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ASSISTANCE TO THE NATIONAL PACKAGING CO-ORDINATION COMMITTEE ON SETTING UP A PACKAGING LABORATORY[1/]

DP/TUR/75/056

TURKEY

Terminal report

Prepared for the Government of Turkey by the
United Nations Industrial Development Organization,
executing agency for the United Nations Development Programme

Based on the work of Klaus Luxenhofer, packaging expert

United Nations Industrial Development Organization
Vienna

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Explanatory notes

References to dollars ($) are to United States dollars, unless otherwise stated.

The monetary unit in Turkey is the lire (LT). During the period covered by this report the value of the lire in relation to the United States dollar was $ 1 = LT 17.50.

References to tons (t) are to metric tons.

The following abbreviations are used in this report:

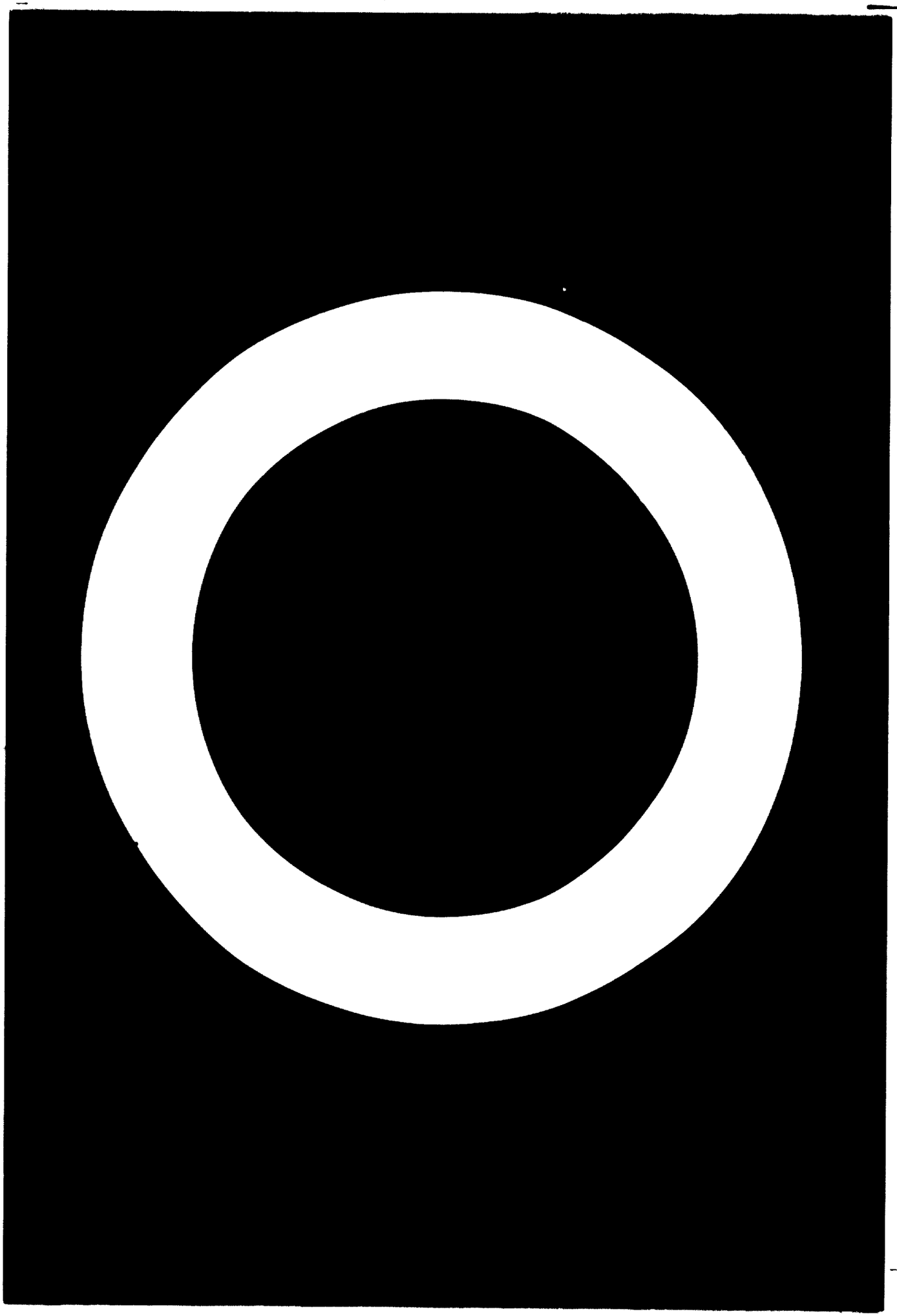
HDPE	High-density polyethylene
LDPE	Low-density polyethylene
PC	Packaging Centre
PP	Polypropylene
PS	Polystyrene
PVC	Polyvinyl chloride
SPO	State Planning Organization
TSE	Türk Standardlari Enstitüsü (Turkish Standards Institute)

ABSTRACT

The project "Assistance to the National Packaging Co-ordination Committee on setting up a packaging laboratory" (DP/TUR/75/056) was authorized by the United Nations Development Programme (UNDP) in October 1976. The United Nations Industrial Development Organization (UNIDO) was designated executing agency.

The objective of the project was to assist the Turkish Government in establishing a packaging testing laboratory at the Turkish Standards Institute (TSE) at Ankara.

A packaging expert was sent in April 1977 for two months to TSE; his assignment was later extended to four months. The report deals with the expert's investigation of the Turkish packaging industry and describes the situation of various branches of the Turkish industries related to packaging. The expert recommends the establishment of a packaging centre which would co-ordinate, promote and develop the production and application of packaging according to the requirements of the Turkish industry. The recommendations include a description of the functions and an organizational scheme for the packaging centre, lists of the necessary equipment and proposed staff, and a training programme for the national staff.



CONTENTS

INTRODUCTION

Summary

Twelve years have past since the first steps at TSE have been undertaken to establish a packaging institution. In May 1977 the excavation works for the foundation of the new packaging laboratory will start. At least within 12 months one can estimate the building phase. According to this TSE does not see any necessity for 1977 to have any foreign experts in Ankara and they have not decided to employ personnel for the new PC.

Without any doubt there exists an urgent need in appropriate research, development and testing facilities.

The head of the new Packaging Centre as well as the section manager have, therefore, to receive a thorough education at the beginning and have to train themselves permanently at the job in order to convince future clients as well as to train further Turkish people. The staff of the new Packaging Centre will have to work actively and progressively to be a real service institution for the industry and differs in this aspect completely from the already existing laboratories at TSE.

General Comments on the background of this project:

The idea of establishing a Packaging Centre (PC) is not new. In 1965 Mr. J.B. Vernot, France, was sent through OECD and elaborated some principal points concerning the PC. In 1966 a second expert from OECD, Mr. G. Jouhaud arrived at TSE and prepared plans for the arrangement of the testing equipment in the packaging laboratory. In October 1966, Mr. Jouhaud came for a second time and together with people from TSE they prepared a project document about this P.C. After this TSE tried first to interest the State Planning Organization (SPO) and second UNIDO - UNDP Office Ankara, but both attempts were unsuccessful.

In 1973 the project was revived and proposed to SPO to ask for UNDP-assistance but this was again unsuccessful.

Besides TSE efforts: in 1970 a packaging consultant group from UNIDO made some studies in Turkey on packaging with the leadership of Mr. A. Soltan, who came again in 1975 and prepared a report (TS/TUR/75/004) and a draft project document. Unfortunately the financial resources from the UNDP distributed by SPO were not met by Mr. Soltan's proposal and had to be changed to the means available.

Change of job description DP/TUR/75/056/11-01/31.7.E.

As a result of the situation described above there was no possibility of accomplishing the existing job description. Nevertheless there have been other tasks which TSE expected the expert to do:

- to make a list of equipment and apparatus necessary for the PC;
- to make a plan for the arrangement of this equipment in the main testing hall; especially for the heavy testing apparatus;
- to choose the equipment which can be built in Turkey and which will be imported;
- to make the personnel organization scheme for the PC;
- to formulate fellowships;
- to make a training programme for the persons from industry, ministries, etc.

The last point however has proven not to be possible to be carried out in a 2-months mission.

Furthermore the expert was asked to discuss with the architect and the statical planning bureau the foundation of the heavy equipment.

Taking into consideration that upon the expert's arrival nothing had started yet, it is impossible to say that it was just the right time to help TSE in some basic decisions. In order to get the right idea of establishing the new PC the expert decided to undertake a two weeks round trip and visited about 35 packaging and packing companies.

Official arrangements

The mission was carried out upon the official request by the UNDP Resident Representative in Ankara (project data sheet DP/TUR/75/056/11-01/31.7.E) was signed 19 November 1976).

The expert entered the field on 18 April 1977 after having been briefed by Mr. A. Nemtchinov, UNIDO.

The change in the job description was approved by Mr. Shallon, Mr. Lalkaka and Mr. Nemtchinov.

The expert carried out his duties at TSE, Ankara and in Izmir, Bursa, Izmit, Istanbul and Kayseri area (s.a. the attached itinerary) and left the field on 6 June 1977.

TSE assisted the personnel interviews by Miss Banu Erol, M.S. graduate in Chamical Engineering from Hacettepe University, Chemistry Faculty.

Objectives of the Project

No change of A. Soltans objectives (page 10 of Report on Packaging (TS/TUR/73/004).

II. FINDINGS

Situation of the Turkish Packaging Industry[1] (Supply).

The packaging industry of Turkey is a very heterogenous industry varying from huge private or state monopolists to very small family type

1/ Packaging Industry = Industry which supplies packaging media and/or containers to be filled afterwards.

workshops. The area where the packaging industry is located is merely in West Anatolia with the exception of Adana, Mersin area located in the South of Anatolia.

Tin plate industry

Eregli Demir is the only one who manufactures packaging tin plate and is governmental. The total consumption of tinplate in Turkey varies between 80,000 and 100,000 t's/a, depending upon the yield of the fruit and vegetable season. About 18,000 t's of tin plate are imported. All hot dipped tin plates (300 tons/a) have to be imported. The import can be allowed for either the can manufacturer if Eregli Demir (Erdemir) cannot supply, or for export purposes. There is a necessity to say something about the quality of Erdemir's tinplates, especially about the constancy of the thickness both of the tin layer as well as of the total plate. Because of the low quality of the tin plate sever converting problems can arise (printing quality low, pin hole corrosion, corrosion of the length welding seal, hardness of the can, impossibility to close can's lid automatically).

The can manufacturing industry consists of 4 major companies listed according to their market share:

1. Tasas (Manisa plant, Kartal plant) Yakacik plant: Total 18.000 t/a
2. Kartal Teneke (Safraköy-Istanbul)
3. Botas (Selcuk-concern - Izmir)
4. Hilal Ambalaj (Safraköy - Istanbul)

The next largest companies are canning companies:

- Tamek (Bursa factory)
- Tat (Bursa factory)

Smaller factories are:

- Motas (Ceyhan - Adana)
- Makik (Izmir)
- Metalkapak (Levent - Istanbul)
- Kombas (Topkapi - Istanbul)

and some 20 more small convertors (crown cork production, etc.).

A new factory producing rectangular cans for tea will be established in Rize (Cay - San - Campany). The main enduser sections are:

- food and vegetables.
- chemical products (perticicles, etc.)
- mineral oil;
- vegetable oil and fat;
- margarine;
- cosmetics;
- dye;
- babyfood;
- aerosoles.

As far as the expert understood there exists no proper knowledge about the right lacquer applioation and no test possibilities for lacquers.

Besides of sporadic tests there exists no oo-operate research activity between the Bursa Institute 2/ or the Izmir University and the can supplier.

The main problem is the low and changing quality of ERDEMIR's tinplate. Because of the monopol situation there exists for the can industry no possibility of rejecting the tinplate. Even the existing TSE Standard (TS 1885) which is not compulsory cannot change the situation.

Aluminium industry

Nasas Hereke, a private company is the only one in the aluminium industry. In the near future there will be a new rolling mill for aluminium foil at Seydisehir but the width of the already ordered heavy Russian equipment makes it very unlikely that there will be any competition for Nasas. Nasas is in the advantageous position of being the sole foil supplier and the main flexible laminates 3/producer. The capacity of flexibles production in Nasas is today about 20,000 tons/a whereof only 6000 tons were produced in 1976. The main items are:

- cigarette paper 2000 tons
- sweets 1500 tons
- dry soups 450 tons
- chocolate 250 tons
- tablet blister foil 100 tons
- butter wrapping
  closures for beverages and dairy products.

For flexibles 2000 tons of aluminium foil are used today. Other converters of aluminium foil are Teko-foil/Istanbul, Ispak/Orhangazi and recently Petas/Izmir for Tetrapak-laminates. Nasas has a PE-Coating unit (ER-WE-PA).

Nasas' capacity is big enough so there exists only an import of special alu-allous (300 tons/a).

For the moment there exists no market for aluminium container. Only Tasa a CCC-licensee is going to use easy open aluminium lids for cans.

Collapsible tubes for tooth paste are merely inplant produced by the three tooth paste manufacturers themselves. In the future, there is no doubt, there will be a market for semi-rigid packages (tray-type) which can be used for marmalade, etc.

2/ Control and researoh institute, General Food Directorate in the Ministry of Food and Agriculture.

3/ on aluminium substrates only

Glass industry

In the Pasabahce industry group there exists one holding of 11 major glass works which covers almost the total glass container market. The two biggest factories of Pasabahce holding are Topkapi Sise ve Cam, Instanbul and Anadolu Cam, Mersin. Both factories are modern companies. Today these companies try to come down with the bottle weight in order to save money. In this effort some physical tests could be helpsome.

Paper, board, corrugated board

SEKA, IZMIT, a state owned paper mill is the main supplier of craft paper for bags and heavy duty sacks, of craftliner (testliner as well) for corrugated board and card board. SEKA has the monopoly on craft paper and craftliner. Besides SEKA there is only VIKING, Izmir, a private factory (one Yankee-cylinder) for production of craft paper and bleached craft paper.

The following companies are producing packaging media:

1.	SEKA Dalama	50,000 tons cromo carton, printing paper
2.	SEKA Cayouma	52,000 tons craft paper, craftliner
3.	SEKA Izmit	15,000 tons fluting
		15,000 tons ohrenz
4.	OLMUK, Edirne	30,000 tons testliner, fluting (start 1977) + cardboard
5.	VIKING	75,000 tons craft paper (capacity)
6.	Kartonsan Izmir	cardboard 35.000 tons

New projects:

7.	SEKA Kastamonu	cigarette paper
8.	SEKA Silifke/Mersin	pulp
9.	SEKA Balikesir	craftliner
10.	SEKA Afyon	semicellularis (start end of 1977) 50,000 tons + 85,000 tons cheap packaging paper
11.	SEKA Hopa area	
12.	SEKA Samsun area	(no decision yet)
13.	Biksan, Bilecik	12,000 (ompas)

At the moment SEKA as a sole importer imports 20.000 tons craft paper per year.

The main converting companies:

a) Corrugated board (boxes) producers:

1. OLMUK (Peters machine + ~Bobst)
2. Omsas (Izmir) + Omsa (Istanbul) = Ompas (2 langston)
3. Kutsan (Peters) in Tire (30,000 t just started)
4. Dentas (SNS), Denizli (30,000 t - Start 1978)
5. SEKA, Izmit

Total market 80.000 tons of corrugated boxes.

b) Paper bag producer

Only one major factory was visited, namely BAK, Izmir. There exists a lot of small family workshops, throughout the country. All bags are handmade. Only some companies have a tubing machine.

The main problem is the glueing. There exists a lot of companies who mix very much sand in the glue so the total weight of a small shopping paper bag rises from 25g to 80g. This sort of cheating the consumer should be stopped by a standard. The main endusers are retailshops, sugar factories, flour factories, etc.

c) Heavy duty bag producer

There exists only one Seka factory at Caycuma. All other bags mainly used for cement are inplant produced by major cement factories (valve type bags)

- Ak - cimento, Buyuk Cekmece, Istanbul
- Nuh - cimento, Gebze
- Zeytinburnu Ciyesan (Izmir) = Cimentas
- Baksan, Zinguldak (Bastan Cimento)

d) Folding box producer

There exists no big company in Turkey. Even one can find specialists for printing (mainly Heidelverg) and shops for producing the boxes. The quality of cardboard used is very poor. Main endusers are confectionary and bakery industries and small producers.

For corrugated board and sack production there is a shortage at the moment. Mainly because of that reason everybody is complaining about SEKA because of its strong position as a sole distributor. SEKA's products are cheap but the quality is low. As opposed to SEKA, VIKING's products are better but more expensive, therefore most converters prefer to wait for SEKA's paper and pay a lower price.

Plastic packaging industry

Since 1974 PETKIM is the sole distributor of plastics in Turkey. PETKIM is a state-owned institution which has own factories for production of resins. PETKIM produces PVC, LDPE, PS and has also a converting plant at Canakkale for heavy duty sacks, agricultural film and recently for shrink film.

The annual consumption of plastics for packaging breaks down as follows:

a)	LDPE (low density Polyethylene):	50,000 tons
	whereof high transparent packaging film	17,000 tons (import)
	agrioultural film	
	heavy duty sacks	33,000 tons

for 1977 PETKIM expects a 80.000 tons consumption for packaging (a tremendous development).

b)	HDPE (high density Polyethylene):	60,000 all import blow moulding
c)	PP (Polypropylene):	9,000 tons all import
		8,500 tons woven sacks
	whereof no OPP - equipment as yet (planning state a plant near Trabzon)	
d)	PS (Polystyrene)	3,500 tons high impact PS for tubs
		2,200 tons EPS import (expandable PS)
e)	PVC (without plasticizer)	3,000 tons blow moulding (bottles)
		600 tons injection moulding (tubs)
		500 tons sheet for thermoforming

The plastic converting industry is very wide spread and PETKIM names about 2400 companies. About 1400 companies dealing with packaging. We can only give the main companies here:

LDPE - heavy duty sacks and agriculture film	Plaza, Cukurova) Mersin
	Azot, Kutahya (fertilizer factory)
PS - sheet production:	Pazanplast, Ankara
PVC - sheet (film):	rotapak
	Delta plastik
	Birlesik Alman Hero fab.
for EPS - cushioning material: (foamed polystyrene)	Istiropor Ambalaj San. Istanbul
	Birlesik Ambalaj ve Kontrplak San. Medidiye, Istanbul,
for PVC bottles:	PEKAS, Istanbul
	Teknoplast, Istanbul

There exist also some very advanced production facilities in Turkey:

- SARAN Plastik Ambalaj (Fabric Dubze)
  this company has a co-extrusion equipment mainly thought for pure plastic laminates and on the Polyamide basis

- PLASER Plastic Sera Ortuleri ve Ambalaj
  this company has tried for four years to market a PP corrugated board

- Kaplamin, Izmir
  this factory produces a packaging board medium functioning like a corrugated board but instead of a fluting it uses foamed Polystyrene.

Only the last company seems to be successful. The other two companies have a lot of difficulties in finding the proper raw materials.

General remarks about the Turkish packaging industry

In Turkey of all types of packaging media one is confronted with monopolists or quasi monopolists:

Packaging media	sole producer and/or distributor of material	sole manufacturer of packaging	competitors in production of packaging
Tinplate	ERDEMIR	-	Tasas, Kartal, Teneke, Botas, Hilal Ambalaj
Aluminium foil	Nasas	Nasas	-
Glass	-	Pasabahce concern Anadolu cam, Topkapi	no importance
Paperboard	SEKA 4/	-	Olmuk, kutsan SEKA, Dentas, Ompas
Plastic	PETKIM	-	1400 companies

The strong position of the material supply in Turkey does not make it easy for the convertor. According to that many complaints arising from both sides it is very difficult to give any judgement about the complaints, because of short time; nevertheless they are of some importance for the new PC and are therefore listed below:

4/ Olmuk/Birne only for own consumption

- the raw material supply is bureaucratic, costly (they must pay half a year ahead) and the quality is changing sometimes below acceptance.

- because of this reason the introduction of a quality control seems to be difficult for the majority of the packaging producers.

(The expert had no time to check personnally these statements.)

- stockholding policy is unknown for most of the packaging producers.

- especially in plastics there exist hardly any knowledge about the rheology5/; there exist only brands ordered which has done well on the extruders for years.

At any case the defeatism of the Turkish packaging industry will not make it easy for the new PC to come into the business. Because of this problems or complaints which have arisen within the packing industry are often shifted from the packaging supplier to the raw material supplier and nothing really happens. This is also the reason why a lot of main consumers of packaging materials started to produce their own packages or buy a packaging company.

As a result of the relatively strong position of the main packaging industries up till now there has been no real incentive to solve packaging problems together with the competitors concerned. Also the idea of a PC to come at TSE was quite new for all companies whom the expert has spoken to. All the companies showed some reluctance, assuming the packaging centre at TSE will produce only standards on packaging. This wrong impression had to be discussed and the service character of the PC had to be explained.

In general it was found that in the packaging industry there is a consensus about the necessity of PC which helps to develop and solve acute packaging problems. However, it will take a lot of time and hard work to convince this individualistic companies to come to the PC with their problems because they have been used for years to solve their problems alone without other people interferring.

Situation of the packaging industry - as far as covered by the interviews (demand)

Non Food Industry

1. Fertilizer and Cement industry

Besides Azot, Kutahya with several plants throughout the country there exist 3 other factories, two of them are private ones. Azot as the largest has just started to produce its own fertilizer bags. 6/ Azot has its own testing facilities. The consumption - today 22 mill. sacks - will increase to 55 mill. sacks per annum all inplant produced. Plaza, Mersin 7/ is the main supplier for the other factories. TSE has just prepared a compulsory standard 8/ for fertilizer bags made from LDPA

5/ Both the two supplier of shrink film as well as Topkapi glass works do not know how to test the material in order to receive the shrinking properties necessary for the packing line.

6/ Heatsealed LDPE-valve-sacks on 8 newly concipated Holweg machines

7/ W + H AD-Plastic Machine

8/ TS 2538

to give the governmental sole distribution company a better control possibility about the quality of the sacks. All sacks are not palletized.

In Turkey there exist 15 state owned and 16 private cement factories, another 12 factories are planned. As mentioned before besides SEKA - sack factory there are 4 cement factories producing the paper sacks for all other companies. In some of the newly planned plants also sack producing facilities will be installed. Testing facilities (drop tests, etc.) are not available.

2. Detergents

Unilever, the main factory, works according to its European internal packaging standards and tries to adapt it to Turkish eventualities as far as possible. The consumer packs are much smaller than in Europe according to the lower and weekly paid salary. Unilever is complaining about the low quality of the packaging material (cardboard, tinplate). Despite the fact that Unilever has internal help for packaging design[2] according to their opinion the first step should be the improvement and standardization of the basic packaging raw materials in Turkey.

Shampoos, fluid detergents, cosmetics, pharmaceuticals, are mainly filled in PVC bottles.

3. Electric industry

The electric industry is very interested in proper packaging material because of the high value of their products. Lacking proper packaging tests and equipment these companies test their material both in their mother companies abroad as well as in transport tests throughout the country according to real hazards.

4. Textile industry

There exist about 100 factories of medium size.[10] All of them have severe structural problems. According to the wide changing length of the textile bales shrinkwrapping would be most economic but it is unknown. They have the same problems with yarn bobbins.

5. Glass manufacturers

Pasabahce, a manufacturer of packaging containers as well as of fine glass (crystals, etc.) has a lot of difficulties in packing their products. They have no idea about proper testing methods for packaging media and boxes and cushioning material. The only test consists in weighing the paper not to be cheated in purchasing.

A new material[11] bleached kraft/expanded Polystrene/bleached kraft is used instead of corrugated board. Pure EPS is rarely used mainly for present packs because of the very expensive mould.

2/ Unilver group is the owner of one of the largest European Packaging Companies (4P Group)

10/ Bursa, Istanbul, Kayseri and Adana have traditional centres. Today one can find companies spread all over the country. The bigger factories are Paktas/Adana, Bursa and Bozkurt, Istanbul.

11/ Sole supplier Kaplamin, Izmir.

For despatch of glass bottles, Topkapi Sise ve Cam San. starts to use shrink film for palletizing and for multipaoks. The lack of testing facilities at the plastic converter makes it impossible for T kapi to get a proper shrink film.

Food industry:

1. Canning industry

This industry has problems to find the proper lacquer for the various products. At the moment there does not exist a possibility of testing lacquers in short time tests in Turkey neither for the tincan supplier nor for the pilling plants. This is a severe problem which also hampers the export of the products. There is also uncertainty about the right labelling and volume for the various products to be exported to EEC countries.

There is only one institution which really deals with canning research at Bursa; all other institutions named in former reports have only made some sporadic tests 12/. The Control and Research Institute, General Food Directorate in the Ministry of Food and Agriculture/ and Livestock, Bursa, even possesses an own small can production unit. About 23 agronoms from the university are working permanently. This institute also controls the quality of the content of cans to be exported but not the quality of the can itself. Sometimes they are dealing with fish conserves; processed meat does not belong to its responsibility. Next year this institute will have a new central laboratory which also starts to deal with plastic packaging material. A micro-biological laboratory is also available.

In order not to get a wrong impression is must be said that even if the Bursa Institute seems to be best suited to deal with packaging problems it is not really willing to do this and also the technical staff is chosen according to food processing only.

2. Bottling industry

Principally there are only very few complaints about the tolerances of glass bottles which do not always fit the rapid filling machines.

One-way bottles are very rare, mostly for export. Both participants, the glass works as well as the filling stations, are interested in a lighter returnable bottle and are already on a successful way towards a weight reduction. For fruit juice the companies would prefer smaller tolerances of the content, i.e. a smaller headspace to prolong the short life, as it has been allowed by the law.

The bottling industry has been using pallets for shipments for years. Recently a change has taken place from wooden crates to plastic bottle crates.

12/ For example there exists no Canning Research Institute at the EGE University.

There also exists an uncertainty about acceptable volume tolerances in bottle production.

3. Dairy industry

There is a growing demand for sterilized milk in Turkey. The only system used is Tetrabrick 13/. For that reason Petas/Izmir has received the license to produce the paperlaminate from Tetra/Pakoon at ERWEPA laminator at the end of June 1977. There are no packaging problems. Cheese in flexibles (coated Cellophane) is quite new and of growing importance. All the material is being imported at the moment.

4. Fresh fruit and vegetables

At the time the expert was in Turkey there was no season for fresh fruit and vegetables. For apples for example there exists not enough cold storage space so a lot of fine apples are deteriorating too fast. Another point is that small retailers sell their fruits or vegetables in paper bags glued with a mixture of adhesive and sand to make it heavier. Not only the stiff easily breaking sealing also the cheating aspect should stimulate TSE to stop this by a compulsory standard on this subject.

5. Dry soups

The laminates dried soups packed are of a very bad quality. The single components are delaminating. A labor glueing machine could not be found therefore an installation of such a unit at the new PC should be considered.

Only Tamek tries to market dried soups with fatty components but has trouble in getting a proper PVDC coated laminate.

6. Frozen food

There is only Meybuz/Kayseri which has just started to enter the market. The development of such products depends mainly on the development of supermarkets. A distribution system also has to be established. The main products which should be marketed first are some kinds of berries, meat cuts, fish cuts, ice cream, all packed into waxed cardboard folding boxes.

General remarks about the Turkish packing industries

Because only the main companies have been visited it is impossible to give any comprehensive comments about the packing industry. As far as the new PC is concerned it was found that there exists much more understanding and interest for a packing institute as the packaging industry showed.

The reason for that is in general some misunderstanding 14/ and bad experience with wrongly applied packaging material and a complete lack of

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13/ Today 5 companies (= 20 mill. kg/a) another 4 factories are planned

14/ Meysu, e.g. uses for steam a thermoformed Polystyrene tub not considering that the high water vapour permeability shortens the shelflife drastically. Instead of a fluidy jam one finds a chewing gum.

any packaging service both from the packing machine supplier as well as from the packaging material supplier as known in Europe. For this reason some major companies have already started to establish own testing facilities but without proper understanding how to manage it really. Only subsidiaries of European or American companies have received proper help from abroad.

Transport system

The industry railway transport for most of the commodities is out of discussion. The main reason is assumably the missing service to bring the product to the railway station and the complete lack of any pallet system which makes handling easy. Loading a truck reloading at the railway station and the same procedure on the reverse on the consignees side is too expensive.

This handling means squeezing, vibration, drops and not always good asphalt roads.

III. RECOMMENDATIONS

General recommendations concerning the establishment of a Packaging Centre in Turkey

All European packaging institutes have started at a small scale about 25-30 years ago. The development of these institutions took place according to its special experiences and knowledges of the staff but primarily was due to the requirements of the industry concerned. As research and development have always been expensive the process of establishing these institutes has taken a lot of time and still requires a permanent outlook for clients and money. In these daily efforts these institutes succeeded only by the sponsorship of the industry, of various ministry funds and other governmental or semi-governmental institutions concerned with packaging. Of course it is not easy to convince these financial backers year by year of the necessity in spending money for a packaging laboratory. For this reason the institutes found it very helpsome to have an advisory board which helps the management to market the services of the packaging laboratory and to help to find money. One can imagine that only real independent institutes are in a position to operate neutral for all types of packing materials and packaging and in the reverse have the chance to receive help and money from all sides.

The permanent lack of financial means forced the institutes to operate as cheap as possible. All types of testing equipment were planned, designed and built indoor by means of their own workshops which can be seen today also. For this purpose it is easy to understand a packaging centre needs both creative engineers with a deep understanding of science and skilled personnel at the work shop. The second is already available at TSE.

Today a lot of the testing devices originally developed to solve an unknown problem one can find as a standard testing equipment used more or less all over the world. As shipment systems, storage habits or even the way of life have changed, many of it have disappeared after having used it once. Because of its auxiliary function to bring an object from one place to the

the other without damaging it, packaging changes permanently according to the transport system, the price of the raw materials, new technologies, etc. For this reason the task of the packaging institutes in general has not changed since the very beginning. What has changed are only the outer circumstances which packaging has to meet but the aim to bring one object secure to another place is still the same. As a result of this one cannot apply a patent for establishing a packaging centre. The future development of the Turkish Packaging Centre will be the result of the requirements of the industry, the activities of its management and the capability of its staff.

The main tasks with which the new PC will be confronted are:

a) quality control and standardization[15] of the basic raw materials to produce packaging media and packages for all types of materials;

b) to improve and to give advice in transport packaging for nonfood, food and export commodities;

c) to improve and to elaborate testing standards and methods of quality control of packaging for the packing industry (food, electrical industry, etc.)

d) to elaborate testing methods for the packaging industry itself;

e) to help the packaging industry in their efforts to use new, cheaper or unknown packaging materials;

f) to incite standardization of testing for packaging media as well as for packaging at TSE in order to facilitate testing in the industry.

At the beginning the packaging media of main interest are tinplate, paperboard and plastics. The glass container industry is very concentrated and at a relatively high level of production. The only problem it is facing at the moment is the reduction of the weight of the container. European institutes are doing research work about this matter at the moment and one should wait for the results first.

The aluminium industry faces some problems with coating and lamination. As a long term object one should consider to establish a small but very flexible coating and lamination pilot machine at the new PC because test runs at a large scale machine are very expensive. This project should be discussed with Turkish companies interested in this subject. [16]

- Research and Development on tinplate means mainly working on canned food. Especially for lacquer there exists only a very nebulous understanding and no testing facilities for the mainly imported lacquers. In order to be not too venturous PC should work closely together with institutions which deal already with research on the content of the cans. [17]

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[15] Standardization means also to give a frame of the material tolerances (gauge, coating gauge, purity of the material, etc.)

[16] Nasas, BAK, PETAS, Ispak, etc.

[17] Bursa Institute, EGE-University, Yalova Institute, Hifzisihha, Refik Saydam Enstitüsü

- For plastics there exist hardly any testing facilities[18/] as was found out at the main converters and at PETKIM. These would be needed to test the basic resins or the properties of the packages. The users of the packaging as well as the packing houses have no possibility of any quality control too. PETKIM has now started to edit regularly a plastics journal in order to inform their customers about the basic know-how and application of plastics.

- As stated before the raw material supply of craftpaper, craftliner and board must be upgraded according to certain quality standards. Secondly the quality of the converted materials can be improved by using corrugated board, for example.

- There is an urgent need in transport hazards testing for all types of packaging including wooden crates and boxes. However, there exist no facilities for this in Turkey. Large companies have their products tested abroad or in expensive transport tests sending the cargo from one end of the country to the other and back again.

Referring to the Turkish Packaging Centre to be established it is important to point out that there is no need to run through all phases of development which other institutes have done because of the following reasons:

a) There exists a number of approved tests and testing equipments elaborated at various other institutes which easily can be taken over to the PC both for packaging material and packages;

b) Turkey, a country with an annual economic growth much higher than most of the countries in the world, cannot afford to wait any longer for the establishment of a PC. Besides this no activities at university level on packaging or packaging material can be found;

c) Waiting means more money because of the inflation all over the world;

d) There is the help of TSE (personnel, laboratories, workshops and equipment) and the UNDP input (equipment, fellowships and foreign experts) which makes it feasible to start the activities at the PC on a relatively broad basis.

At least during the start-up time there is no need at the new PC to educate specialists without the overall admitted understanding of the general aspects in packaging as there are: transport hazards: humidity, oxygen, UV-radiation, heat, cold, microbes, vermin, impacts, pressure, vibrations; identification of the contents, marketing aspects.

Functional scheme and tasks for the Packaging Centre

TSE has asked the expert to provide them with some advice on an operative concept for the new PC according to his experience at the Munich Institute

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18/ Asot has a melt index meter and a drop tester for sacks.

of Food Technology and Packaging and the Swedish Packaging Research Institute. A general schmee of function is shown in figure I. In figure II a functional scheme of the Packaging Centre itself is shown. The latter shows that the head of the PC should be free of administrative business as far as possible. For this matter TSE should support him with an administrative officer. Under the responsible technical directorate there should be one sub-department dealing with the daily routine testing, both for retail packaging and for transport packaging, heavy duty as well. If standard testing methods are not available or if special problems have to be solved people from both the Research and Development (R + D) Departments should help the sub-department.

The idea of exempt the R + D Departments from the daily routine tests is that there is no need having a university graduate on the testing job and that the R + D staff should deal with special media or long range objects undisturbed as far as possible. This is very important because it is a well known fact that one can train a capable man rather quickly by using his hands properly but using his brain he has to train himself (therefore also a need for relatively young personnel at PC) on problems. For this purpose he has not to be bothered by daily routine jobs.

Proposing two R + D sections is simple to explain because according to the university education one cannot find graduates who deal with the physical/mechanical side as well as with the chemical/microbiological more analytical side.

It will be the job of the responsible technical director to make a team out of the PC staff as flexible as possible, viable as well as operational.

This includes of course a person convincing by scientific background as well as by authority. Together with the service engineers and with the help of the adivsory board (see figure I) he should be in a position to activate and to stimulate the industry about the new facilities at the PC. The standardization of packaging should be furtheron a task for TSE only with some help and advice from the PC and the concerned industry branches.

As pointed out at the beginning of this report no national packaging committee or advisory board has been established as yet.

Such a body would be necessary to establish a PC in Turkey. This seems to have two aspects. A political and a practical one. An advisory board (figure III) would fit much better the Turkish situation than a National Packaging Co-ordination and Development Committee. The reason for this is rather simple because almost all the responsibilities carried out by this Committee are mainly the job of the PC itself and the industry as well as the responsible official bodies only can give advice and some help but it seems much too difficult

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19/Union of Chambers of Commerce and Industry, Ankara, Export Promotion Board, Ankara, Ministry of Health-Food and Packaging Control Department.

Figure I: General scheme of function of the Packaging Centre

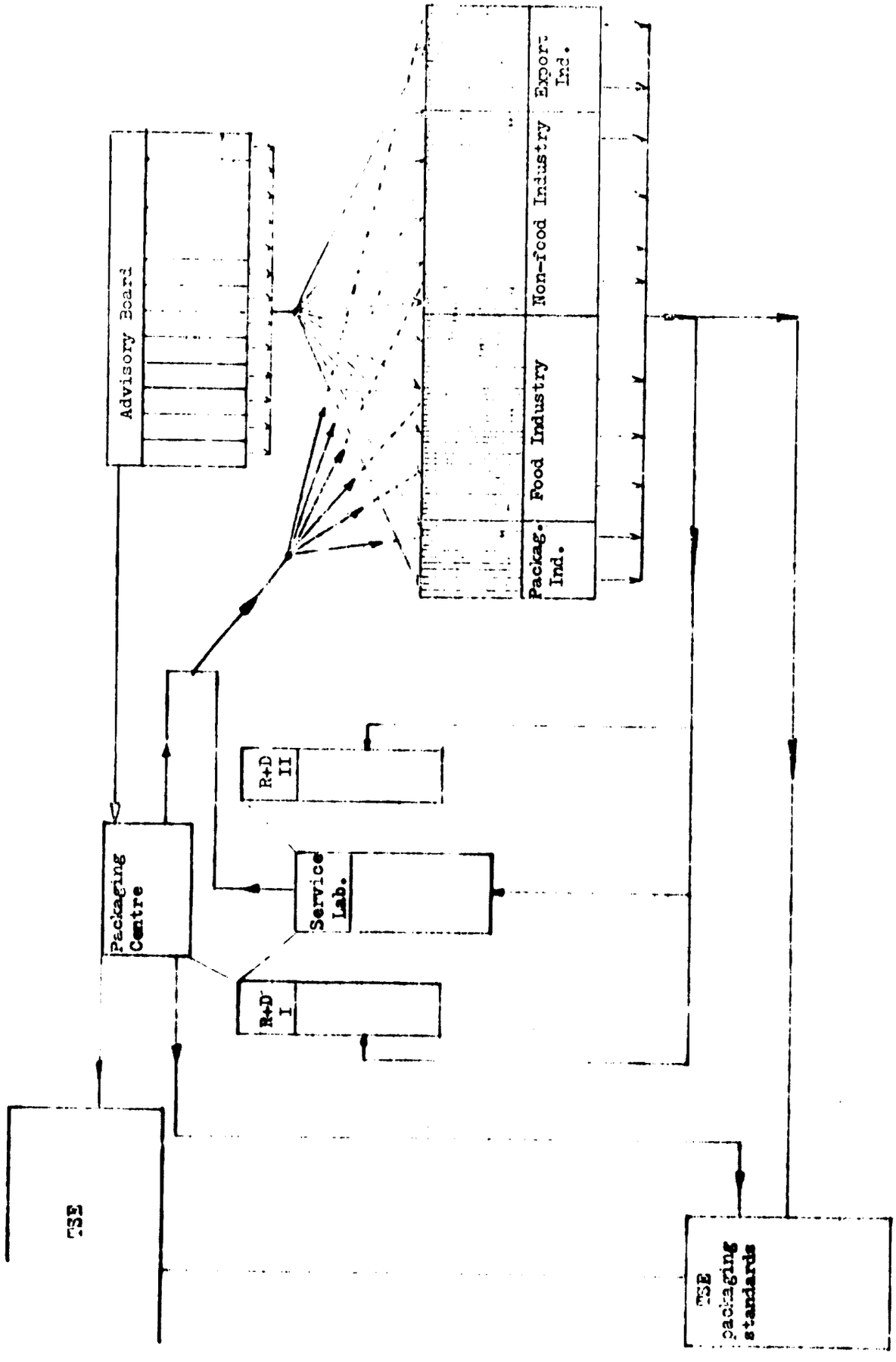


Figure II: Functional Scheme for a Packaging Centre at TSE

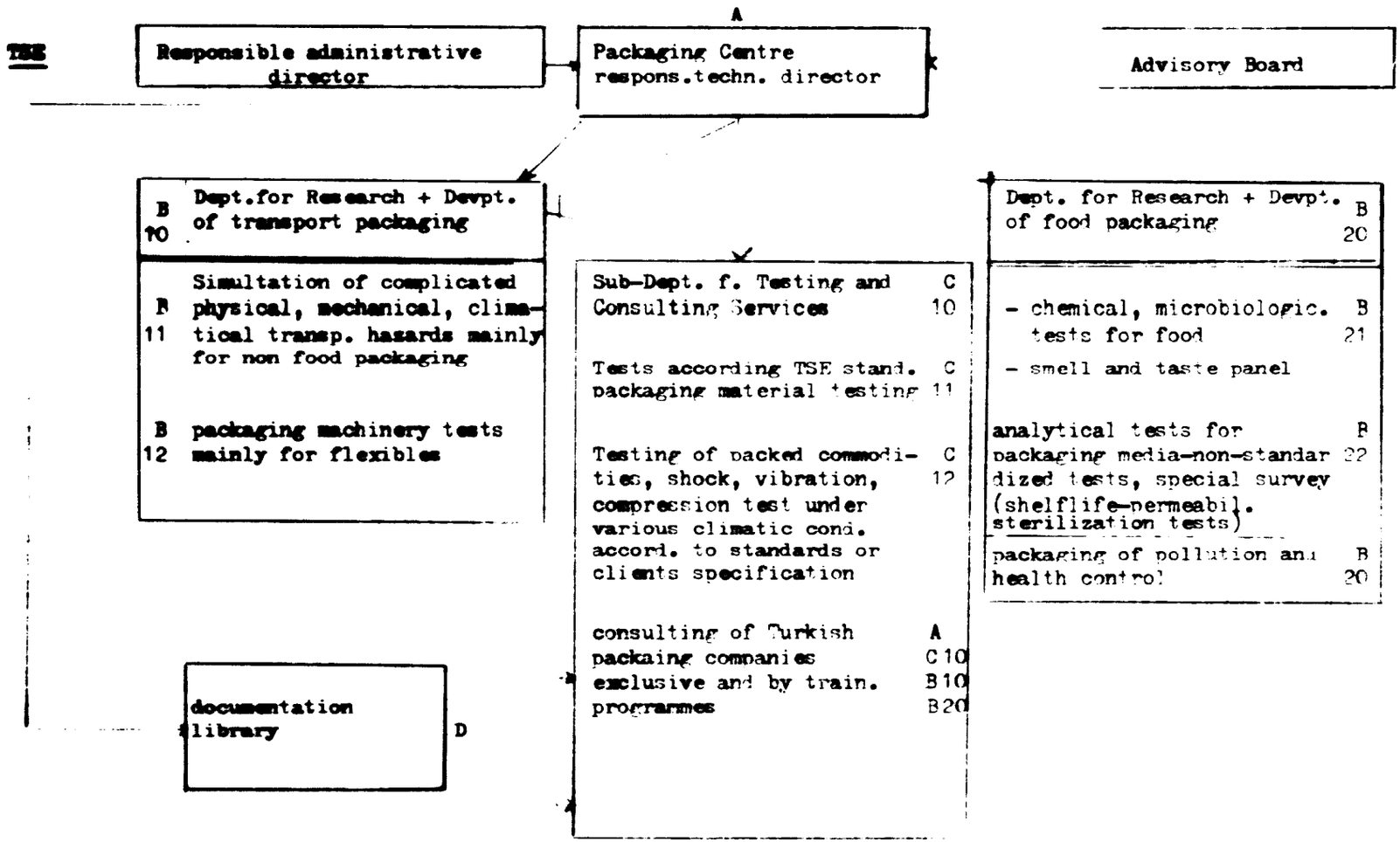
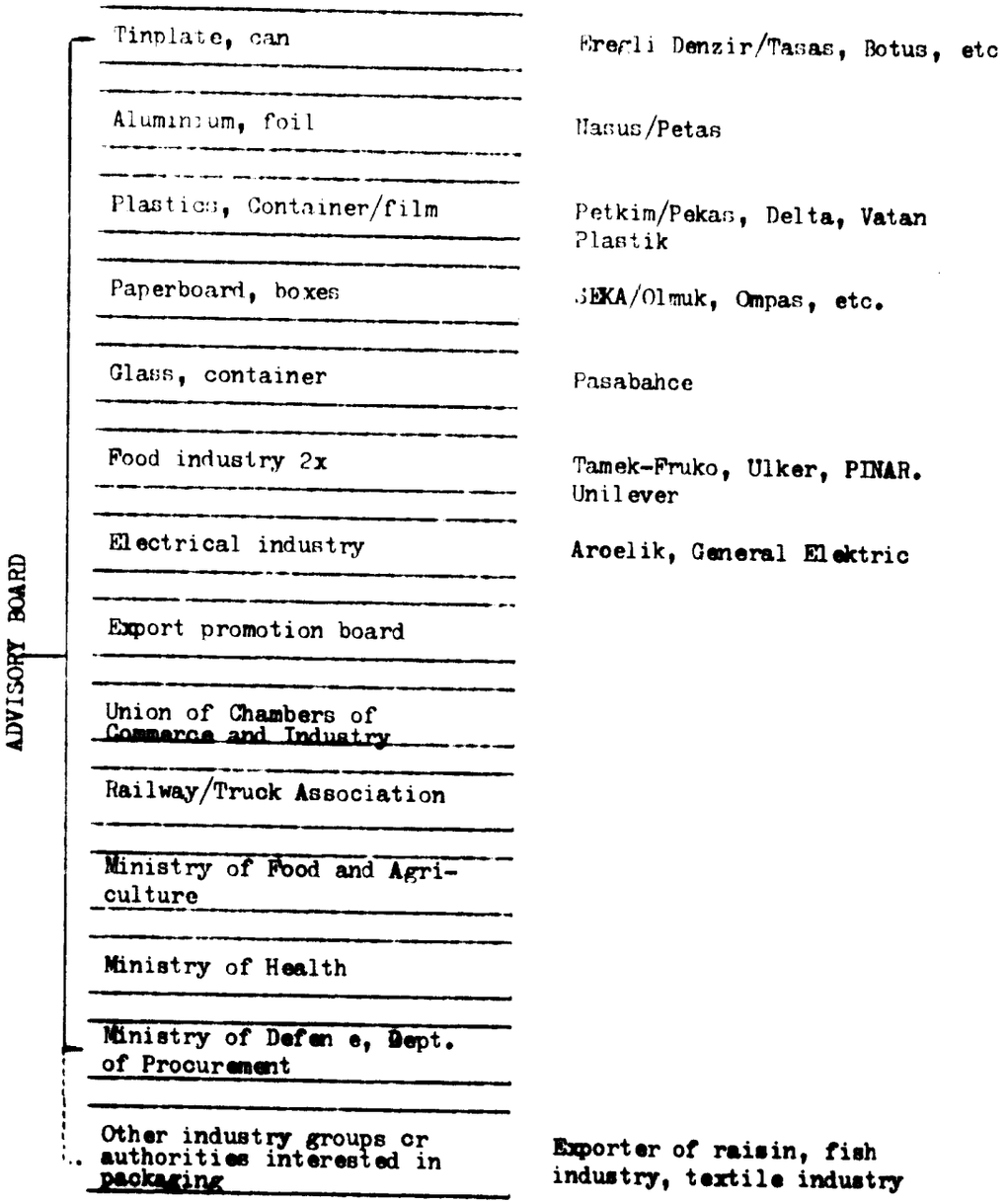


Figure III: Possible constellation of an Advisory Board



to co-ordinate such a Co-ordination Commitee itself and start to make it work as a body of its own. The Advisory Board will have a double function:

Especially during the start-up time it should help to market the new institution called PC and should try to find the first clients. Later on the duties should change more and more into a body representing mainly these industry branches and authorities who permanently work together with the P + D sections at the PC. The members of such an Advisory Board should therefore be selected respectively for one year out of the represented industry groups and from the head of the PC. By this way one can be sure that year by year the Advisory Board itself will receive new ideas and the PC will have the chance to get into contact with new companies and new problems to be solved.

UNDP-Input [20]

The UNDP input - foreign experts, fellowships and equipment - totals now up to 172,000 US$ for a period until 1982 minus the costs of Mr. Luxenhofer (10,000 US$). An amount of 162,000 US$ remains therefore. UNDP also agreed to spend 25 - 30 per cent of this amount for equipment which means about 52,000 US$ so that 100,000 US$ remain for personnel aid.

The fact that at the moment only very little experience in packaging is available shows that preference should be given to training of Turkish staff abroad in order to ensure that foreign experts could be used best.

At the moment it is not yet clear however, how many people will be employed at the PC. But it seems quite reasonable to assume four persons (A, B, B and C of annex I) for the first period until 1982 will be available.

In annex I the proposed fellowship programme is tabellized. US$ 27,000 have to be spent for training programmes, US$ 73,000 remain for foreign experts. This means that it will be impossible to have a chief adviser who will guide the head of the PC during the start-up time.

To use the remaining money best following experts are proposed (see annex I).

US$	UNDP Input	
172,000	available amount	
10,000	Mr. Luxenhofer's mission	expert
68,400	proposed experts	
29,800	training programme	fellowships
60,400 [21]	apparatus	equipment
1,400	sundries	

[20] according to letter of UNDP dated 2 May 1977 to Mr. Isfendiyar former General Secretary of TSE.

[21] In the final discussion of June 1, 1977 UNDP agreed to increase the total amount of US$ 52,000.

TSE-Input

TSE's total input until 1982 cannot be given at this stage.

For 1976 and 1977 an amount of LT 8,528,300 has been granted by the Turkish Government and it will be mainly used by for the new building (finished October 1978).

For 1978 there will be another request to the Government for further money destinated mainly for equipment to be manufactured locally and for personnel.

Annex I

PROPOSED STAFF FOR THE PACKAGING CENTRE

Person	preferable education	special knowledge (as far as possible)	age (approx.)	languages	start of activity
A	chemical eng./ industrial eng. University graduate (master)	experienced in R&D as well as some years practice in the industry "A" should be in a position to held lectures even at a university level	35-40	english	as soon as possible
B_{10}	mechanical engineer/ chemical eng./ physicist university graduate	some experience in analytical and theoretical work at university level	25-35	english	after finishing the packaging Lab.
B_{20}	chemical engineer/ chemist university graduate	broad experience in analysis techniques	30-45	english	after finishing the packaging Lab.
C_{10}	mechanical engineer (b.sc.)	packaging engineer experienced in the packing industry with an ambition for sales and marketing	35-40	english	as soon as possible to help to establish the testing equipment

Person	preferable education	special knowledges (as far as possible)	age (approx.)	languages	start of activity
D	chemical engineer (b.sc.)	training in documentation	25-50	english (german french)	later, after establishing the pack. lab. can be done by TUB-staff at the beginning
B_{11}	mechanical eng./chem. eng. university graduate	-	22-30	english	later
B_{21}	microbiologist university graduate	food processing	25-50	english	later
B_{22}	chem. eng./ chemist university graduate	-	25-30	english	later
C_{11}	mechanical engineer/ technician				later
C_{12}	mechanical eng./ chem. eng. (b.sc.) or technician				later
B_{12}	mechanical engineer/ chem. eng. (b.sc.)	experienced in packing with flexibles			later (if at all necessary)

Foreign inputs (personnel)

foreign experts (calculated $ 4,600.- per m/m)	duration m/m	$ 1,000
1. chief consultant counterpart: A, B_{10}, B_{20}, C_{10}	24	110.4
2. testing expert, counterpart: C_{10}, C_{11}, C_{12}	8	36.8
3. expert on transport packaging tests and development, counterpart: B_{10}, B_{11}, C_{10}, C_{11} main task 1: planning of special testing device main task 2: training	6	27.6
4. expert on analytical testing of packaging media, counterpart: B_{20}, B_{22} main task 1: planning of testing device main task 2: training	6	27.6
5. expert on microbiological testing counterpart: B_{21}	2	9.2
expert subtotal	46	211.6
fellowships (calculated $ 1,200.- per m/m)		
1. A	3	3.6
2. B_{10}	3	3.6
3. B_{20}	4	4.8
4. C_{10}	6	7.2
5. Head of the workshop	1.5	1.8
fellowship subtotal A	17.5	21.0
later on after a period of establishment and parallel to employment of personnel		
6. B_{11}	3	3.6
7. B_{21}	4	4.8
8. B_{22}	4	4.8
fellowship subtotal B	11	13.2
fellowship subtotal A + B	28.5	34.2
Grand total. 245,800.- US $		245.8

Annex II

LIST OF EQUIPMENT

name of equipment	manufacturer(1)	Imported	indigenious	Priority urgent	Priority later	estimated price US $
Transport packaging Devpt section						
1. mech droptester for sacks (4-5 m height)	from drawings *		x	x		2,000.-
2. mech. drop-tester for small packages	from drawings *		x	x		1,000.-
3. shock tester-vertical	from drawings *		x		x	2,000.-
4. inclined plane impact tester	from drawings *		x	x		3,500.-
5. electronic compression tester		x		x		20,000.-
6. Vibrating table (heavy)	Spangel, Law, L.A.B.	x			x	17,000.-
7. rotating drum 5m Ø	from drawings *		x		x	10,000.-
auxiliary equipment						
8. 2-ray oscillograph	Tectronik	x		x		4,000.-
9. amplifer for - -(mosfettypo)		x		x		1,400.-
10. quick releasehook			x	x		100.-
11. Control instruments for climatic roous	Voltas Avco	x(40,000)	x (10,000)		x	50,000.-
12. quartz measuring plug for testing of cushioning material and for biaxial strength of films (3x) (various sensity)		x			x	2,000
13. hopper of filling device for valve and open mouth sacks	from drawings *		x	x		600.-
					subtal	

name of equipment	manufacturer(1)	imported	indigenious	priority urgent	later	estimated price US $
auxiliary equipment for tromps Packg.						
14. strapping device			x	x		100.-
15. stapling device for boxes			x	x		300.-
16. Tape dispenser (2x)			x	x		200.-
17. camera (reflextype)	Various	x			x	300.-
18. high speed film camera	Fairchild	x			x	3.000.-
19. fork lift doll			x	x		1.000.-
20. heat sealing device	various	x		x		1.000.-
Transport Packaging Testing Devpt. section		94,700.-	31,800.-	41.700.-	84,800.-	126.500.-

name of equipment	manufacturer(1)	imported	indigenious	priority: urgent	priority: later	estimated price US $
Packaging Material Testing Devpt Section						
1. Water vapour permeabilitymeter		x		x		1,700.-
2. gas permeability meter		x		x		2,000.-
3. dart tester		x		x		1,500.-
4. sample cutting press			x	x		350.-
5. plastics of lacquerporosity meter		x		x		1,300.-
6. creaser of board stiffness tester	PIRA-type	x		x		900.-
7. carton board creaser	PIRA-type	x		x		500.-
8. aluminium foil pinhole meter	from drawings*		x		x	1,500.-
9. 4-point bending stiffness tester	B K	x		x		2,800.-
10. orrugated medium tester	Liberty Engg. Co. Jillinois	x		x		9,000.-
11. corrosion resistance tester		x		x		3,800.-
12. tape adhesion tester		x		x		700.-
13. gas pressure meter		x		x		1,600.-
14. Vacuum meter		x		x		1,000.-
15. deep freezer (-60°C)		x		x		10,000.-
Packaging Materials Section	Testing of Devpt.	37,400	1,850	37,750	1,500	39,250.-

name of equipment	manufacturer(1)	imported	indigenious	priority: urgent	priority: later	estimated price US $
Retail packagings Testing Section						
1. electromagnetic quick release device for bottle drop-testing	from drawings *		x	x		100.-
2. Vacuum packaging apparatus	Kramer					
	Grebe	x			x	3,000.-
3. small Vibration table	B K	x			x	3,800.-

* should be prepared by local personnel

List of Equipment

1. electronic compressiontester x) 1.2 x 1.2 m clearance	26,000.-	US $
2. 2-ray oscillograph (Tectronix) x)	4,000.-	"
3. amplifier (mosfet-type) x)	1,400.-	"
4. heat sealing device (1 m width) (impuls type)	1,000.-	"
5. water vapour permeability meter	1,700.-	"
6. gas permeability meter	2,600.-	"
7. plastic & lacquer porosity meter	1,300.-	"
8. 4-point bending stiffness tester	2,800.-	"
9. corrosion resistance tester	3,800.-	"
10. tape adhesion tester	700.-	"
11. gas pressure tester	1,600.-	"
12. vacuum meter	1,000.-	"
13. dart tester	1,500.-	"
14. forklift doll	1,000.-	"
15. deepfreezer (-60 °C)	10,000.-	"
	60,400.-	US $

x) to be ordered in 1979

Annex III

TRAINING PROGRAMME

Persons to be trained from PC-staff	Type of training programme abroad	Duration m/m	US$	Duration in m/m 1978	1979	1980
Head of PC (person A) 31.01	- Testing of packaging materials, transport packages and retail packages. Training in packaging research development - Organization and management of a packaging centre	5	6.700	3	2	
Head of the R + D Dept. for transport packaging (person B 10) 31.03	Training in testing methods of transport packaging, education in application of physics, mechanics involving actual packaging problems	5	7.500			5
Head of the R + D Dept. for food packaging (person B 20) 31.04	Training in analytical methods of testing food packaging. Basic education in quality control of packed food. Training in basic understanding of packaging materials application for main foodstuffs	5	7.500			5
Head of the testing lab. (Person C 10) 31.02	- Testing methods of various packaging materials according to approved standards - training in interpretation of testing results for the customers - Testing of packages (food-non food), training in uncommon packaging testing (how to solve problems	6	8.100		3	3
(Technicians of the workshop)	Study tour to one or two packaging centres, to collect datas for home construction of simpler testing equipment	(2)	(3.500	in 1977)		
	TOTAL (without study tour)	21	29.800	3	5	13

1 man/month (m/M) = UNIDO calculation

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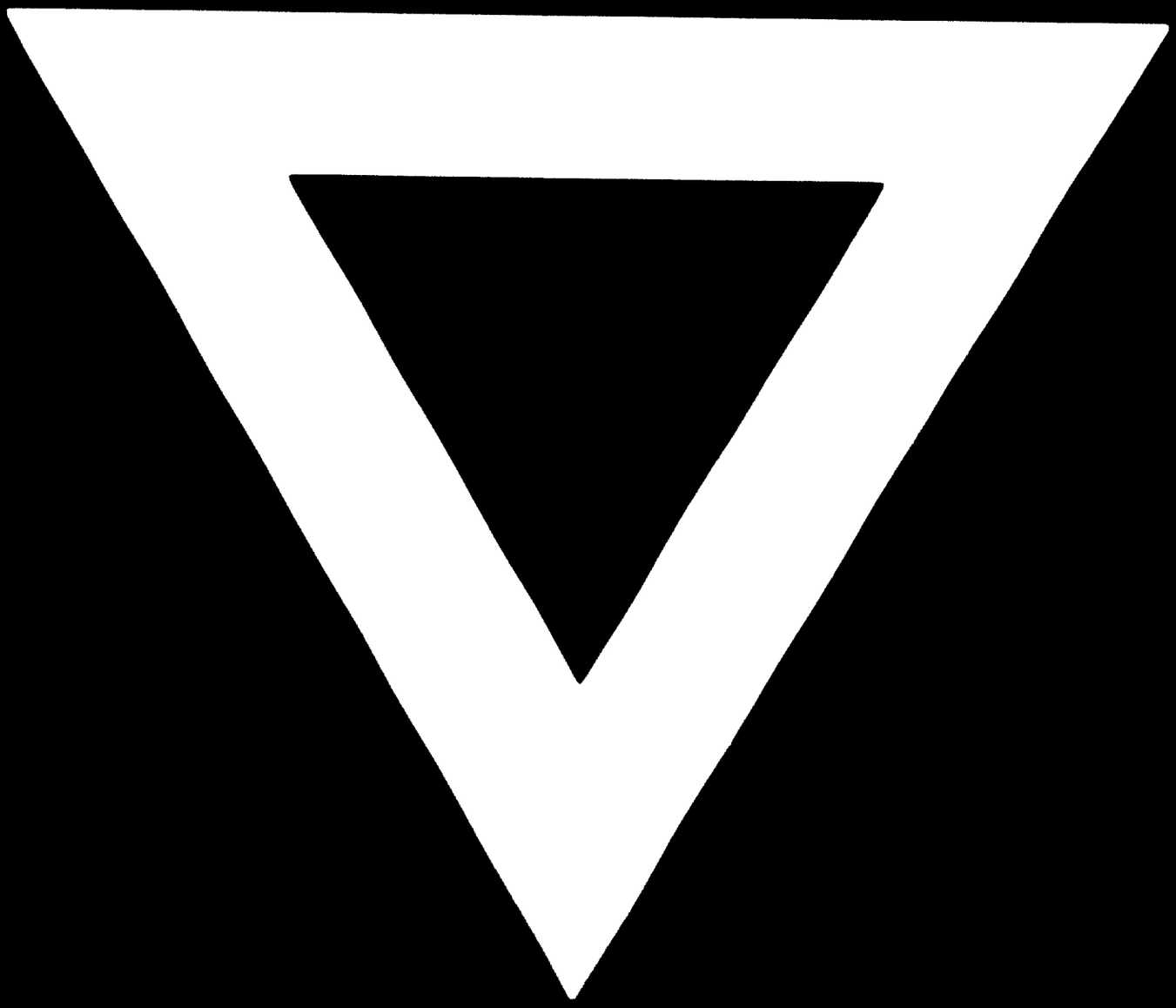

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