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**EXTENSION
OF
THE
POLISH
PACKAGING
CENTRE**

DP/POL/71/517

POLAND

TERMINAL REPORT

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



United Nations Industrial Development Organization

United Nations Development Programme

EXTENSION OF THE
POLISH PACKAGING CENTRE

DP/POL/71/517

POLAND

Project findings and recommendations

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

Based on the work of Alfred C. Poulter, expert in packaging

United Nations Industrial Development Organization

Vienna, 1975

Explanatory notes

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

The monetary unit in Poland is the zloty (Zl). During the period covered by the report, the mean value of the zloty in relation to the United States dollar was \$US 1 = Zl 19.92

A slash between dates (e.g., 1970/71) indicates a crop year, financial year or academic year.

Use of hyphen between dates (e.g., 1960-1965) indicates the full period involved, including the beginning and end years.

A full stop (.) is used to indicate decimals.

A comma (,) is used to distinguish thousands and millions.

The following abbreviations of organizations are used in this publication:

BFSV	Beratungs- und Forschungsstelle für seemässige Verpackung (office for advice and research on packaging for sea transport)
NPC	National Packaging Centre
PIRA	Printing and Packaging Research Association
PRDC	Packaging Research and Development Centre
UNDP	United Nations Development Programme
UN/UNDP Bureau	UN-UNDP Packaging Research Development Programme Bureau (of the National Packaging Centre of the State Council for the Materials Economy, Poland)

The following technical abbreviations are used in this publication:

PE	polyethylene
PP	polypropylene

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SUMMARY

The basic objective of the project "Extension of the Polish Packaging Centre" (DP/POL/71/517) was to provide scientific research and technological support to the rapidly expanding packaging industry so that it could meet the growing demands of the industry. The immediate objective was to develop research works and facilities at the Packaging Research and Development Centre (PRDC), Warsaw, and to establish the demonstration plant at Białystok for plastics packaging. The UNDP contributed \$271,900 for 5 experts, 15 fellowships and equipment. The government counterpart contribution amounted to Z1 348,482,900.

The project completion date was extended to the end of 1975 because of building delays.

A wide range of aspects of future planning and progress has been discussed with the management of the National Packaging Centre, Packaging Research and Development Centre and the demonstration plant. Chapter II gives the resulting recommendations covering the following aspects:

- Further assistance
- Co-operation and co-ordination
- Work plans of PRDC and the demonstration plant
- PRDC information services
- National training in packaging
- Training staff in PRDC
- Work load of some senior staff
- Institutional pattern of research and development
- Metal transport packaging
- Climatic and mechanical hazards

INTRODUCTION

In November 1971, the Government of Poland requested the assistance of the United Nations Development Programme (UNDP) in the field of packaging. A number of reasons led to this request:

(a) The production of goods requiring packaging was growing rapidly in Poland and there were significant basic deficiencies, both in quality and quantity, in meeting this demand for packaging;

(b) With increasing exports, there was a demand for packaging that would be competitive with that in the importing countries;

(c) The imports of packaging materials and packages were increasing, particularly of the more sophisticated types;

(d) Much of Polish packaging was of a conventional type and the processes and plants were often outdated;

(e) There was a particular need to introduce modern, plastic-based packaging as well as coated, laminated and treated materials for producing packages with specific strength and barrier properties which, for example, are needed in connexion with modern food processing.

In brief, the production of packaging materials and packages needed to be increased and generally updated.

The project "Extension of Polish Packaging Centre" (DP/POL/71/517) was approved in December 1972 and it became operational on 1 March 1973. The State Council for the Materials Economy was designated as the government co-operating agency and the United Nations Industrial Development Organization (UNIDO) as the executing agency. The UNDP contribution to the project was \$257,450 and that of the Government Z1 288,802,800. The project was planned to last for two years, until 28 February 1975.

In January 1974 the Polish Packaging Centre was renamed the Packaging Research and Development Centre (PRDC) and a part of its work was transferred to the new National Packaging Centre (NPC). The NPC became substantively responsible for PRDC, the packaging demonstration plant at Białystok and the UN-UNDP Packaging Research Development Programme Bureau (UN/UNDP Bureau).

At the tripartite review in September 1974 the project was extended by 10 months, to 31 December 1975. Subsequently, the dates for the experts' visits were revised, six fellowships were cancelled, and the assignment of work on expanded polystyrene packaging at the packaging demonstration plant was transferred to an SIS project in 1976 (IS/POL/75/B/01/37). The contributions to the project were also revised: the UNDP contribution to \$271,900 and that of the Government to Z1 348,482,900.

There were several reasons for the adjustments of the project. The first was a delay of about 10 months in the completion of the PRDC and demonstration plant buildings because of a labour shortage in the building industry and excessive rain at a crucial stage in the factory foundation work. There were also delays in the fellowships and in delivery of plant and laboratory equipment. The equipment delivery delays were generally shorter than the building delays and in certain respects were fortunate because the relative phasings in the operations could be retained.

The second reason for delay was the significant increase of costs of the UNDP input components from the time the Project Document was prepared.

The trend towards the separation of the packaging industry from general industrial organizations in Poland called for an integrated research programme to support this industry. The PRDC as the central research and development unit for packaging, therefore, had to widen its activity to meet the increasing needs of industry by co-ordinating economic and research activities and by carrying out basic research, standardization, professional training and implantation work.

The extension of the scope of PRDC was the immediate objective of the project. It was planned in two parts:

- (a) Development of research work and facilities in new headquarters at Warsaw;
- (b) Establishment of the demonstration plant at Białystok.

The following long-term objectives were set after comparing the requirements for packaging media in Poland with the production possibilities of the packaging industry:

- (a) Increase in production of packages that are necessary for foreign trade;
- (b) Elimination of inadequacies in packaging supply especially where damage results from the lack of packages or the use of unsuitable packages;
- (c) Fuller adjustment of packages to the changing demand of the home market;
- (d) Substitution of plastics for traditional materials.

I. FINDINGS

All packaging activities in Poland are co-ordinated by the State Council for the Materials Economy, through its organ the NPC.

The PRDC is a unit of NPC responsible for central packaging research and development work and for co-ordination of the work in the packaging field carried out at institutes, ministry central laboratories, branch laboratories and relevant factory laboratories. There are about 14 such laboratories in the country partly or wholly concerned with packaging materials, the production of packages and their use and with transport.

In Poland, packages are usually produced either in a factory of the particular ministry responsible for the basic material or in a factory of the ministry requiring to use the package; for example, glass bottles are made by the Ministry of Construction and Building Materials and the Ministry of Chemical Industry. The production of packages may be the main or just a subsidiary part of the operation of a factory. This fragmentation, although natural in its growth, has resulted in a packaging industry without an entity. This has made the over-all co-ordination of the industry by NPC and of research and development by PRDC a difficult task calling for good will and a desire to co-operate on all sides.

The main objective of the project was the development of the research work and facilities of PRDC and the establishment of the demonstration plant at Białystok. The progress made is reviewed in part A of this chapter.

In part B of this chapter the activities and work programmes for PRDC and the demonstration plant are considered in relation to the long-range objectives of the project. The immediate or short-term objectives relating to these activities are reviewed and comments on specific aspects of the work are given.

Part C of this chapter covers those aspects of Polish packaging that are generally wider in scope and application than those covered under the work of PRDC and the demonstration plant. They include aspects of the work of the NPC and of the national training in packaging.

A. The extension of PRDC and establishment of the demonstration plant

The Polish Packaging Centre was started in 1958 as the national packaging institution incorporating the former packaging laboratory in the Ministry of Home Trade. The premises were demolished in 1972 because of major road developments. New buildings were needed to replace the old and to provide for the extended facilities.

The establishment of the demonstration plant was a new approach in the Polish packaging industry to solving technological problems in appropriate areas of packaging materials and production and for carrying out training.

The first phase of the demonstration plant at Białystok was for plastic packaging and provided a modern factory of approximately 8,000 m² for the production of plastic film and its conversion and of expanded plastic packaging. Associated with the factory is the packaging systems department, which is equipped with modern plastics packaging machines using the types of materials produced in the factory, and a plant laboratory equipped for testing such materials and packages. The interplay between the packaging systems department, the plant laboratory and production allows the rapid formulation and production of films with optimum properties for the different packaging systems and, subsequently, for user requirements. The complex at Białystok includes a training and conference centre for local, national and international training in packaging. The UNDP contribution covering experts, fellowships and equipment was primarily for the packaging systems department and plant laboratory although assistance in the start-up of production was also given in the form of fellowships.

Government approval has been given for the expansion of the demonstration plant (phase II) planned for 1977-1978, which will provide a further 6,000 m² of factory space and plant for the production and conversion of laminates and the production of printed self-adhesive labels. The factory will also include a double line for foamed polystyrene packages. It is planned to extend the scope of the systems and plant laboratories to cover the additional technologies.

1. Buildings

The new buildings for both PRDC and the demonstration plant (government inputs) have been completed, except for the training and the administration

blocks at Białystok, and have been occupied since June and July 1975. The training block was planned to be completed by December 1975 and the administration block by April 1976. As far as can be assessed the layouts seem well suited for their purpose, although PZIC is short of reserve space and plans are in hand to build on the land used for their temporary accommodation. As already reported, government approval has been given and money allocated for phase II of the development of the demonstration plant.

2. Provision of experts

The position regarding experts is summarized in annex I. It will be seen that of the five assignments, four have been completed and one has had to be transferred to an SIS project because the plant contributed by the Government will not be installed until the end of the first quarter of 1976 which is later than the completion date for the main project.

Summaries of technical reports prepared by experts during the implementation of the project are given in annex II. Annex III lists the papers presented by experts at symposia, conferences and lectures.

3. Fellowships

The situation with regard to fellowships at the end of the project is summarized in annex IV. Of the 20 fellowships 14 have been completed and 6 cancelled. The cancellations were caused by changes in emphasis during the development of the project, difficulties in finding candidates with appropriate language abilities, and increasing equipment costs. The value of the training received through the fellowships has been stressed by all concerned, especially of the four fellowships for the demonstration plant which proved to be crucial for the start-up of that plant.

Two main difficulties were experienced with fellowships. The first was the inadequate language proficiency of some candidates; the second was the difficulty of placing some fellowships particularly where there was an industrial emphasis or a high fee as at some research institutes. It may be of interest to note that the average time for placing the candidates was 13 months per candidate without language training and 29 months for those with language training.

4. Equipment

A list of equipment provided by UNDP is given in annex V. It includes the maker, model and cost excluding transport, delivery and installation, where appropriate.

All items have been delivered to site. As regards the climatic chamber at PRDC, difficulties are being experienced with the flatness of and water drainage from the floor and with aspects of the control. These matters have been taken up with UNIDO. The weatherometer has yet to be installed; this is being arranged internally at PRDC.

All UNDP equipment for the demonstration plant has been installed and is in operation; some additional technical documentation and spare parts are required, however. These items are being taken up with UNIDO through the UN/UNDP Bureau.

5. Recruitment and training of staff

The staff of the Centre had increased from 60 in the old buildings to 120 in November 1975 and it is planned to increase the number to 140 in 1976 and subsequently, possibly, to 150. This large influx of new staff has resulted in a need for training which will be met in part by fellowships abroad. In 1975, a training course for new staff was started consisting of a weekly lecture on packaging technology; 27 members of the PRDC staff attended and they were scheduled to start a second year course shortly. There will be 9 employees in the 1976 first year course. The PRDC was also responsible for training the staff of its recently formed branch office at Bytom.

It seems that the assessment of specific training needs has had to be discontinued, perhaps only temporarily. The consultant believes that the individual assessment of training needs, preferably once a year, and the resultant training are important for the future value of the institute to the industry it serves; this is particularly so at a time of rapid recruitment.

With a staff of 140 in 1976 and an additional staff of 60 or more at Bytom, there is a need for a full-time training officer for PRDC to assess and implement general and individual PRDC training needs. This would pay dividends in the long term. If it is not possible at this time to employ a staff member solely for training, there should be someone whose main responsibility is training.

Demonstration plant at Białystok

The present staff is 384 employees, of which 151 are in administration and management. The plant laboratory and packaging systems department have a staff of 19. To complete phase I, 80 more persons must be recruited mainly for engineering and production.

The preliminary training of staff proceeded as programmed, with full-time training at the local technical college followed by in-plant training. About 76 operators and supervisors received pre-start-up training (duration one half to two months) at factories in Poland, and two persons had extended training of six months. At the end of training there was an examination and report. The necessary training was completed before start-up. In the long term it is planned to increase the number of classes available at the factory school and to establish a section in plastics technology at the existing secondary school in the town.

B. Work programme and activities of PRDC and the demonstration plant

1. Packaging Research and Development Centre

The organizational structure and the scope of activities for PRDC departments are given in annex VI.

Programme of research and development

The PRDC was given the authority in 1975 to co-ordinate all research and development work carried out in packaging laboratories in Poland as part of the branch problem entitled: "Modernization of packaging production and increasing the efficiency of packaging and packaging materials used in the national economy".

For this purpose money has been allocated by the Ministry of High School and Techniques for payment through PRDC to participating branch laboratories

for work done. It was considered that this would materially assist in encouraging co-operation and in strengthening the Centre's co-ordinating responsibility.

As a result, PRDC has prepared a five-year plan, to be revised annually, for the research and development work covering the branch subjects and involving 24 institutions. The four subjects are:

(a) Optimalization of the technology of packaging materials and package production with the view of instituting modern packaging techniques and of reducing materials consumption in the packaging process;

(b) Testing methods and criteria for the assessment of the quality of packages and packaging materials and for the optimalization of packaging protection properties;

(c) The adaptation of packages and unit loads to the needs of modern transport and storage techniques;

(d) Environmental pollution in relation to packaging (recycling and reuse).

Objectives

There has been significant progress towards meeting the following short-term objectives:

(a) Elaboration of technical requirements in a complex pattern (material-machine-package) as well as extension of studies of hazards to transit and consumer packages;

(b) Carrying out experimental work on new technologies based on the analysis of new developments in packaging both in this country and abroad;

(c) Extension of consulting and advisory activities as well as expertise for the industry;

(d) Centralized work on forecasting in the field of machinery and equipment as well as packaging production;

(e) Extension of work on the possibilities of package and packaging materials substitution;

(f) Extension of such activities as training and the arrangement of exhibitions, technical conferences and symposia with the participation of home and foreign experts;

(g) Certification for selected packages with the view of granting quality marks;

(h) Designing new packages especially with the use of combined materials.

It should be noted that on its formation NPC assumed the responsibility for initiating national training in packaging. PRDC has the responsibility for co-ordinating packaging research and development work in Poland.

There have been some revisions in the timings of the project activities owing to the delays in equipment and buildings and to the assignment of priorities. The revised schedule is shown in table 1. It should perhaps be mentioned that the project activities are the specific items of work designed to achieve the immediate or short-term objectives of the work of the Centre. Reference to the schedule shows the items within each project title which have been completed and those in progress, together with the time taken or planned, whichever is appropriate.

Financing of PRDC

Up to the present PRDC has been centrally financed. This was to be changed and as from 1 January 1976, 10-15 % were to come from central funds and to be earmarked for general technical work; 85-90 % of the funds would come from contract work.

Quality certification

Work is being done on guidelines for quality criteria of packages for quality certification by PRDC.

Information services

It is expected to complete the contract for obtaining Printing and Packaging Research Association (PIRA) abstracts for reissue in Polish and in a form which can readily be used for computer information retrieval. This will allow circulation of abstracts 4 to 5 months after the issue of the journals. A fast but limited circulation of important abstracts is not considered practical.

Table 1. Dates of PRDC project activities (November 1975 revision)

Project activity	Revised dates		Project Document dates	
	Start	Duration	Start	Duration
Application of thermoforming technology for the production of packages			1 October 1971	6 months
Testing methods of thermoformed semi-rigid packages made of PVC	1972	1972-1975		
Elaboration of technology of shrink film packaging			1 March 1972	11 months
Extension of shrink film use for multipacks and forming unit loads				
Technique of packing with shrink-film protection of palletized unit loads	1972	1972-1976		
Technique of packing in shrink-film multipacks and wrapping				
Elaboration of the "form-fill-seal" technology			1 January 1974	12 months
Defining requirements for home-made oriented thermo-films of PP depending on packing system	1974	1974-1976		
Defining a suitability of PP film manufactured in Poland through blow moulding for packages	1974	1974-1974		

Project activity	Revised dates		Project Document dates	
	Start	Duration	Start	Duration
Elaboration of testing methods of transit packages made of plastics			1 March 1971	21 months
Testing methods and technical requirements for plastic packages	1971	1971-1976		
Assessment of climatic and mechanical hazards during transport and storage of packed goods			1 January 1971	60 months
Testing of mechanical hazards occurring in transport and re-production of hazards in laboratory conditions	1971	1971-1974		
Testing of micro-climate in transit packages	1974	1974-1976		
Testing of materials properties and defining their suitability for protecting goods against climatic hazards	1972	1972-1974		
Adaptation of the new packaging techniques with flexible and semi-rigid plastic films			1 February 1972	34 months
Testing of machineability of home-made combined films in basic packing systems	1972	1972-1980		
Assessment of PP film suitability and defining directions for its application	1973	1973-1973		

A number of comments have been made by other experts on the project about the lack of technical journals and, therefore, the unawareness of current world trends and developments among staff in some laboratories and factories. This is a serious situation and it would be advisable to call a meeting of representatives from appropriate factories and laboratories to explain what services PRDC could offer on request and automatically and what they do not offer, and to advise how they themselves could meet requirements not covered such as selection and purchase of essential journals and translation problems.

It is hoped that the move into the new buildings will result in a large increase in the use of the reading room and information service by industry and other institutes. There were a total of 10 technical consultations with industry in 1975 and an average of 2 readers a week from industry, which is hardly better than the use two years ago.

Co-operation and co-ordination

The co-operation between PRDC and other packaging and related institutes and factories has increased appreciably in scope and extent. The close co-operation in the field of laminates between PRDC and the pilot-plant laminator at Kety is a good example.

PRDC has the responsibility for the co-ordination of research and development work throughout the packaging industry. This is not proving an easy task. Perhaps the setting up of a "packaging adviser" structure within each ministry producing and using packages might be beneficial within the ministries and provide an easy contact from outside. It is used by at least one large producer/user of packages in the United Kingdom.

PRDC is endeavouring to promote co-ordination by increased involvement of laboratories through the branch project scheme. They are now elaborating a complex co-ordination plan which they will introduce to industry.

Design office

PRDC is now operating what is claimed to be the only office for designing integrated packaging systems in Poland. As an example of their work they have been given a contract to design consumer and transit packages for oil for the whole petrochemical industry in Poland. PRDC is of the opinion that it is too early to formulate the pattern of such design offices for Poland. A branch office for packaging design with a staff of 16 was set up at Bytom.

It should, perhaps, be mentioned that NPC has responsibility for the graphic and aesthetic aspects of packaging design and is considering setting up cells within industry for this purpose.

Institutional pattern of research and development

The general current pattern for industrial research and development is that the work is carried out as a part of the wider research of the ministry concerned, either at an institute, at another central laboratory or at a factory laboratory which may or may not be entirely devoted to packaging.

It was felt that the large industrial institutes have their own research and development basis and can operate efficiently so that PRDC's assistance primarily relates to such things as test procedures.

As regards a demonstration plant for advancing technological development like the one used for plastics packaging at Białystok, it was felt that it was generally right and, where possible, should be adopted for other areas of packaging technology, particularly if it can be incorporated at the time of construction of a new production factory. It was emphasized that the experience gained from a demonstration plant such as the one at Białystok should serve the industry as a whole and not just one factory. The need was also stressed to use such a set-up for education as well as experimental work.

The consultant felt that the cost of establishing and staffing a demonstration plant could be justified only in a limited number of instances. Technological developments not otherwise covered should be dealt with by PRDC which for this purpose now required a small technology "hall" for their work.

Conclusions on PRDC work

The new PRDC buildings are attractive and functional and with the additional staff should allow a significant growth in the Centre's work in 1976. The progress made and the degree of co-operation with industry is encouraging. The consultant would make only the following observations:

(a) The co-ordination of research and development within industry is not proving to be easy. In view of the limited assistance likely to come from a phase II plan, it is even more important to make the most efficient use of all facilities available, which of course involves good co-operation and co-ordination;

(b) With the increased information and library facilities there is a need to ensure their use by industry which would seem to be very small;

(c) There may be a danger that the scope and extent of the work become too large in some departments of PRDC with a consequent loss of efficiency; in some cases such as the library and information services the need for effective delegation may have to be considered before long;

(d) There is a need for systematic and specific training for laboratory staff particularly where there is a high rate of recruitment.

2. The demonstration plant at Białystok

The following comments were made in general:

(a) The director stressed the great value of the training obtained through fellowships which had made a crucial contribution to the start-up of the plant. He also referred to the value of the director's study tour;

(b) The effects of delays in the building programme and in the delivery of plant for the production of expanded polystyrene film on the programme of work were pointed out, and it was agreed that the visit of the expert covering foamed plastic films would have to be postponed again;

(c) The director also drew attention to the good co-operation which had developed between PRDC and demonstration plant. This was evident in the spirit of mutual assistance in the present work on the production of plastic films with specific use properties, for example, in the production of polyethylene film for laminating as well as of thin thermo-shrink film.

The consultant was impressed during his visit and tour of the demonstration plant with the progress made since his visit the previous year and by the evident enthusiasm of those he met. The demonstration plant seemed to be well launched with a good "captain and crew". (For the structure of the demonstration plant see annex VII.)

A number of aspects relating to buildings, experts, fellowships and staff are covered in section A of this chapter. Other main aspects are discussed below.

Objectives, activities and current work programme

The Project Document lists the following short-term objectives for the demonstration plant:

(a) Design and experimental production of selected modern types of packages, especially those made of plastic, which are practically unavailable on the domestic market;

(b) Manufacture of the prototypes of research instruments designed by the Polish Packaging Centre as well as experimental production of auxiliary equipment and accessories for packaging, marking and closing;

(c) Elaboration of the technology of modern packaging systems and/or its adaptation to the local conditions;

(d) Training of personnel responsible for various industrial branches for the production and application of packaging media.

In table 2 these project activities are listed with the revised and original duration and starting date. It should perhaps be mentioned that the project activities are the specific items of work required to achieve the project objectives.

Regarding activity no. 8, designs have been received from the Food Packaging Machinery Institute for a shrink tunnel and "L" type heat-sealer, and 30 production units are scheduled for next year.

To date there has been no request for prototype testing equipment. Activity no. 9 is held up because of the delay in completing the training centre.

It will be seen by reference to the list that five of the items are already under way. In discussion with the director it was most encouraging to learn:

(a) That, despite the short time of operation of the plant and relative inexperience of the staff, the work had already had results of significant commercial value and had achieved some of the objectives. An example given was the production of PE film in the plant suitable for use on the Polish-made Transwrap machines. Previous film had had to be imported and the consequent shortages had resulted in 60 such packaging machines remaining idle. The granulates for producing the film had been imported and the next stage in the development was to formulate a suitable film from Polish-produced granulates.

Table 2. Dates of the demonstration plant project activities
(November 1975 revision)

Project activity	Revised dates		Project Document dates	
	Start	Duration (months)	Start	Duration (months)
1. Experimental manufacture of packaging materials and packages	April 1975	12	January 1974	12
2. Development of home manufacturing technology of thin polyethylene film	July 1975	12	January 1974	12
3. Introduction of modern packaging systems solutions based on thin polyethylene film	December 1975	10	February 1974	20
4. Examination of the influence of technological parameters of production of polyethylene film on the parameters decision in packaging applications (impact strength, optical properties, blocking, printing ability)	-	-	April 1974	19
5. Development of manufacture technology of foamed polystyrene film and ready-made packs	April 1976	12	January 1975	12
6. Development of manufacture technology of shrink film from home-made polyethylene	April 1975	Continuous work	January 1974	Continuous work
7. Evaluation and adaptation to the local conditions of modern packaging systems with special emphasis on the application of home-made packaging materials	-	-	January 1975	-

Project activity	Revised dates		Project Document dates	
	Start	Duration (months)	Start	Duration (months)
8. Manufacture of prototypes of testing instruments developed in the Laboratory of the Packaging Research Development Centre	April 1975	-	April 1974	-
9. Designing of various types of packages	-	-	September 1973	-

(b) That the demonstration plant had set up a packaging systems department and a plant laboratory for appraising films, adjacent to production which contributed appreciably to the success of the development work.

Future plans and possible assistance required

Phase II of the development of the demonstration plant has received official government approval and the allocation of funds. The plans are currently being prepared for a plant for the production of laminates, printed adhesive labels and a double production line for foamed polystyrene packages. Assistance will be needed for fellowships, experts and a laboratory laminator. The technological support will be provided from the existing systems department and plant laboratory.

C. The National Packaging Centre and aspects of the project having a wide application in Polish packaging

1. The National Packaging Centre

The Project Document was approved before the NPC was formed. The NPC has a primary role in the development of Polish packaging and in the over-all direction of research and development. A knowledge of their work is necessary to understand the pattern of packaging development.

The NPC is the central executive authority responsible to the President of the State Council for the Materials Economy in the long-term planning and progress of packaging in Poland. The organization of the central packaging activities is shown in annex VIII and that of the NPC in annex IX. The long- and short-term objectives of the Centre are given below.

Long-term objectives:

- (a) Elaborating five-year-plans of production development and packaging use with guidelines on directions of development of different branches;
- (b) Elaborating prospective plans of packaging production development;
- (c) Carrying out research in marketing and design and transmitting the results to packaging makers and users;
- (d) Initiating work directed towards greater specialization and concentration of packaging production and towards separating and integrating the packaging industry;

- (e) Ensuring skilled staff for packaging makers and users;
- (f) Defining the direction of investment in the packaging industry;
- (g) Initiating research and development;
- (h) Defining the basic subjects of research and development in the packaging industry;
- (i) Introducing modern packaging production technologies and technique of packing.

Short-term objectives:

- (a) Determining packaging balances;
- (b) Elaborating and co-ordinating yearly plans for the development of packaging production and use;
- (c) Ensuring materials deliveries for the needs of the industry;
- (d) Preparing training and education in packaging;
- (e) Drawing up guidelines for the application of different ranges of packaging materials and packages;
- (f) Establishing guidelines in the field of materials economy (purchase, rotation etc.).

In addition to these objectives, the Project Document includes project activities for PRDC and the demonstration plant.

These objectives show how crucial the roll of NPC is in the whole field of packaging in Poland. Its long-term objectives include the elaboration of needs and plans for production, research, development and technology, design and use as well as for the direction of investment, defining the basic subjects for and initiating modern production techniques of packaging and the integration of the packaging industry.

The short-term objectives show the wide extent and importance of NPC responsibilities which include the elaboration and co-ordination of yearly plans for package production and use, determining packaging balances, ensuring the deliveries of materials needed for the packaging industry, preparing a national training and education scheme in packaging and detailing guidelines in the field of packaging materials economy (purchase and reuse).

The present total staff of the Centre is 36. The consultant offers three suggestions which he feels may be self-evident to the management of the Centre:

(a) The outcome of the work of the Centre should be absolutely crucial to the progress of the packaging industry. It is important, therefore, that the members of the team at the Centre should make regular visits to other centres concerned with the production, use and development of packaging relevant to their work as well as some visits abroad. It is easy to become out of touch with developments in the field.

(b) The pressure of the immediate work may easily detract from work on the less urgent, but probably more important, long-term responsibilities.

(c) The present workload of the senior staff of NPC mitigates against efficient implementation of the Centre's responsibilities.

2. Co-ordination and integration of the packaging industry

Two of the visiting experts referred in their reports to the need for closer co-ordination within the packaging industry. This consultant believes that the management of NPC is well aware of this and in discussions they outlined a number of possible ways of improving the efficiency of the industry. They felt, however, that the present was not the right time to implement them.

3. National training in packaging

The NPC has responsibility for the preparation and progress of national training and education in packaging and packaging technology. An inter-ministry committee chaired by NPC has been set up to prepare a scheme for such training.

There are 100,000 persons involved in packaging at different levels in the country. To assess their needs and to assist in planning, a questionnaire was sent to industry unions, producers, users and design and research and development centres. The replies showed that there was a real interest in this subject and that funds for training are available. The committee is preparing a draft plan which it hopes to have ready by May 1976.

It is suggested that the European Packaging Federation syllabus^{1/} for packaging training at technologist level be used as a starting point for preparing courses at various levels. A correspondence course in English based on

^{1/} European Packaging Federation, Blueprint for Packaging Education, London, July 1967.

the syllabus may be taken world-wide. It is suggested that once the training project is past the preliminary stage a full-time training officer should be appointed to continue it and to arrange for the preparation of training material.

D. Suggestions for future action

During the consultant's first assignment in 1973 he visited the main industrial laboratories concerned with packaging in Poland. It was not practical to repeat these visits on subsequent occasions but from what he saw then and from more recent discussion with the directors of NPC, PRDC and the demonstration plant he is sure that a second phase of the packaging project is most desirable. In his view the project now coming to an end has strengthened the central packaging research and development, and any future help should specifically emphasize the application of packaging technology.

This need for further assistance is supported by the increasing requirements for efficient sales-promotion packaging for Polish products, particularly for exports. The increasing demand for such packaging is illustrated in table 3.

Table 3. Package consumption in Poland, 1970-1980
(Percentage)

Package	1970	1971	1972	1973	1974	1975	1980 (estimated)
Metal	19.5	19.9	18.7	19.5	20.7	21.9	22.9
Glass	12.1	11.5	11.7	11.5	15.3	10.2	12.4
Wood	9.6	12.8	13.2	11.3	9.9	8.8	5.8
Plastics	12.4	10.7	11.0	13.1	15.3	18.4	21.5
Paper and cardboard	39.0	38.7	39.9	37.6	37.6	34.7	33.6
Other	7.4	6.4	5.5	7.0	7.1	6.0	9.6

This two-stage approach to developing the necessary scientific and technological support for the packaging industry along with strengthening the central research and development and the subsequent development of the relevant industrial laboratories was quantified in a draft document supporting a request for assistance for a second phase. The requests from 15 centres were collected and collated and included requests for experts, fellowships and equipment and for building and equipment from the Polish Government.

The suggested requests for aid amounted to about five times that for phase I and for government aid the proposed increase was even greater. The consultant had the opportunity of considering the draft document and thinks that the size of the requests, particularly following phase I of the project, is too large. He suggests that, in collating the requests, the necessity for and priority of projects for which the assistance was requested may not have been considered. Also, it may not have been considered whether major items of equipment were really necessary or if alternative equipment could be shared or borrowed.

There are many aspects of packaging technology where assistance is required and the case for it is good. On the other hand, aid should be reduced to cover the essential packaging needs in areas which are considered by the authorities to have top priority. (An example might be the food-processing industry.)

Fellowships are probably the most valuable form of UNDP assistance, but every effort should be made to place candidates through contracts arising in the purchase of production equipment. It would also be advisable to reduce the time of fellowships by pre-training in Poland when possible.

When the use of experts is being considered, the alternative of fellowships should be considered. The start-up of the Białystok plant is an example of the successful use of fellowship training.

With regard to equipment it is suggested:

(a) That UNDP assistance be essentially for items of equipment which together with fellowship training and/or expert advice will enable the project to achieve its objectives. There should be other sources of convertible currency available for each laboratory to buy the relatively small items of equipment needed from time to time.

(b) With the present need to make the best national use of UNDP and other sources of convertible currency co-ordination of and co-operation between those working in the same general area of packaging is increasingly important. Every effort should be made to avoid duplication of effort and expensive equipment and to ensure the sharing of knowledge obtained through fellowships and experts. An example of this would be in the development of laminates where the laboratory work is done at PRDC and the technological work is done on the pilot-scale experimental laminator at Kety. The co-operation is good but the physical separation is a considerable inconvenience. The demonstration plant at is starting to produce laminates and will need pilot-plant facilities which could be shared with PRDC. This situation requires a careful assessment before a request for equipment is put forward.

When assessing projects and associated requests for assistance, the priorities are most important. Guidance should be given to those preparing the schedules on a financial cut-off point for the total assistance.

If possible, a small full-time team of two or three persons, including someone independent of those putting forward requests, should be asked to revise the phase II proposals with the blessing of the ministries involved. The task would require up to three months.

II. CONCLUSIONS AND RECOMMENDATIONS

A. General

1. Progress of the project

The basic objective of the project was to ensure the necessary scientific and technological support of the rapidly expanding packaging industry by developing PRDC and establishing a demonstration plant at Białystok. Government and UNDP inputs covered new buildings, experts, fellowships and staff at both sites. The work programme outlined in the Project Document has been successfully completed in all essential details but with an extension of ten months. Staff recruitment is well advanced and the work in hand is in line with the objectives. The demonstration plant has already produced significant commercial results in industry.

2. Further assistance

There is a need for further assistance in the development of packaging technology. In view of the present financial restrictions it is recommended that the draft proposals for phase II should be reduced to cover essential packaging needs in areas which are considered by the authorities to have top priority (an example might be the food-processing industry).

3. Co-operation and co-ordination

While progress is being made by PRDC in their co-operation with other laboratories and industry, there are still problems in the area of co-ordination. These have been discussed with and are appreciated by NPC and PRDC. It is recommended that these two centres should work closely together in pursuing this important aspect.

4. Work plans of PRDC and the demonstration plant

It is considered that the work plans are meeting the objectives for supplying the required technical support of the Polish packaging industry. It is recommended that the work should continue along the present lines. This also applies to the future programme for the demonstration plant.

5. PRDC information services

There is a need for more technical information to be readily available in some areas of the packaging industry. It is recommended that the head of PRDC information services should call a meeting of appropriate representatives from industry to explain the services PRDC offers and to advise on how they themselves may meet other requirements, for example, by the purchase of selected journals.

6. National training in packaging

This is the responsibility of the NPC, and suggestions made after discussions during previous visits are being pursued. At the present stage it is recommended further:

(a) That the syllabus^{2/} for packaging training at the technologist level should be used as a starting point for preparing Polish courses at different levels;

(b) That as soon as the national training project has passed the preliminary stage a full-time training officer should be appointed to continue it and to arrange for the preparation of training materials.

7. Training of staff of PRDC

There has been a rapid increase in staff which will total about 140 in 1976. A full-time officer should be appointed, or at least someone whose first and main responsibility is staff training, and he should be responsible for assessing and providing for general and individual PRDC training needs. His work should include an annual individual appraisal. Such an appraisal should also apply to the technical staff at the demonstration plant.

8. Work load of some senior staff

The workload of the senior staff of NPC militates against efficient implementation of the Centre's responsibilities. It is recommended, therefore, that consideration be given to resolving this problem. (See annex VI.)

There may be a danger that the scope and extent of the work may become too great in one or two departments of PRDC with a consequent loss of efficiency.

^{2/} Ibid.

In some cases, such as the information services, the need for effective delegation may have to be considered. It is recommended that the situation be kept under review.

9. Institutional pattern of research and development

Attention should be paid to the remarks regarding the demonstration plant pattern for technological development work, particularly when associated with a new factory. It is recommended that this should be kept under review.

B. Specific

1. Metal transport packaging

(a) It is essential that an immediate start be made in establishing a statistical information centre for the drum industry as a whole. The data obtained would enable the future development of the industry to be estimated and planned. The statistical data should be comprehensive. The best location for setting up this centre would be the NPC.

(b) A much closer liaison is required than exists at present between ministries, unions and research and development centres which seem to operate in their own areas of packaging without awareness of what their opposite number is doing.

(c) The arrangements that were made for Polish personnel to visit modern drum factories in Holland and the United Kingdom should be taken up at the earliest possible moment. It is essential that a number of Polish personnel be engaged in drum manufacturing to gain knowledge of modern drum-making equipment and layout.

(d) Drum plant personnel should at one of their meetings, which should be held regularly, discuss a common approach in each plant to formalizing process and quality control. Out of such discussions a programme could be drawn up to apply to the industry as a whole.

(e) To enable Poland to compete with other countries in the export of industrial products normally packed in drums, the types of production and drums will have to change appreciably. There will be an increasing demand by industry for the lighter double-seamed drum both of plain steel and with lacquer finishes. These drums are generally cheaper and can be produced more rapidly.

(f) In testing the conformance of drums to various international standards, each manufacturing unit producing drums to such standards should be equipped to carry out leakage tests, pressure tests hydraulically and drop tests. This provision should also apply to each research and development centre of a ministry responsible for a drum-manufacturing unit. It suggested that NPC should arrange a meeting for senior personnel in the drum industry, interested users and associated institutions to discuss and implement the above recommendations.

2. Climatic and mechanical hazards

It is recommended:

(a) That reliable information be obtained about packaging technology in Poland compared with other countries and that this information be used as a basis for planned research and development;

(b) That efficient co-operation be encouraged between organizations in Poland (research and development, production, use, transport) for the development of optimal packages and systems of delivery. One means of achieving this is through co-operative research and development among the relevant parties.

Annex I

PROJECT PERSONNEL

A. UNIDO experts

	<u>Contract dates</u>	
A. C. Poulter, senior expert	4 May 1973	20 December 1973
	4 November 1974	3 December 1974
	14 October 1975	29 November 1975
G. W. Deakin, expert in transport metal packaging testing and research	29 September 1974	7 October 1974
	12 May 1974	29 May 1974
	15 September 1975	2 October 1975
E. Schmidt, expert in measuring climatic and mechanical hazards	11 July 1974	10 September 1974
	3 September 1975	15 September 1975
R. Vogt, expert in mechanization of packaging processes	4 July 1975	28 September 1975
K. Andrews, expert in production of foam plastics films and ready- made packages	The post was transferred to SIS Project No. IS/POL/75/B/01/37	

B. Counterpart staff

Z. Kostro, Director of the UN-UNDP Packaging Research and Development Programme
Bureau

A. Sołtan, Director (1975)

J. Fraćzek, metal packaging specialist, PRDC

S. Jakowski, Head, Transit Packaging Department, PRDC

W. Barcicki, Head, Packaging System Department, Development plant

Annex II

SUMMARIES OF TECHNICAL REPORTS PREPARED DURING
THE IMPLEMENTATION OF THE PROJECT

I. DEVELOPMENT AND QUALITY CONTROL OF
METAL TRANSPORT PACKAGING INDUSTRY

Summary of three technical reports based on the work of G. W. Deakin,
expert on metal transport packaging

A. Findings

1. From discussions and enquiries made during visits, there do not appear to be any comprehensive and accurate statistics on the production of drum manufacturing industries on which to base future requirements.
2. Drum manufacturing units are responsible to various unions and ministries. Without collaboration, this is likely to cause difficulties, frustration and delays in carrying out policies in the technical fields which are of interest to all plants.
3. In general, the drum plants are equipped with old machines and with one or two exceptions are poorly laid out. The quality of the products is poor. The plants require a modern approach.
4. A completely new approach is required to process control and quality control to assure a standard that would meet the test requirements for international acceptance.
5. There is only one type of liquid drum produced in Poland. This is of heavy galvanized, all-welded construction; it is a type of drum that is being used less and less in other countries.
6. Little or no testing of drums appears to be done at the drum plants. They did not appear to have heard much about testing prior to the expert's visit. They should now be brought actively into this area of testing to conform to international standards.

B. Recommendations

1. It is essential that an immediate start be made to establish a statistical information centre for the drum industry as a whole. The data obtained would

- enable the future development of the industry to be estimated and planned. The statistical data should be comprehensive. It is suggested that the best location for setting up this centre would be at the National Packaging Centre.
2. A much closer liaison is required than exists at present between ministries, unions and research and development centres which seem to operate in their own areas of packaging without knowledge of what their opposite number is doing.
 3. The advantage of the arrangements that were made for Polish personnel to visit modern drum factories in Holland and the United Kingdom should be taken up at the earliest possible moment. It is essential for a number of Polish personnel engaged in drum manufacturing to become acquainted with modern drum-making equipment and layout.
 4. Drum plant personnel should at one of their meetings, which should be held regularly, discuss a common approach in each plant to formalizing process and quality control. Out of such discussions a programme could be drawn up to apply to the industry as a whole.
 5. To enable Poland to compete with other countries in the export of industrial products normally packed in drums, the type of production and type of drums will have to be changed appreciably. There will be an increasing demand by industry for the lighter double-seamed drum of plain steel and with lacquer finishes. These drums are generally cheaper and can be produced more rapidly.
 6. In testing of drums to conform to various international standards, each manufacturing unit producing drums to such standards should be equipped to carry out leakage tests, pressure tests hydraulically and drop tests. This procedure should also apply to each research and development centre of a ministry responsible for a drum manufacturing unit.

II. MEASURING CLIMATIC AND MECHANICAL HAZARDS OCCURRING DURING THE TRANSPORT OF PACKED GOODS

Summary of two technical reports based on the work of Ernst Schmidt, expert in methods of testing climatic and mechanical hazards in the transport of packed goods

A. First report

The first visit of the expert covered the field of mechanical hazards excluding the climatic chamber and was for eight weeks, starting on 12 July 1974.

His duty station was the Packaging Research and Development Centre, Warsaw, and his counterpart was Dr. Jakowski, Head of the Transport Packaging Division.

Briefly, the expert made the following recommendations:

1. That reliable information be obtained on the state of packaging technology in Poland compared with other countries, as a basis for planned research and development.
2. That efficient co-operation be encouraged between organizations in Poland (research and development, production, use, transport) for the development of optimal packages and systems of delivery. The report suggests that one means of achieving this is through co-operative research and development among the relevant parties.
3. That for studies on transport hazards, realistic test procedures and guidelines be drawn up for the whole system of packaging and delivery especially for export promotion.
4. That extra equipment be obtained for:
 - (a) Electronic measurement of deformation, force, vibration and acceleration;
 - (b) Measurement of air pollution and air currents;
 - (c) Reliable measurements of temperature and humidity during journeys;
 - (d) Photography, to supplement that available, if and as necessary.

Suppliers and types are given in the report.

The report also includes suggestions for possible co-operation with BFSV in Hamburg, of which the expert is the Director, such as:

- (a) Discussion of general research work and acute problems by correspondence;
- (b) Giving specific staff the opportunity to study the experiences and methods of the BFSV;
- (c) Co-operation in the planning and implementation of research and test journeys, e.g. by exchanging test specimens.

The report contains the following annexes:

- I. Use of ISO containers
- II. The organization of research and test journeys
- III. Advice on methodology for the next PRDC voyage
- IV. Use of the PRDC climatic chamber
- V. Literature references on journey hazards and package design
- VI. Plan of methodology for developing optimized packages

B. Second report^{a/}

The second visit of the expert was for two weeks starting on 3 September 1975. The duty station was as before. His counterparts were Mrs. D. Wróblewska and Mrs. J. Zawadzka who are responsible for climatic hazards investigations. The second visit was required because the climatic chamber had not been installed at the time of the first visit. The purpose of the visit was to complete the following items in the job description:

1. To assess the climatic chamber regarding accuracy of control, uniformity of climatic conditions and conformity to manufacturer's specification;
2. To elaborate the instruction defining testing methods and ways of chamber use;
3. To carry out training in the servicing and maintenance of the chamber.

Item 1 was not completed because temperature and humidity control curves were not supplied and the controller broke down during the expert's stay.

Assistance was also given in connexion with organizing a sea test voyage.

The following is a summary of the main recommendations in the second report:

1. The manufacturers should be notified of:
 - (a) The faults and difficulties listed in the report;
 - (b) Spare parts and instruction manuals needed as noted in the report;
 - (c) Control curves as required for PRDC work.
2. The assessment of the climatic chamber should be completed.
3. Test procedures and schedules should be prepared for required tests and carefully stored together with the chamber documentation and spare parts.

^{a/} See: DP/ID/SER.A/10.

The report contains the following annexes:

- I. Procedure for defining the useable room of the climatic chamber
- II. Use of the climatic chamber for preconditioning packaging materials and packages for which subsequent mechanical testing procedures must be performed
- III. Investigating and testing preservatives against corrosion in connexion with the use of a climatic chamber and other equipment
- IV. Use of the climatic chamber for alternating climates
- V. Use of the climatic chamber for constant climates

III. MECHANIZATION OF PACKAGING PROCESSES USING
PLASTIC FILMS b/

Summary of a technical report based on
the work of R. Vogt, expert in the mechanization of packaging processes

The mission of the expert, as part of the parent project "Extension of the Polish Packaging Centre" (DP/POL/71/577), was to assist in mechanizing packaging processes using plastic films. The assignment was for three months from 4 July to the end of September and was preceded by a short preparatory visit. The duty station was the packaging demonstration plant at Białystok.

The time was spent in practical work on the demonstration plant machines and in discussions of future projects including the laminating and metallizing of films. Unfortunately, the practical work was restricted by the limited supply of test materials since the Białystok production plant was only beginning to manufacture appropriate films. It was possible to put the Illig machine into operation with improvised materials. The consultant's activities also included aspects of production within his competence.

The modern development of packaging materials follows three necessary steps:

- (a) Producing plastic films of the best possible quality, entailing tests with different raw materials, additives and evaluation of appropriate formulations;
- (b) Measuring the required physical and chemical parameters at the laboratory;
- (c) Testing the manufactured packaging materials on the packaging machines (runability of the material).

b/ See: DP/ID/SER.A/35.

To meet these requirements the expert recommends assistance in:

- (a) Obtaining equipment and auxiliary materials not at the moment produced or available in Poland;
- (b) Improving the information facilities;
- (c) Training the staff through special courses, seminars, meetings or expositions concerning the field of packaging, plastics and packaging and plastics machinery.

In addition, the expert proposes small-scale assistance from the Special Industrial Services (SIS) in the form of advice on specific problems related to phase II of the plant's production or to other topical problems.

On the basis of his observations and experience the expert suggests that the planned enlargement of the Białystok plant (phase II) would require the close co-operation of a West European firm (e.g. 4P) which has the know-how and the technical abilities needed for such a project.

Annex III

PAPERS PRESENTED AT VARIOUS MEETINGS

Expert	Type of meeting	Subject	Date	Location	Number of participants
A. C. Poulter	Symposium	The contribution of research and development work to the expansion of the packaging industry	25/7/73	Gliwice	80
G. W. Deakin	Lecture	Establishing criteria of assessment of metal transit packages and information on the organization of a plant laboratory and equipment	26/9/74	Rybnik "Huta Silesia"	40
	Lecture	Modern structures of metal transit packages and rules for the proper choice of manufacturing technology	27/9/74		40
E. Schmidt	Conference	Packages in containerized transport systems and principles of placing, fastening and protection against corrosion of loads in containers	22/8/74	Warsaw	32

Annex IV

FELLOWSHIPS AWARDED

<u>Name</u>	<u>Field of training</u>	<u>Country of study</u>	<u>Starting date</u>	<u>Duration in months</u>
W. Z. Barcicki	Vertical and horizontal packaging systems	United Kingdom	26 Sept. 1974	3
J. Fraćzek	Design and production of metal transport packages	Federal Republic of Germany	9 Jan. 1975	2
K. Głuchowski	Methods of increasing resistance of corrugated fibre-board	Austria	14 Oct. 1974	2
M. G. Golinska	Production and application of combined packaging materials based on plastics	Federal Republic of Germany, Finland	15 Apr. 1975	3
A. Hulpowski	The modern methods of production of packages from foamed polystyrene	Federal Republic of Germany	30 May 1974	3.5
E. M. Kubik	Testing methods of films used for thermoforming	Finland	17 Mar. 1975	3
A. J. Kuzia	Application of polyolefine films	United Kingdom	17 Jan. 1974	3
P. Mackiewicz	Machinery and equipment for mechanization of packaging processes	Federal Republic of Germany	5 Sept. 1974	3.5
A. Nassalski	The shrink films packaging systems	Federal Republic of Germany	30 Jan. 1975	3
B. Rita	The shrink films packaging systems	France, Italy, Sweden	19 Oct. 1974	3
Z. Siedlecki	Assessment of mechanical hazards	Federal Republic of Germany, Sweden		

<u>Name</u>	<u>Field of training</u>	<u>Country of study</u>	<u>Starting date</u>	<u>Duration in months</u>
S. Szczepanski	Programming methods of packaging indus- try development	Federal Republic of Germany	31 Mar. 1974	3
K. M. Zarska	Testing methods for granting the State quality certificates	France	14 Nov. 1974	3
L. Zembko	Auxiliary appliances for mechanization of packaging processes	Federal Republic of Germany, Ausria	3 Feb. 1975	2
R. Bartosiak Z. Kostro J. Lekszycki S. Nowacki R. Ostrowski A. Sołtan	Study tour	Denmark, Federal Republic of Germany, France, Netherlands, United Kingdom	October 1974	

Annex V
EQUIPMENT PROVIDED BY UNDP

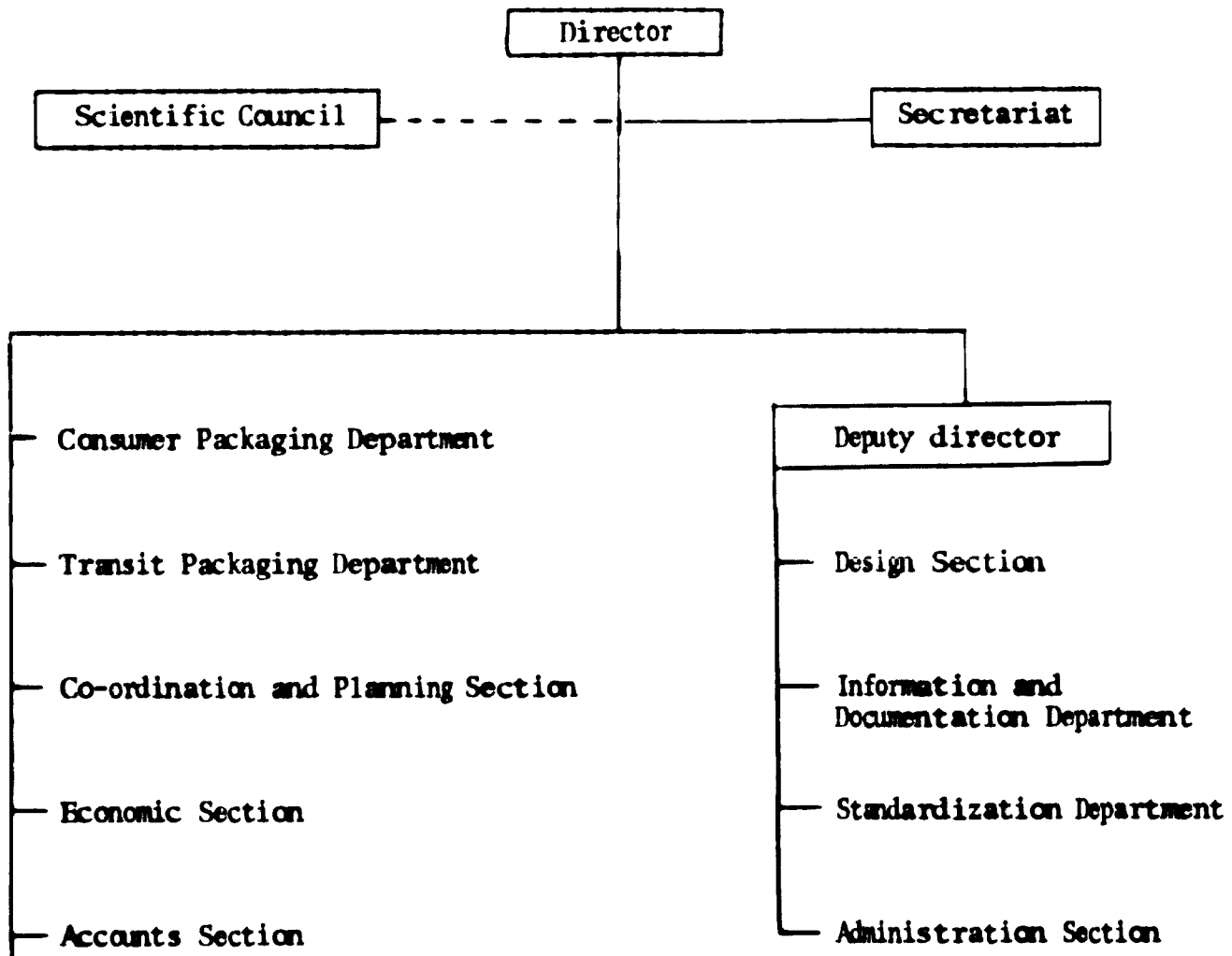
Items	Model and Manufacturer	Cost (dollars)
<u>A. Packaging Research and Development Centre, Warsaw</u>		
Compression tester	Model CT. 10.000 Lorentzen - Wettre, Sweden	25,737
Climatic chamber	Model WF-603-40+200 H Webber Manufacturing, United States	24,310
Weatherometer	Type 600/DMC/MR Atlas, United Kingdom	15,781
Air conditioner	Model 50 BF 006 Transex, Austria	8,440
Elgastat	Type B-224 Atlas	1,078
<u>B. Demonstration plant, Bialystok Packaging systems department</u>		
Horizontal fill, form and seal machine	Flowpack Model 250 Baker Perkins, United Kingdom	22,043
Universal thermoforming machine	Model SB-53b Illig, Federal Republic of Germany	7,239
Roller cutting press	Model ZSM 45 Illig	2,303
Machine for curling blister edges	Model H-Umbli 48 Illig	1,268

Items	Model and manufacturer	Cost (dollars)
Blister sealing machine	Model 1815 'C' Frame Ridat Eng., United Kingdom	1,628
Heat-sealer to cut or perforate	Model Super Sealboy, Karate Audion Electro, Holland	116
Heat-sealer for cutting between double seal	Super Sealboy /SSB 235+2/ Audion Electro	285
Heat-sealer for vacuum sealing pouches	Model FS 67/V/30 Audion Electro	868
Vacuum packaging machine	Model K 3 Komet, Federal Republic of Germany	1,797
Shrink-wrapper with "L" sealer	Model POLYSTAR WS 500 Fische-Herfurth, Federal Republic of Germany	2,347
Sleeve-wrapping machine	Model SPM 600 Fische-Herfurth	2,975
Shrink tunnel	Model ST 600 Fische-Herfurth	2,380
Shrink-wrap equipment with gas radiator	Model Vpa1 - Gas SAT, France	4,158
Heat-sealer for stretchable films	Hand Univer Element F Euram, Italy	85
Opener for plastic film pouches	Model KB 400 Kalfass Verp., Federal Republic of Germany	356

Items	Model and manufacturer	Cost (dollars)
C. <u>Plant laboratory, Białystok</u>		
Precision electronic tensile tester "Instron"	Instron Ltd, United Kingdom	21,932
Elmendorf tearing resistance - plastic films	Model 4-1 Lorentzen - Mettrel	1,097
Pivotable sphere haze meter	Model HG-1200 Gardner Exp. Corp., United States	1,355
Glossmeter for plastic films	Model GG-9095 Gardner Exp. Corp.	1,735
"See through" clarity meter	Model GG-4904, Ux-14 Gardner Exp. Corp.	4,175
Manual and semi-automatic heat seal	Audion Electro Holland	184
Foot-pedal sealer, Super Sealmaster		
Gas permeability of films	Model CS-89 Custom Scient. Instr., United States	985
Electro-static field meter	Model EF 372/59 Davenport, United Kingdom	910
Pogo Extensometer	2603-001 Instron Ltd, United Kingdom	864
Cost of packaging, transportation, installation		158,431 20,918
	Total	179,349

Annex VI

ORGANIZATIONAL STRUCTURE OF PRC



Consumer Packaging Department. Elaboration of testing methods of consumer packages and packaging materials. Defining the usability of flexible packaging materials (mainly plastics) in mechanized packaging production and packaging processes; defining technical requirements for these materials. Work connected with introducing new plastics packaging materials.

Transit Packaging Department. Testing mechanical and climatic hazards during transport and storage. Elaboration of testing methods of transit packages. Testing selected properties of packaging materials. Elaboration of design principles of transit packages and unit loads.

Co-ordination and Planning Section. Initiation of research and development work, resulting from the current needs of industries and PRDC for packaging. Co-ordination of research and development and design work in relation to packaging, packaging materials and packaging methods on a national scale.

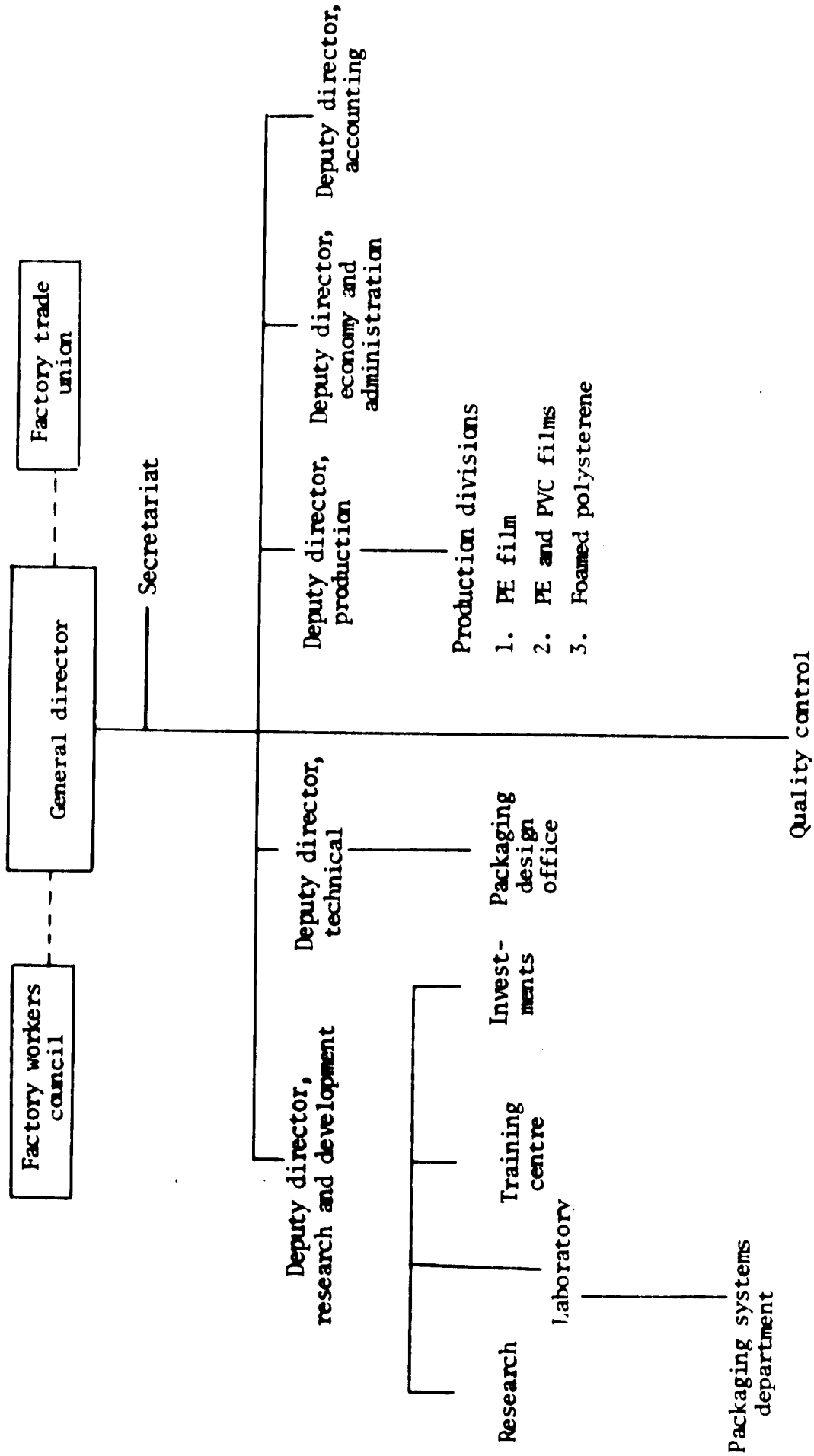
Design Section. Engineering design of packs and packaging systems. Technical advisory service in the selection of materials, construction and packing methods.

Information and Documentation Department. Collecting, elaborating and publishing information in the packaging field based on specialized literature. Popularization of world trends in the technical development of packaging. International co-operation in exchanging scientific, technical and economic information.

Standardization Department. Elaborating and organizing draft standards for classification, terminology, general testing methods, packaging modulus system etc. Giving opinions on draft standards, international draft recommendations and other documents in the field of packaging, packaging materials and goods packaging. Initiating and directing standardization activities.

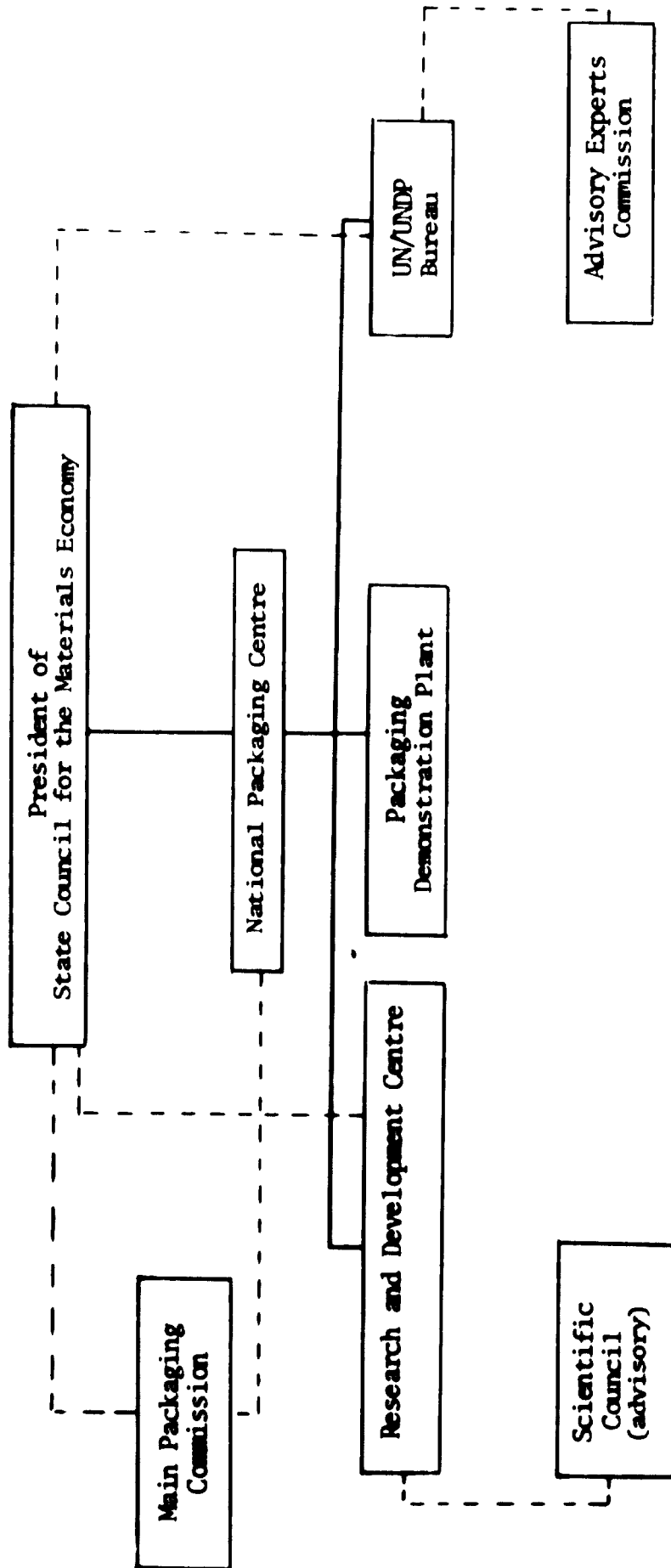
Annex VII

COMPONENTS OF ORGANIZATIONAL STRUCTURE OF THE DEMONSTRATION PLANT WHICH RELATE TO THE PROJECT



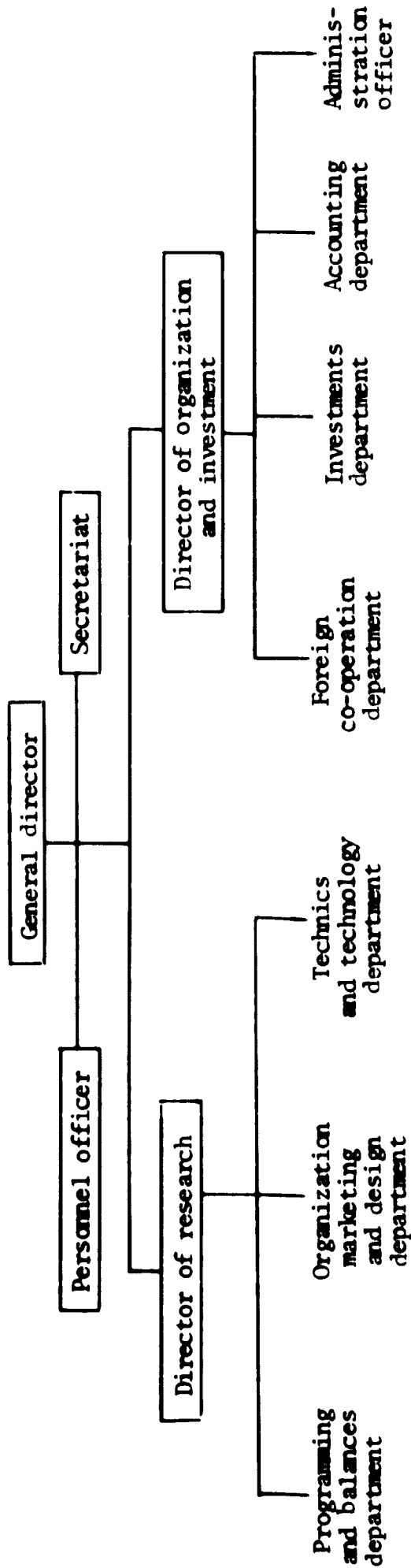
Annex VIII

ORGANIZATIONAL STRUCTURE OF CENTRAL PACKAGING ACTIVITIES



Annex IX

ORGANIZATIONAL STRUCTURE OF NPC



Annex X

UNITED NATIONS DEVELOPMENT PROGRAMME CONTRIBUTION

Project: "Extension of the Polish Packaging Centre" (DP/POL/71/517)

PROJECT PERSONNEL COMPONENT	Total		1973		1974		1975	
	Months	Dollars	Months	Dollars	Months	Dollars	Months	Dollars
Senior expert	10	25,750	7.5	18,750	1	2,500	1.5	4,500
Expert in transport metal packaging	2	5,750	-	-	0.5	1,250	1.5	4,500
Expert in measuring climatic and mechanical hazards	2.5	7,500	-	-	-	-	2.5 ^{a/}	7,500 ^{a/}
Expert in mechanization of packaging processes	3	9,000	-	-	-	-	3	9,000
Staff visits	-	1,250	-	-	-	358	-	892
Component total	17.5	49,250	7.5	18,750	1.5	4,108	8.5	26,392

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TRAINING COMPONENT

(a) Polish Packaging Centre, Headquarters

Production and testing methods of transport plastics packages	3	3,150	-	-	-	-	3	3,150
Assessment of the mechanical hazards in different modes of transport	2	2,200	-	-	2	2,200	-	-

a/ Two months, \$6,000 refer to 1974.

	Total		1973		1974		1975	
	Months	Dollars	Months	Dollars	Months	Dollars	Months	Dollars
Methods of increasing resistance of corrugated fibreboard	2	1,800	-	-	2	1,800	-	-
Shrink-film packaging systems	3	1,800	-	-	-	-	3	1,800
Production and application of polyolefines packaging films	3	1,800	-	-	-	-	3	1,800
Programming methods of packaging industry development	3	2,200	-	-	3	2,200	-	-
Design and production of metal transport packaging	3	1,800	-	-	-	-	3	1,800
Testing methods for granting state quality certificates	3	2,800	-	-	1.5	1,900	1.5	900
(b) <u>Demonstration plant</u>								
Shrink-film packaging systems	3.5	2,525	-	-	3	2,000	0.5	525
Modern methods of production of packages from foamed polystyrene	3	4,437	-	-	3	4,437	-	-
Auxiliary appliances for the mechanization of packaging processes	2	1,200	-	-	-	-	2	1,200

	Total		1973		1974		1975	
	Months	Dollars	Months	Dollars	Months	Dollars	Months	Dollars
Controlling, recording and regulating systems in packaging machines	3.5	2,630	-	-	3.5	2,630	-	-
Systems of packaging in flexible films	3	1,650	-	-	3	1,650	-	-
Group training		5,652	-	-	-	-	-	5,652 ^{b/}
Component total	39.5	37,965	-	-	23.5	21,138	16	16,827
EQUIPMENT COMPONENT								
Non-expendable equipment		179,349	-	-		129,382		49,967
Component total		179,349	-	-		129,382		49,967
MISCELLANEOUS								
Reporting costs		2,000	-	-		-		2,000
Sundry		3,000		90		1,590		1,320
Direct cost		336		336		-		-
Component total		5,336		426		1,590		3,320
Total	57	271,900	7.5	19,176	25	156,218	24.5	96,506

^{b/} Took place in October 1974.

Annex XI

GOVERNMENT COUNTERPART CONTRIBUTION

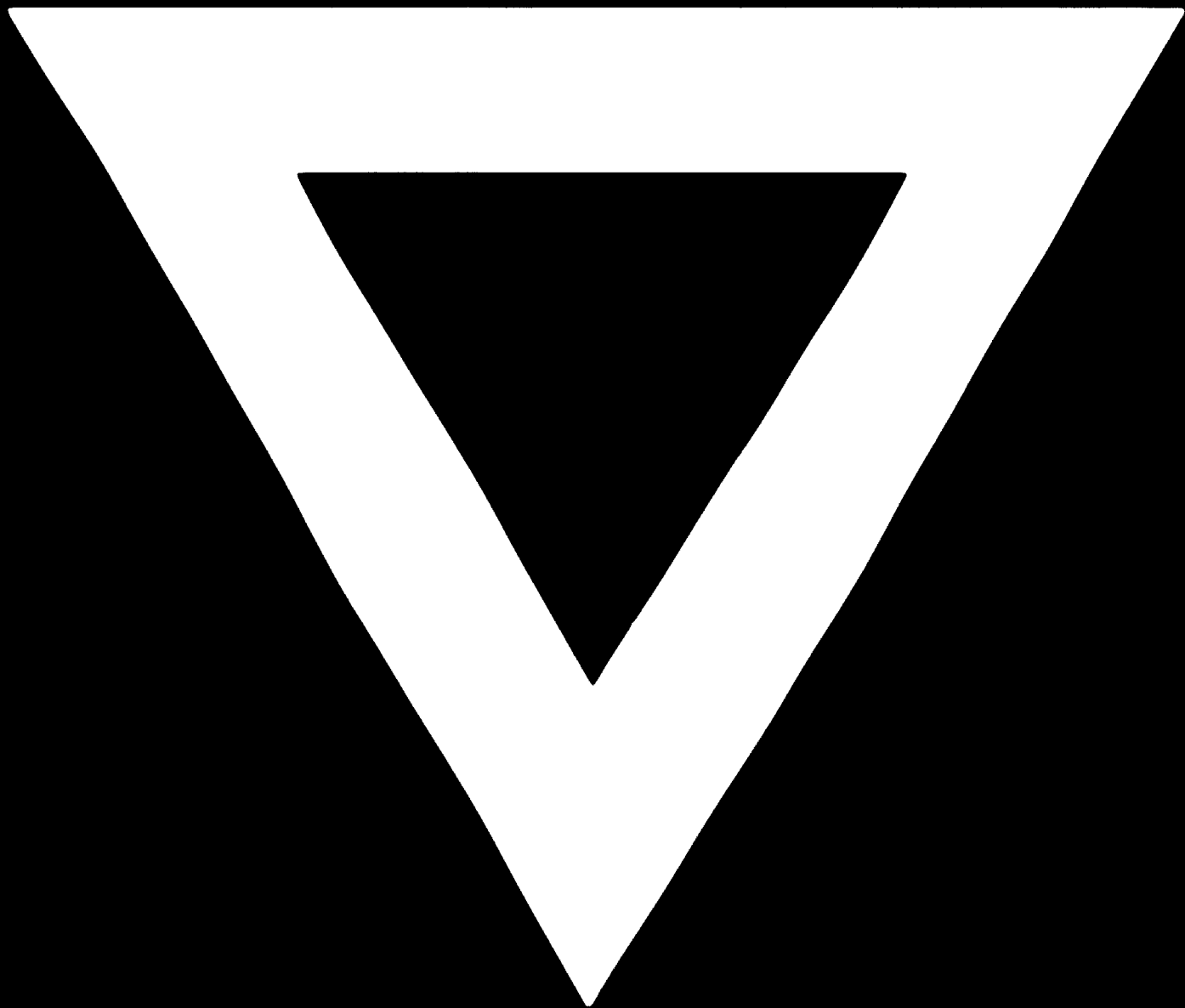
Project: "Extension of the Polish Packaging Centre" (DP/POL/71/517)

PROJECT PERSONNEL COMPONENT	Total		1973		1974		1975	
	Month	Thousand zloty	Month	Thousand zloty	Month	Thousand zloty	Month	Thousand zloty
Counterpart Director	27	216.0	12	96.0	12	96.0	3	24.0
Other staff technicians secretaries administrative, management staff, servicing staff etc.	150	589.6	44	174.3	56	207.5	50	207.8
(a) <u>Packaging Research and Development Centre</u>								
Metal packaging scientist	36	219.6	12	72.0	12	73.2	12	72.4
Metro packaging specialist	9	40.6	-	-	-	-	9	40.6
Climatic hazards specialist	36	209.4	12	68.4	12	68.4	12	72.6
Chemist	36	202.6	12	52.8	12	65.8	12	84.0
Climatic instruments operator	16	41.6	-	-	4	10.4	12	31.2
Combined materials-testing specialist	36	192.4	12	63.9	12	63.9	12	64.6
Combined materials-testing specialist	5	30.0	-	-	-	-	5	30.0
Metrologist	16	80.0	-	-	4	20.0	12	60.0

	Total		1973		1974		1975	
	Month	Thousand zloty	Month	Thousand zloty	Month	Thousand zloty	Month	Thousand zloty
<u>(b) Demonstration plant, packaging system department</u>								
Director	36	228.0	12	76.0	12	76.0	12	76.0
Chief	12	69.0	-	-	-	-	12	69.0
Technologist	16	54.4	-	-	4	13.6	12	40.8
Technologist	9	33.3	-	-	-	-	9	33.3
Technologist	4	8.4	-	-	-	-	4	8.4
Mechanical engineer	8	27.2	-	-	-	-	8	27.2
Mechanical engineer	8	24.8	-	-	-	-	8	24.8
Economist	7	21.7	-	-	-	-	7	21.7
Equipment operator	3	7.9	-	-	-	-	3	7.9
Equipment operator	3	5.4	-	-	-	-	3	5.4
<u>(c) Plant laboratory</u>								
Chief	7	44.8	-	-	-	-	7	44.8
Physical testing assistant	7	19.6	-	-	-	-	7	19.6
Chemical testing assistant	9	30.6	-	-	-	-	9	30.6
Laboratory staff	3	7.6	-	-	-	-	3	7.6
Laboratory staff	7	19.6	-	-	-	-	7	19.6
Laboratory staff	5	12.5	-	-	-	-	5	12.5
Laboratory staff	5	9.5	-	-	-	-	5	9.5
Laboratory staff	4	5.9	-	-	-	-	4	5.9
Laboratory staff	8	16.9	-	-	-	-	8	16.9
Component total	528	2,468.9	116	603.4	140	694.8	272	1,170.7

	Total		1973		1974		1975	
	<u>Month</u>	<u>Thousand zloty</u>	<u>Month</u>	<u>Thousand zloty</u>	<u>Month</u>	<u>Thousand zloty</u>	<u>Month</u>	<u>Thousand zloty</u>
EQUIPMENT COMPONENT								
Expendable equipment		140.0	-	45.0		95.0		
Non-expendable equipment		166,906.0	750.0	2,886.9		163,269.1		
Premises		178,848.0	20,906.7	44,370.7				
Component total		345,894.0	21,656.7	47,302.6		276,934.7		
MISCELLANEOUS								
Operation and maintenance of equipment		120.0	-	30.0		90.0		
Component total		120.0	-	30.0		90.0		
Total		348,482.9	22,260.1	48,027.4		278,195.4		

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