be a handling hazard to the safety and well being of workers.

Exports

Complex packaging problems faced by the corporation are in the respect of exports of fruits and vegetables - mangoes, papaya, banana, brinjals etc. Vegetables such as beans, chillies, onions, potatoes, garlick are exported, to the neighbouring markets in jute sacks of 25 kg each. However, customers in the West European countries prefer packages of fresh vegetables of 15 kg. each duly packed in corrugated fibre board telescopic boxes. The poor compression strength and high moisture content of the box are the

major complaints of the customers.

The export of fresh vegetables and fruits is undertaken only if air cargo space was available. It is reported, this availability has become more uncertain and does not fit into the priority area of the Ethiopian Airlines. Often the corporation is made to suffer business losses and customer's resentment for their failure to honour the commitments on delivery schedules.

Recommendations:

1. Resources should be found to supply adequate number of plastic crates to the corporation.
2. Corporation's employees should be given training in handling and stacking of fresh and perishable commodities immediately;
3. Packaging material - viz. corrugated boxes in collapsible form are stored for too long a period by the corporation - part of their strength is lost on account of prolonged stay in the stores;
4. Export packaging of fresh fruits and vegetables is a subject matter of utmost urgency and importance. Work on packaging development for a few selected fruits and vegetables should be carried out and developed packages should be tested under simulated conditions and or through field trials. In the interim period, the edges of the corrugated fibre board boxes should be given an extra reinforcement. Use of perforated polyethylene as a wrapping material is recommended.
5. Use of water proof waxed cartons should be considered for export of fresh vegetables.

33. Establishment visited : Eranco - Ethiopian Railway
Officials contacted : Ato Kebeb T/Mariam
Chief Division Transport
Date : 12/5/83

Mainly, high bulk and low value items are freighted from Djibouti and Addis Ababa and back. These include food grains, fresh vegetables and fruits, sugar. Wagons with wooden body are in use which are more than 50 years old. There are 300 covered wagons and 100 flat wagons. No damages are recorded or reported by the railway authorities. It was not possible to visit the warehouses due to some restrictions. Freight movement by railways could be developed as viable source of transportation.

34. Establishment visited : Meta Beer Factory
Sabata, Addis Ababa

Officials contacted : Captain Fikra Yesus
General Manager
Ato Afework, Stores I/C
Mr Luber Mojah
Production Manager

Date : 14/5/83

The unit is one of three beer producing units in the country. With a production of 3 million litres a month, its packaging requirements of 325 ml glass bottles are of the order 105 million bottles every month. The bottles are intended for multiple trips and a deposit is charged from the customers to ensure their returnability. In plant loss of bottles due to breakage is reported to be 3 percent. In other words, about 3/4 million bottles are lost every year in the plant itself. The reason for such a high incidence of breakage could be the scratches suffered by bottles in handling and excessive trips performed.

Production Loss:

It is not only the loss of bottles but related to these is the loss of nearly 1 million litres of beer as well. The revenue loss is estimated to be about 3.6 million birr every year. Besides, an additional 2 percent of the bottles is estimated to be either broken in transit or during deliveries made to the various customers. The overall loss aggregates to about 5 million bottles every year valued at 6 million birr. The situation appears to grave and needs to be corrected immediately.

It is worth noting that these transit losses occur despite the fact that the beer is transported in plastic crates and serves a catchment area that is well connected by roads. Fatigued bottles with scratched surface coupled with harsh handling (observed by the consultant) could be the possible cause of losses in transit. The broken cullet totalling to nearly 700-800 tonnes every year is turned into the ground instead of dispatching it to the glass factories for recycling.

Recommendations:

1. Bottles are inspected through visual observations. The method fails to segregate bottles bearing scratches on walls. Observations through a magnifying glass provided on the assembly line or through a photo sensitive process could be more effective.
2. It is reported that the bottles received from Sava Glass Factory Asmara give a better performance on the high speed filling machine in contrast to those received from Addie Glass Factory. An experiment to determine the variation in breakage percentage separately for the supplies received from different factories is recommended so that corrective action could be planned.
3. The bottle cleaning operations need to be radically improved. Since the consumers use beer bottles for packing other liquids before these are returned to the factory, a few bottles were observed to be containing organic matter stuck in to the neck.
4. Training on handling and stacking of the crates should be undertaken on a high priority basis.

35. Establishment visited : Ministry of State Farms
Officials visited : Dr Semes
Head, Research & Advisory Deptt
Date : 16/5/83.

The department is engaged in an advisory function to the State Farms. Due to acute shortage of storage space, the post harvest losses are estimated to be 20-25 percent.

The department does not seem to be concerned with rendering advice on preservation, and storage of produce at the state farms. It is felt that the department, can play a leading role in carrying out applied research studies on the origin and intensities of food losses and can help devise programmes for reducing these.

36. Establishment visited : Hides & Skin Corporation
Officials contacted : Mr Epharaim
General Manager
Date : 16/5/83

Hides and skins constitute the second largest export from the country and are handled by the Hides & Skin Corporation. The hides and skin are chemically treated with DDT to repel infestation. Uneven spreading of the chemicals on the hides/skins treated is a noticeable feature. The hides after treatment are baled and wrapped for despatch. Each bale of hides weighs about 110-120 kg with a bale size of 2' x 1' x 1'. The skins, mainly of goats and sheep, after chemical treatment are baled with a wrap around of hessian cloth in dimensions of 1' x 1' x 1' meter and are marked and sent for despatch. A bale of goat skins normally contains 300 pieces, while that of sheep skins contains 200 pieces each.

Problems Encountered:

Skins attract moisture from the atmosphere and get infested due to moulds and fungus. The hessian wrap around is not sufficient to afford protection against moisture absorption. The quality of hessian cloth used for baling is poor. The volume of the bale can be further reduced. The bales of hides are voluminous, without any wrapper, and occupy a lot of space in storage and transportation.

Recommendations:

1. Every bale of skins should be mechanically pressed for volume reduction duly wrapped with a polyethylene lined hessian cloth, and strapped with steel wires/steel straps. A reduction in volume to the extent of 33 per cent is achievable. This may result in economies in handling, storage and freight costs. The incidence of excess moisture absorption by the otherwise dry skins is likely to be reduced to the barest minimum.
2. An experiment to spray the powdered chemical by means of compressed air connected to a spray gun may ensure uniform application of insecticide.
3. The quality of the hessian cloth used for baling should be improved. With the use of polyliner inside the hessian cloth, the present quality of hessian cloth may be functionally acceptable.

37. Establishment visited : Ministry of Agriculture
Protection and Regulation Deptt
Officials contacted : Ato Hadra
Date : 17/5/83

This department is engaged in devising measures and strategies for crop protection and initiates regulatory steps for the same. According to the department's estimates, nearly 30 percent of losses are witnessed in respect of cereals produced in Ethiopia. Of these, 15 percent is attributable to those experienced during harvest and 15 percent are post harvest. This department hardly advises farmers and grain traders on the steps needed to ensure right packaging and proper storage of cereals and other agricultural crops.

Recommendations:

This department's infrastructure is most suitable for provide advisory services to the farmers on the methods of proper packaging, storage and stacking. It is at the farmer's/peasant's level that sizeable loss of 20 percent of the agricultural produce occurs and therefore the farmer is the focal point for the introduction of improved methods for packaging and preservation of agricultural produce.

38. Establishment visited : Ethiopian Retail Trade Corpn
Stationery Enterprise
Officials contacted : Ato Ibrahim Abdirahman
Date : 19/5/83

As an organisation meant for the supply of stationery items to various organisations in Ethiopia and for retail distribution in the market, it procures its supplies through imports and domestic sources. The range of products dealt with by the corporation is between 10000 to 15000 items. Corporation's turnover is estimated to be of the order of 10-12 million Birr every year.

Problems Encountered:

Corporation's storage conditions are not conducive and upto the mark. The quantum of products lost due to poor storage conditions is seldom estimated. It is understood that the losses would be in the neighbourhood of 3 percent in storage and 2-3 percent in transportation and handling. A loss of half a million Birr every year for non-perishable items is considered to be extremely high. Moreover, items worth 7-8 million Birr are being imported, mostly in retail and intermediary packs bearing brand names of the seller. Accordingly, the imports become much more expensive.

Non-availability of racks for storage of products have forced the management to store items on the floor. These absorb moisture and gather dust from the floor. Moreover, the principle of first come first go in storage is not being observed.

Recommendations:

1. The entire composition of imports should be reviewed and a change over to the system of importing items in bulk and repacking these in the country may save nearly 1-2 million Birr every year.
2. Additional storage space with proper ventilation facilities should be provided. An installation of a dehumidifier would greatly help to maintain humidity level under control.

39. Establishment visited : Food Processing Enterprise
Asmara Road, Addis Ababa
Officials contacted : Ato Tasfu Gasho, Manager
Date : 21/5/83.

Being at the receiving end, this enterprise has to shoulder numerous problems arising out of damaged products. Shortfalls in weights of powdered detergent, prepacked sugar, soiled toilet soaps, flour; leaking containers of fruit juices, unidentifiable containers of food, are some but complex problems reported by the management. This enterprise also deals with the fresh meat, beef, and vegetables where the problems assume different stature and complexities.

The incidence losses suffered by products is due mainly to poor standards of packaging, particularly in respect of pre-packed sugar, flour, biscuits, detergent powder, toilet soap - (imported from Greece). Annual loss is estimated to be about half a million birr. In the balance sheet, such a loss is compensated by raising and recovery of higher prices for imported items.

Recommendations:

1. Cleanliness standard in the packing section of fresh vegetables need to be improved.
2. The stacking of the filled C.F. boxes is too high and should be reduced in height to reduce the incidence of bulging and busting of boxes.

3. A lot of damaged goods occupy the storage space. The salvage operation should be practiced to release space for better utilisation.
4. The unit should be provided with empty cartons to re-pack the goods when the transport packages are get damaged. Absence of these cartons increases the damage rate and aggravates the situation during re-shipping operations.
5. The damaged packages should be segregated from the non-damaged ones - and sold at a discounts. Display of damaged packages along with the good ones, shadows the quality of the products in the otherwise intact packages.
6. The staff in the food section should be provided with gloves to handle products like table cheese, minced beef etc.
7. A couple of fly repellent are needed in the store and the shopping area.
8. Fresh vegetables and fruits are packed in polyethylene bags having over sized dimensions with top closed by a forming a know on it. A 33 percent reduction in size of poly bag is achievable with a twist wire closure of the bag.

40. Establishment visited : Textile & Leather Products
Retail Corporation

Official contacted : Ato Wolde Abza
General Manager

Date : 23/5/83

This corporation deals with textiles, ready made garments, shoes, blankets, woollen & leather garments and has a turnover of 30 million Birr every year. The process of procurement is through Ethiopian Domestic Distribution Corporation. The corporation as a purchaser exercises enough precautions to accept only damage free goods. It was pointed out that the corporation loses about 5 percent of its turnover by way of spoilage and or damages suffered by the products. In terms of value, it would mean a loss of 1.5 million Birr by way of value reduction.

Packaging and Problems Encountered:

A visit to the stores revealed that a large consignment of men's tailored suits on hangers had been imported from Bulgaria. These suits, were individually packed in numbers 8 to 10 in numbers are placed in oblong corrugated cartons, strapped by polypropylene straps. A majority of these straps had snapped and the contents were badly exposed. Similarly, children-ware had been received in jute sacks with mouth hand stitched by jute twine. A large number of these had snapped in transit.

A large consignment of men's neckties imported from Czechoslovakia, had been received in grey board telescopic cartons and packed into CF Boxes. Almost all the intermediary packages were damaged and contents exposed.

Shirts and readymade garments in CF Boxes despatched from 'General Textiles and Garment Factory' Akaki - hardly 25 km away from Addis Ababa were in an deplorable conditions. Custom's confiscated goods such as linen, jeans, hosiery items were stored in unpacked form on the floor.

Recommendations:

1. There is no advantage in importing ready made gents suits with hangers on and packed individually in full length form. These can be imported in bulk in specially designed 5 ply CF Boxes, duly strapped to withstand the rigours of journey. This would reduce the volume of the packages and result in freight cost reduction by 15 percent. It will also reduce per unit cost of packaging.
2. The storage condition for highly valuable goods approximating to 2-5 million Birr at any given time is too deplorable. Training of persons for right storage and stacking operations should be attempted immediately.
3. There is a need to provide protection against moisture to the textiles packed in bales. The poly overwrap is too thin and gets torn out and fails to provide protection against water/moisture hazard. The possibility of wrapping these with a poly layer betumanised KRAFT paper inside the hessian sacks is recommended.

41. Establishment visited : Ethiopian Food Corporation
Kaliti Food Products
Biscuit Factory
- Officials contacted : Ato Berhane,
General Manager
Ato Keros
Production Manager
- Date : 26/5/83

Bread and Biscuits are the principal products of the corporation. The distribution of bread is mainly in non-packaged form. Upto the dealer point, bread in bulk is delivered in used hessian sacks.

For defence use 4 biscuits weighing about 200 gms are packed in polypropylene over wrap, heat sealed and 21 kg of these biscuits are re-packed in CF Boxes. A substantial quantity of biscuits is despatched in loose form packed in units of 21 kg in CF Boxes. Each of the box is cross strapped by jute twines. Consumer packs in 250 gsm duplex board printed in 4 colours are in vogue.

Packaging Problems Encountered:

Biscuits for defence forces: Nearly 35 percent of the biscuits are packed loose into 3 ply CF Boxes each weighing 21 kgs, with top and bottom flats interlocked for closing. Each of the box is strapped by jute twine which invariably loses its tension during stacking due to bulging of boxes. Nearly 80 percent of the boxes were found to be bulging even after two days of storage. It is reported that 20 percent of the boxes have to be replaced by new ones before these are

despatched to the defence stores. The rate of breakage of biscuits is estimated to be 5 percent at the point of production. Each of the boxes containing loose biscuits is punctured by a sharp tool to inspect whether its contents are loose or wrapped with poly propylene. This practice is most damaging to the strength of the already weak box. Four biscuits are wrapped in polypropylene film joined in the middle, end sealed on an automatic machine.

Branded Customer Packet

250 grams of biscuits are packed in 4 colour printed duplex board cartons, bearing the brand names MARIE - CEREALIA, CEREALIA OSWEGO, CEREALIA PETIT - etc. Each carton is manually wrapped with 0.025 micron cellophane and pasted by glue. 18 of these cartons are packed in a wrap around wrapping paper in 4 x 4 formation with two packages kept on the top wrappers, ends are folded and glued.

Recommendations:

1. Compression Strength of the CF Box is too low. The corners of the box should be strengthened by extra support by means of specially made corrugated corners, or else, this should be replaced by 5 ply boxes which can accommodate easily about 30 kg. weight each.
2. Till the time, the improvements are carried out in the boxes, it is recommended that the boxes should not be stacked more than 5 high.

3. The flaps should be glued for closing and then strapped with polypropylene straps and heat sealed.
4. The practice of packing loose biscuits should be stopped immediately.
5. Use of 'E' flute paper corrugated support around the biscuits, banded in a preformed column and wrapped around with printed polycoated paper can lead to a substantial cost reduction without sacrificing quality.
6. There does not appear to be any relationship between the graphics of biscuits printed on the carton and those found inside it. This element of deception in packaging should be removed immediately.
7. Cellophane over wrapping should be substituted by polypropylene on account of its inherent advantages.

42. Establishment visited : Ethiopian Bonded Warehouse
Addis Ababa

Officials contacted : Ato Feleke, Manager

Date : 30/5/83.

Seventeen stores of the Bonded Warehouse agency are not fully utilised. In fact 11 of the stores with 55000 sq.ft. covered and well guarded area are completely unutilised. The space can and should be let out to other corporations to ease the pressure on storage space.

Disputed, abandoned, unclaimed and confiscated items are lying in the warehouses. General cargo valuable goods like T.V. hi-fi equipment, tape recorders, transistors, fancy textiles, dry cells, etc. are stored in 6 general goods stores. Most of these goods are littered in small lots on the floor and are not well protected. To save such valuable cargo, it is important that these should be stored properly and in racks.

Recommendations:

1. There is no systematic segregation of cargo of different types. This should be attempted and prompt steps should be taken to auction these goods. There can be 'custom department's own retail shop for sale of these goods;
2. Empty packaging boxes (CFB) should be given to the department to store valuable and other cargo properly;
3. It is envisaged that the hazard of pilferage could be the highest by keeping the goods in the open and exposed condition. This may be minimized if the goods are kept in packages in concealed form.

43. Establishment visited : Ethiopian Import and Export Corporation
Officials contacted : Ato Abraham
Date : 27/5/83

The corporation is a major body for importing general goods into the country. It is understood that packaging standards for goods that are imported from socialist countries are not adequate. This could either be due to near certainty of orders to be placed with these corporations or due to genuine difficulties in procuring adequate packages. The corporation loses about 6 to 7 million Birr due to product damages on account of damages caused to laundry and toilet soaps, floor polish, etc.

Recommendations:

1. It is advisable to have a total review of the imports and as far as possible, the items should be imported in bulk.
2. Packaging specification for the items imported should be specified clearly and in quantitative terms.
3. Most of the purchase orders specify that the packaging should be able to withstand hazards of sea journey. For goods imported in the containers, the packaging specifications are far different and in many cases are lower than those of goods freighted without the containers. The type of transportation and handling hazards obtaining in Ethiopia should be brought to the notice of exporters, to Ethiopia.

44. Establishment visited : Ethiopian Meat Corporation
Officials contacted : Ato Gellane
Head, Planning Department
Ato Birhane
Head, Sales Department.
Date :

The corporation deals with products like pre-cooked beef, Zighni shipro, vegetable soup, corned beef, luncheon meat, beef stock, beef in jelly, marmalade tomato paste, in prepacked form. In addition chilled mutton, beef, and frozen beef and mutton are produced and sold in fresh forms.

Packaging and Problems Encountered:

The medium of packaging used for pre-cooked meat is mainly the tin containers upto 410 gms. Cooked beef is also packed in aluminium foil, poly laminated pouches. Preformed lacquered tin containers are imported in flat form in the factory. The filled containers are glue labelled for distribution in the market. The packaging cost is reported to be of the order of 50 percent of the total selling price. The organisation is keen to develop alternative packs for its various types of products. Many of the labels delaminate during the distribution and the corrugated cartons used as transportation pack are reported to be of very poor quality leading to bursting of boxes and spoilage of consignment.

Recommendations and Suggestions:

1. Triple laminate pouches of Aluminium foil - polyethylene and Al-foil or metalised polyester; polyethylene, Al-foil are considered to be useful for replacing tin container for pre-cooked meat and beef. However, it would be essential to carry out stability tests - to validate the contention that these are suitable for a shelf life of 2 years or so.

Experimental packs numbering at least 3 dozen of various products filled in foil laminate pouches under hygienic conditions can be sent to a packaging laboratory like the Indian Institute of Packaging by air for assessing stability, of the products and determination of shelf life. All help needed in this context was offered by consultant. Vacuum packaging facilities with provisions for gas insertion CO₂ or Nitrogen may have to be commissioned for the purpose. These machines are not very expensive and could pay for themselves by way of the corresponding economies that would accrue on account of reduction in the cost of packaging material.

2. Lamination facilities for procuring composite laminated material may have to be created with Ethio-Plast together with the provisions for manufacture of pouches out of the laminated material.
3. There is need to undertake studies for the development of packaging standards for processed food products on a

planned basis. Export of processed food is a fertile area for exports. Accordingly packaging laws and regulations obtaining in the prospect countries, the packaging designs, materials, styles of construction should be studied as an essential requirement.

4. It is of paramount importance, that at least 4 technical persons should be trained in the field of packaging.
5. International Food Fairs are held regularly in one or other parts of the world. These display packaging machinery for packing of processed food. Periodic exposures of experts to these food fairs would greatly contribute to the development of local expertise in tune with the changes taking place in the world.

Ethiopian Meat Corporation - Packaging Materials used

	Aluminium Pouch	Canned	Flesh, Chilled frozed
Products	Cooked	Zighine, Shipro, Vegetable Soup, Corned Beef, Luncheon Meat, Beef in Jelly, Beef Stock, Foul Beef in Jelly, Marmalade Tomato Paste.	Chilled Mutton Carcass, Chilled Beef Carcass, Frozen Beef Boneless, Frozen Mutton Carcass
Packing	Aluminium pouch Cartons Trays Melting-Glue Other - Glue	Cans Labels cartons	Polyethylene Bags Polyethyelene Sheets, Waxed Cartons Strapping Tape Metal Clips

45. Establishment visited : Ethiopian Insurance Corporation
Addis Ababa
- Officials contacted : Ato Mulugeta
- Date : 30/5/83.

Ethiopian Insurance Corporation settles claims payment of nearly 30-32 million Birr annually. More than two third of these claims i.e. 20 million Birr are stated to be account cargo damages. The claim rate can be reduced by 1/3, if the handling and packaging standards were improved.

It is true that the Insurance Corporation has no control over the packaging and handling systems, but they could be most effective as a catalyst in improving these two systems. For instance, through the mechanism of proper inspection of packaging specifications of the goods insured, the premium for less prove items could be charged higher than those with adequate packaging. Over a period of time, such an approach is likely to provide an indirect incentive to exporters and importers to upgrade the standards of packaging. In the case of exports, the corporation provides a cover upto the port of despatch i.e. FOB Assab, not CIF. It is felt that the corporation bears a higher risk for surface insurance and foregoes the benefit for covering a major part of the journey involving lower risk. A differential and selective policy with due evaluation of the risk involved and reversal of approach from cover upto FOB stage to CIF, may step up the invisible foreign exchange earnings of the corporation.

As an instrument of loss minimisation, the Insurance Corporation can and should organise a campaign for prevention of losses that take place due to a variety of factors such as fire, transit damages, total loss, pilferage etc. In this context, the work done by the Loss Prevention Association, a limited company under the General Insurance Corporation, USA provide sufficient evidence, how these organisations have been able to create consciousness for loss prevention in the various sectors of their respective economics. Over a period of time, even the premium rates could be revised downward or upward in order to make these more elastic to loss prone areas.

46. Establishment visited : Pre-cooked Vegetables/Scraps
CANNED PRODUCTS
Official contacted :
Date : 5/6/83.

General

Layout of the factory is extremely defective and presents problems for smooth material handling. It is advisable to re-design the layout to enable a sequential flow of material. General hygienic conditions, by any reckoning, are much below average. For instance, the uniforms of the workers are dirty and none of the workers (male or female) use any head gear. There is no protection against flies. The plastic containers for handling empty cans and finished canned products are soiled.

Quality Control Test

In process quality control system, it is learnt does exist but in practice no quality testing is being done.

Packaging Problems Encountered

Soldered tin container flats duly lacquered are imported in various sizes to pack 240 gm, 1 kg, and 3 kg of materials. These are formed, flanged and bottom seamed on semi-automatic lines. Each of the empty container is steam sterilised before it is conveyed manually to the filling station. Inside surface of Sterilised container is invariably touched by hand for batching these in proper formation. The filled containers are sterilised in a rotating drum where

these are given a steam bath.

Filled containers numbering 60 (240 gm); 24(1 kg) and 6(3 kg) containers with contents, as the case may be, are packed into 3 ply corrugated boxes, flap interlocked for closures and kept in the stores for incubation. On expiry of the incubation period of 21 days, each of the filled container is brought out of the respective CF box, labelled with pre-cooked starch paste and repacked into the same box.

A high incidence of delamination of labels has been observed. Nearly 5 percent of containers are dented and 2 percent are found to be leaking. In addition, there is a wastage of 5 percent during reformation of tin flats into containers.

Recommendations:

1. A chemistry graduate should be trained on various aspects of food packaging.
2. In process wastage of 5 percent, together with a formation waste of an additional 5 percent are very high. Replacement of forming machines, is recommended.
3. Material handling in hand trollies will reduce material wastage and smoothen operations.
4. Plastic crates should be provided for storage during incubation stage.
5. Use of five ply box for handling loads in excess of 30 kg is recommended. The compression and the bursting strength of the boxes currently in use are poor.

6. Instances of higher moisture content in the board have been observed. These could be potent source of delamination of the labels.
7. Replacement of good quality glue - PVA is recommended for label application.
8. Use of foil, poly, paper laminated pouches with gas insertion system would result in substantial cost reduction.
9. The layout of the stores, the ventilation facilities and the system of stacking of cartons should be improved. It is desirable to stack the boxes on wooden pallets so that these are not in direct touch with the floor.
10. The principle of first come first go in storage is not being followed. Instead the first consignments gets despatched on the basis first come last go.
11. Date of packaging and batch number should be mentioned on each of label with product ingredients and date of expiry.
12. Dehydrated vegetables as well as powdered ready mix soups, can be manufactured in the plant and easily packed in heat sealable flexible pouches.
13. The printing of labels needs radical improvements. Two colour attractively printed labels may prove to be more acceptable. The graphics should be in line with the colour preferences of the target audience.
14. The emphasis on quality testing is a must for safeguarding the health of the consuming population. It is vital that the products are tested by an independent laboratory occasionally for certification that the contents are not contaminated.

47. Establishment visited : Meat Corporation
Wondo Genet
- Officials contacted : Ato Gelana
Chief of Planning
Ato Asfaw
Ato Hailu
Production Manager
Ato Mulgeta
- Date : 5-6 June 1983.

Beef and Mutton Plant

The beef and mutton plant under the corporation produces. Frozen minced beef and cuts of mutton that are packed for export and local distribution. The management is to be complemented for observing a high standard of hygiene in the slaughter house. The material used for packaging are polyethylene sheets, telescopic corrugated fibre board boxes, printed woven cotton tubings for carcasses, plastic straps, and metal seals. The merits and demerits of the packaging system in use and the improvements suggested are as under.

Woven Cotton Hosiery Fabric

One side interlocked two colour printed tubings are procured from local suppliers for the export of frozen carcasses as per customer's demands. One carcass each is packed in cotton tape and open end closed by applying a knot manually. Nearly 20-25 percent of the fabric is used and can be saved by changing the method of closing. The open end can be stitched instead of closing it by a knot or else a twist-tie operation by a pre-sleeved flexible steel wire can be put into operation. This advantages were explained to the officials.

Pigmentation Hazards: Every tube is printed in two colours. The ink transfer to the carcass is an obvious hazard. Printed pressure sensitive labels pre-fixed on a release paper with identification marks or tags to be stitched at the closing and are recommended.

Minced Beef Packings:

24 kg of minced and frozen beef individually wrapped in 1 kg packs in polyethylene sheet and bulk-wrapped in poly-sheet are placed in a triple walled telescopic printed CF Box 60 cm x 18 cm x 44 cm, strapped by polystraps and sealed by a metal seal. The boxes are non waxed and attract moisture during storage at - 15°C. The straps become too loose and thus defeat the purpose of strapping.

Mutton Cuts:

'Mutton cuts' are of uneven sizes and weighing about 11kg are poly wrapped and packed in a single colour printed CF Box and strapped.

Recommendations:

1. There is no need to use a poly over wrap for frozen minced beef particularly when 1 kg of beef is individually wrapped.
2. The corrugated fibre board boxes should be waxed from inside for packing of frozen mutton and beef.

3. A five ply waxed box (instead of the 9 ply box) with a overlap, flap closed by PVA could be better solution for 15 kg of mutton packaging and 20 kg of minced beef. This would also eliminate the possibility of further strapping. A suitable size can be developed by the paper and pulp unit.
4. There is an immediate need for training of at least one packaging professional for packaging development for beef and mutton and other frozen meat.
5. A detailed study on packaging development of meat and meat products should be a continuous feature of the unit. The prospect of beef and mutton exports in small packs should be explored.
6. Quality testing of packaging material are conspicuously absent.
7. The use of side stapplied boxes, should be replaced by side glued boxes for edible products in the interest of avoiding the rusting of hazard.
8. The size of the fibre tube for packing of carcass can be reduced by effecting improvements in the end closing. To ward off the hazard of transfer of inks to carcass, the use of printed tags or pressure adhesive printed tables would be more advantageous.
9. Stretchable film should be used instead of polyethylene film, for wrapping minced beef.

48. Establishment visited : National Fibre Corporation
Addis Ababa

Officials contacted : Ato Emishaw,
Planning Chief and his
Colleagues.

Date : 13/6/83

The corporation is responsible for producing jute fibre based packaging material in Ethiopia and specifies the dimensional and other characteristics of the material to be produced by three factories under its control. It is also concerned with centralised purchasing of jute and other inputs for the units under its control. The prospects of jute based packaging material are extremely bright and once, the farmers are motivated for a change over from the packaging of their produce in animal skins to jute sacks, the demand for sacks may double itself.

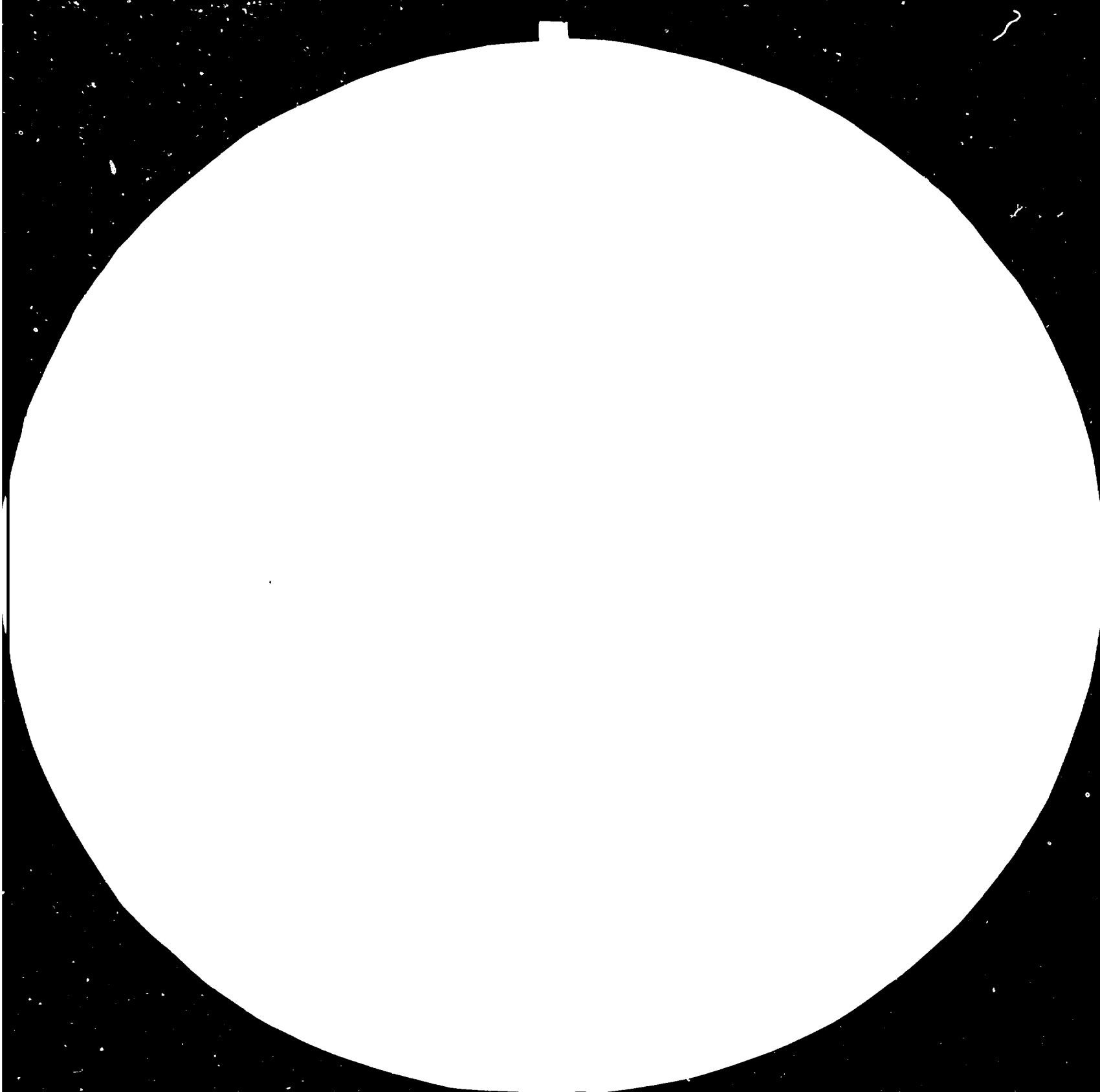
Issues relating to observance of quality control, training of personnel and standardisation of jute sacks for different materials were discussed.

Recommendations:

1. It is felt that as an apex body, the corporation must have a training cell of its own, for training of various technical personnels in different factories. Accordingly, three persons should be trained as trainers.
2. Marketing of jute sacks in the country is weakest spot of the total operations. Agricultural Marketing Corporation, is supposed to be responsible for sale of

jute sacks. It is felt that agricultural marketing corporation would not be effective in the application areas of sugar, salt, coffee, glass bottles, flour, etc. It is suggested that the marketing, sale promotion management should be further strengthened in the corporation. The corporation should prepare an audio visual kit for educating the users on the merits of deploying jute sacks.

3. There is a need to depute a consultant to carry out packaging development in newer areas including jute lamination with other materials. For instance, poly laminated jute sacks for fertilizers, hessian laminated corrugated boxes, poly lined sacks etc. can be certain important areas of application.
4. Standardisation of sacks should be undertaken on a priority basis.





32



16



4



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-
STANDARD REFERENCE MATERIAL 1010a
1963-A (previously TEST CHART No. 2)

49. Establishment visited : Fibre Factory
Asmara

Officials Contacted : Ato Kerbe Bulto
Manager

Date : 16/6/83.

Fibre factory Asmara manufactures annually 3500 tonnes of hessian sacks, hessian cloth and twine. In the sack range, its product mix includes sacks for sugar, teff, flour, coffee, salt, maize. The unit consists of 64 looms, 800 workers, 12 spinning frames, 24 sewing machines, and a single colour branding press.

Problems Encountered:

1. In process quality control is very weak. The supervisory staff needs further exposures in maintaining quality of production.
2. Tensile strength and moisture content of the cloth are subjected to sample testing in the laboratory but the application of laboratory results to improve production quality appears to be weak.
3. Production department is not aware of the customer's requirements and customers complaint. Nor are they aware of ways and means to produce composite material (laminated hessian sacks - for specific water resistance application).
4. Hessian wastes, cutting and pieces of twines, etc. amount to 110 tonnes every year totalling to 3 percent of the total production. This is sold as scrap at a throw away

price and the recovery is low.

5. Specifications laid down for various sacks are seldom tested by production unit.
6. Branding of sacks is diffused and ink adhesion very poor.
7. The working of steam pressing, automatic cutting and stitching sections is good.

Recommendations:

1. Training of technical manpower should be given the top most priority.
2. Jute/hessian wastage can be put to better uses like manufacture of felt, laminated table mats and jute wool for blankets etc.
3. Product mix can be improved by manufacturing jute carpets, printed textiles for curtains, and furnishing materials.
4. Laminated sacks endowed with water resistant properties should be produced for certain uses.
5. Standards of sacks produced need to reviewed and revised.

50. Establishment visited : Sava Glass Asmara
Officials contacted : Mr Kidane
General Manager
Mr Mario Cadario
Technical Manager
Date : 16/6/83

Sava Glass Factory is a larger of the two units manufacturing glass bottles and tumblers. With years of experience in the production of glass bottles (Amber, Green Transparent) of high quality, this unit is capable of producing any type of bottle. The technical abilities are of a very high order with a back support of a good laboratory and facilities for in process quality control. The factory has moulds to produce 180 types of different bottles and tumblers. In value terms, its turnover is 10 million US dollars every year. In the past, a sizable portion of its capacity was utilised for the manufacture of bottles meant for exports to the neighbouring countries. Currently, the unit's major concentration is on meeting the demand of the domestic market for bottles meant for beer, wines, soft drinks and tumblers with branding done through screen printing and heat transfer designs.

Packaging Problems Encountered:

1. Unit's accumulated finished goods stock of bottles for soft drinks and beer is estimated at 5 million US\$. Non-availability of transport facilities is stated to be the major cause of inventory accumulation.

2. Despatch of bottles is affected in used hessian sacks. About 1.30 million sacks are used every year for delivery of bottles to destinations outside Asmara. Loss of bottles despatched by inter modal transport viz. ships/road is stated to be 10 to 25 percent. This may total upto 2.8 million bottles every year.
3. Packaging of bottles has extremely limited cushioning grass purchased locally at a price of 160 Birr per tonne. The quantity of grass used is much less than that of desired level.
4. The sacks used are of very poor quality. Most of these are water soaked and are not suitable for handling bottles.
5. Even with a high stock accumulation of finished goods, the production pattern of the unit appears to be inflexible and an unending production for soft drinks continues to be unabated.

Tumblers are packed into three ply corrugated box with separators (pigeon holes) and piled in rows of two or three rows.

Recommendations:

1. Inventory planning, and product mix of bottles should be immediately improved to avoid heavy accumulation of inventories. Paradoxically, when the entire country is undergoing through a period of extreme shortages, of glass jars and bottles of various types, the unit is not able to produce the range that is well demanded.

2. Production of vials and bottles for the pharmaceutical industry and glass jars for Jams, Jellies, meat products should be added to the product mix.
3. Prevention of manufactured bottles from being lost in transit should be given the highest priority. With use of better quality reconditioned and proper interlay of cushioning grass or paper sheering and proper handling, the damage rate is expected to be reduced substantially.
4. Due to harsh handling, weak packaging material, improper cushioning, bottles get scratched on their finished surfaces which are quite sensitive to scratches and their strength is reduced to a fraction of the original strength. Scratching or bruising can be minimised with proper cushioning.
5. Maximum danger to the bottles is reported to occur during sea journey and handling operation at Assab. Introduction of delivering bottles in sacks and duly palletised or in wire bound crates with layers separated by corrugated sheets - may reduce the damage rate. Repacking can be done at Assab in the sacks.

51. Establishment visited : ISA Factory Packaging Division
Asmara
Officials contacted : Ato Worku Shiferaw
Manager
Date : 16/6/83.

The plant has a capacity to manufacture about 150-180 tonnes of board and boxes on a three shift basis. The board making (single face), printing, creasing and fluting, slotting, operations are done on high speed machines. The unit uses sodium silicate as a bonding agent, The quality of glue is good. Employing about 85 workers, the unit is grossly under utilised and on an average turns out total tonnage not exceeding 1000 tonnes every year; against 1800 to 2000 tonnes capacity. This is the only unit in the country, which is manufacturing 5 ply boxes required for packaging of heavier products.

Other Problems Encountered:

Three ply board is made pasting of sheets on a single facer through a gluing roller. Due to wet glue application, the board wraps and a few sheets of the board are piled on one another and compressed under a hydraulic press. The flutes of the board loose their original height and become flattened to some extent.

There are no facilities for testing of board or paper or printing characteristics. Quality assessment operations are absent.

The unit's cost of production is very high. This is due to gross under utilisation and rejects and trimming waste of more than 8 percent of KRAFT liner, test liner and fluting media.

The boxes give an appearance of smudged printing. This is evidently due to poor lifting and subsequent transfer to the board surface of the ink or it could be due to poor quality of ink.

Inventory planning and build up of raw material, paper and board is for a period of 8 months. Aging of paper under storage conditions is not ruled out.

Only two types of boxes are predominantly manufactured viz. regular slotted and flaps telescopic designs. Introduction of other designs needs to be looked into. Adherence to single type of fluting irrespective of the requirements of users is harmful. Flute variations according to needs of the product to be packed may be looked into.

No evidence of cost and waste control measures was noticeable.

Instances of imperfect flute corrugation, crushed corrugation in printed area were noticed. (This defects were explained to the technicians and the manager).

Recommendations:

Two technician should be urgently trained in the designing and proper utilisation of board for box making.

